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GOVERNOR JEFF COLYER, M.D.
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GROUNDWATER MANAGEMENT DISTRICT NO 2
% TIM BOESE
313 SPRUCE ST
HALSTEAD KS 67056-1925

City of Wichita
Director of Public Works & Utilities
City Hall Eighth Floor
455 N Main
Wichita, KS 67202-1606

Re: City of Wichita ASR Project
New Applications, File Nos. 48,704 through 48,733 and proposed modified Phase II approval

Dear Mr. Boese and Mr. King,

On March 12, 2018, the City of Wichita (City) transmitted its proposal, prepared by Burns & McDonnell Engineering Company, Inc., entitled "ASR Permit Modification Proposal Revised Minimum Index Levels & Aquifer Maintenance Credits", for Equus Beds Groundwater Management District No. 2 (GMD 2) to review. The proposal requests, and provides the City's analysis to support, revisions to the City's Phase II ASR project. The Phase I order is not proposed to be modified.

The principal requested changes are to: 1) lower the minimum index levels used to determine when the City can withdraw its recharge credits, and 2) to support a new type of recharge credit from project operations, Aquifer Maintenance Credits, including specific accounting methods, terms and conditions associated with such credits. Existing physical recharge credits, (PRCs) will be developed and accounted for pursuant to the existing methods.

The City considers the proposal complete. In my letter of September 18, 2017, I outlined a process and timetable for review of the proposal, starting with sending the package to GMD 2 for review, posting proposal-related documents on DWR's web site, public notice, and a hearing within 45 days of receipt of the City's proposal.

The City's proposal and supporting documents, as well as the pending new applications, have been posted on KDA's website.

To facilitate review of the proposal, and based on our understanding of the City's proposal, we have developed a **draft** set of proposed approval documents for initial review. **Please note these are draft and no decision has been made.** We have indicated sections that can only be completed after receiving input at hearing and GMD 2's recommendations later in the process. This letter and these documents will also be posted on our web site for the public's review.

To ensure that the package for the hearing is as complete as possible, we are providing an initial review period to allow GMD 2 to review the City's proposal as well as allowing both GMD 2 and the City to review KDA's draft proposed conditions.

Please provide any initial review comments including any recommended terms and conditions related to the City's proposal and KDA's draft proposed approval documents by April 27. Please note that this is not a formal request for GMD 2's recommendation; that will come during the formal review.

Both the City and KDA will review these initial review comments to determine if there should be any change to the City's proposal or to KDA's draft approval documents prior to the hearing. Again, this initial review will not limit GMD 2's ability to provide its comments and recommendations during the formal review to follow.

In the meantime, KDA will be working toward a public hearing date in late May and will initiate public notice. I will reach out to you in the next two weeks to obtain your suggestions on a specific date and location for the hearing.

Attached please find the following drafts for initial review:

- 1) a draft proposed replacement to the existing Phase II ASR project approval,
- 2) an example of proposed permit conditions for one of the above referenced new applications, and
- 3) and an example of a findings and order amending one of the individual approvals of the existing Phase II permits.

In addition to the attached drafts, below is a summary of our proposed additional permit conditions.

KDA-DWR's will determine if the pending applications comply with applicable rules and regulations, and ensure that if approved, the applications will neither impair existing water rights nor prejudicially or unreasonably affect the public interest. If these applications are approved, they will contain multiple conditions designed to ensure that physical aquifer recharge will continue to occur when aquifer conditions are acceptable, and facilitate the Equus Beds Wellfield being managed at near full conditions.

Built on the established conditions for the current ASR appropriations, the draft proposed permit conditions include, but are not limited to the following proposed modifications and additions:

1. That the locations of the index wells and the index water levels for the basin storage area ("BSA") shall remain as set forth in Attachments 3 and 4 to the Original Order, In the Matter of the City of Wichita's Applications to Operate an Aquifer Storage and Recovery Project in Harvey and Sedgwick Counties, Kansas dated August 8, 2005, except for proposed lower index cell levels in the Phase II ASR Findings and Order _____ 2018 (see Table 2-11: Proposed ASR Minimum Index Levels in the City's proposal "ASR Permit Modification Proposal Revised Minimum Index Levels & Aquifer Maintenance Credits").
2. That AMCs will be assigned to index cells annually through the following accounting methodology, unless otherwise modified by formal written approval of the Chief Engineer.
 - AMCs will be assigned by dividing the total volume of water diverted from the Little Arkansas River to the City's Main Water Treatment Plant by the total number of points of diversion within the Equus Beds Wellfield in service that year (excluding Phase I recharge and recovery infrastructure). This will ensure equal AMC distribution across the active production wells, which could have pumped water from the aquifer.
 - A one-time, five percent (5%) initial loss will be deducted from the total number of AMCs applied in each index cell. This initial loss accounts for losses to the aquifer inherent in the injection and recovery process.
 - In addition, a gradational, recurring loss to AMC's as provided in Figure 15 of the City's proposal would be applied annually across the BSA to account for the migration of recharge credits and losses from the BSA illustrated by the model and historic data. Generally, index cells on the west side would have a one percent (1%) loss, index cells in the central area a three percent (3%) loss, and index cells on the east side a five percent (5%) loss. These losses would be taken from the cumulative total beginning the year after the water is recharged, as they represent losses to migration that occur during the year.
3. As is provided for with respect to the accounting for physical recharge credits, that if the City develops an improved model or methodology to account for AMCs that is approved by the Chief Engineer after consideration of the recommendation by GMD 2, that the Chief Engineer may approve such improved methodology without the necessity of holding additional public hearings.

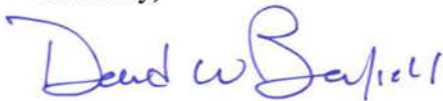
4. That the AMC's may be accumulated only when index cell water levels are at elevations that limit physical recharge into the basin storage area as provided in the ASR's operating plan. AMC accumulation rate is dependent on the quantity of water and rate of diversion authorized under Appropriation of Water, File No. 46,627, which is authorized 14,738.24 million gallons per year at a diversion rate of 41,667 gallons per minute.
5. That physical recharge activities will continue to occur when there is adequate recharge capacity within the aquifer.
6. That AMCs may be withdrawn from a cell only when AMC's are determined to be available from that cell and the static water level at its index well is at or above the established minimum index level as measured in January of that year.
7. That the total accumulation of recharge credits through physical recharge (PRCs) and AMCs combined cannot exceed 120,000 acre-feet, which represents the estimated storage available within the ASR project area during 1993.
8. That the City in its June 1 reporting each year, shall also report an accounting of water diverted from the ASR Phase II surface water intake and sent directly to the City's Main Water Treatment Plant; that the Report shall be submitted to the Chief Engineer and GMD 2. The accounting shall use the accounting methodology described herein.
9. That the final determination of available AMCs in each cell in the basin storage area shall be made by the Chief Engineer, upon consideration of the required annual report, and any recommendation by GMD 2. The Chief Engineer shall make the final determination in writing.
10. That each AMC diversion well shall be equipped with a water flow meter, meeting the requirements of K.A.R. 5-22-4, to separately and accurately record the total quantity of water diverted from the aquifer and counted as an AMC.
11. That the available quantity of AMCs for each index cell would be the cumulative total of AMCs accumulated during previous years, minus any recovered quantity of AMCs from the index cell, and annual losses.
12. That recovery of AMCs, similar to PRCs, will be measured as the metered recovery of a recharge credit from an authorized point of diversion.
13. That the City will develop an annual ASR Operations Plan that will be used to evaluate groundwater levels in the wellfield and the aquifer's physical recharge capacity. This information will determine when AMCs can be accumulated. The Operations Plan calculations will be based on the following parameters:
 - Static Groundwater Elevations
 - Maximum Groundwater Elevations
 - Sustainable Specific Injectivity
 - Maximum Calculated Sustainable Recharge Rate
 - Maximum Well Infrastructure Recharge Rate
 - Maximum Well Infrastructure Recharge Rate
14. That the ASR Operations Plan shall be submitted to the Chief Engineer and GMD 2 for review within 60 days of approval of the new Phase II applications.
15. That surface water intake quantities and direct municipal supply quantities shall be reported by the City to the Chief Engineer and GMD 2 as follows:
 - a. Each month for the first year of operation;
 - b. Each calendar quarter for the second year of operation;

- c. By March 1 each year thereafter; or
 - d. Other intervals as may be required by the Chief Engineer to properly evaluate the project.
16. That if water quality in a nearby, existing domestic well meets the current drinking water standards and the water quality is subsequently changed by the ASR project such that the water no longer meets the current drinking water standards, the City will provide and install a home water treatment system to bring the water back to drinking water standards or provide other appropriate remedies to replace the domestic water supply with water that meets the drinking water standard without additional cost to the resident.
17. That if a domestic water well, existing before the filing of these applications for permit, and within 660 feet of an existing or new ASR well, is adversely impacted by drawdown from such well, the City will re-drill or take other appropriate, affirmative action to restore productivity of such domestic well to the same rate and quality as existed before.

In drafting our proposed approval documents, we note that it appears that the City's proposal does not fully address necessary reporting when taking recharge credits – how and with what frequency the City will report on the source of diverted water: native, PRCs, and/or AMCs.

If you wish to discuss these specific conditions, please contact me. I would be happy to meet again with the Board to discuss these matters.

Sincerely,

A handwritten signature in blue ink that reads "David W. Barfield". The signature is written in a cursive style with a large initial "D".

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

Initial Draft for review, March 22, 2018
Proposed Replacement F &O for
ASR Phase II

Findings and Order
In the Matter of the City of Wichita's Phase II
Aquifer Storage and Recovery Project in
Harvey and Sedgwick Counties, Kansas

Findings

1. That in a Findings, Conclusion and Order dated August 8, 2005, on file in the office of the Chief Engineer, In the Matter of the City of Wichita's Applications To Operate an Aquifer Storage and Recovery Project in Harvey and Sedgwick Counties, Kansas ("Original Order"), the Chief Engineer approved Appropriation of Water, File Nos. 45,567, 45,568, 45,569, 45,570, 45,571, 45,572, 45,573, 45,574, 45,575, 45,576, and 46,081 proposing the appropriation of water for beneficial use.
2. That the Order had 24 Conditions including, but not limited to designation of the basin storage area and index cells for the project area, locations of the index wells, approved model and accounting methodology, and reporting requirements.
3. That in a Findings and Order dated August 1, 2006, ("Modified Order"), the Chief Engineer modified the Original Order approving Appropriation of Water, File Nos. 45,567, 45,568, 45,569, 45,570, 45,571, 45,572, 45,573, 45,574, 45,575, 45,576, and 46,081, specifically permit Condition Nos. 9, 12, 14, 17, 20, and 23, pertinent to bank storage wells.
4. That on September 18, 2009, the Chief Engineer issued a Findings and Order approving Appropriation of Water, File Nos. 46,627; 46,714; 46,715; 46,716; 46,717; 46,718; 46,719; 46,720; 46,721; 46,722; 46,723; 46,724; 46,725; 46,726; 46,727; 46,728; 46,729; 46,730; 46,731; 46,732; 46,733; 47,178; 47,179; 47,180; and 47,181.
5. That in a Findings and Order dated December 21, 2009, the Chief Engineer modified the original Order and Modified Order, to be referred to as the "City of Wichita's Aquifer Storage and Recovery Project in Harvey and Sedgwick Counties, Kansas", without referencing specific file numbers in the title of the Orders; and Condition No. 23 of the Modified Order was revised to allow the project review to extend through 2010.
6. That on September 28, 2010, the Chief Engineer issued a Findings and Order approving Appropriation of Water, File Nos. 47,440; 47,448; 47,449; 47,450; 47,451; 47,452; and 47,453, proposing the appropriation of groundwater (recharge credits) for municipal use.
7. That on July 23, 2013, the City of Wichita (City) filed Applications, File Nos. 48,704; 48,705; 48,706; 48,707; 48,708; 48,709; 48,710; 48,711; 48,712; 48,713; 48,714; 48,715; 48,716; 48,717; 48,718; 48,719; 48,720; 48,721; 48,722; 48,723; 48,724; 48,725; 48,726; 48,727; 48,728; 48,729; 48,730; 48,731; 48,732; and 48,733, proposing the appropriation of groundwater (recharge credits) for municipal use.
8. That these new applications represent merely a continuance of Phase II of the Aquifer Storage and Recovery (ASR) project, wherein surface water will be diverted from the Little Arkansas River by

means of a surface water intake (authorized under Appropriation of Water, File No. 46,627), treated, and injected into the Equus Beds Aquifer, to be later withdrawn by means of the same aquifer storage and recovery wells for municipal purposes.

9. That aquifer storage and recovery means the artificial recharge, storage and recovery of water and consists of apparatus for diversion, treatment, recharge, storage, extraction and distribution of water.
10. That the City and Equus Beds Groundwater Management District No. 2 (GMD #2) entered into a Memorandum of Understanding (M.O.U.), dated December 3, 2008, documenting the agreements made between the City and GMD #2, as to the proposed permitting, construction, and operation of Phase II of the aquifer storage and recovery project, a copy of which was subsequently received in the office of the Chief Engineer, Division of Water Resources, Kansas Department of Agriculture (DWR) on January 20, 2009.
11. That as referenced by GMD #2 in their recommendation of approval, and to maintain consistency with the Phase I ASR project, the new applications shall be subject to the pertinent conditions established in the “Original Order”, and as modified by the August 1, 2006 (“Modified Order”), more specifically identified as follows:
 - A. That passive recharge credits shall not be allowed.
 - B. That the basin storage area and index cells for the project are as set forth in Attachment 2 to the Original Order.
 - C. That the locations of the index wells and the index water levels for the basin storage area shall be as set forth in Attachments 3 and 4 to the Original Order.
 - D. That the Model and accounting methodology remains as previously submitted, until otherwise modified by formal written approval of the Chief Engineer.
 - E. That if the City develops an improved model or methodology to account for water stored in the basin storage area that is approved by the Chief Engineer after consideration of the recommendation of the GMD #2, that the Chief Engineer may approve such improved methodology without the necessity of holding additional public hearings.
 - F. That the project shall be operated so that the measured water levels, and the water levels predicted by the Model, stay at or below the highest index water level any time water is being recharged into the basin storage area
 - G. 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 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.
 - H. That the City by June 1 each year shall report an accounting of water diverted from the surface water intake and recharged into the basin storage area in the Equus Beds Aquifer; that the Report shall be submitted to the Chief Engineer and GMD #2. The accounting shall use the Model and the accounting methodology described herein.

In addition, the accounting reports shall meet the requirements of K.A.R. 5-12-2, including specifically addressing the following items for each cell in the basin storage area:

- Natural and artificial recharge;
- Groundwater inflow and outflow;
- Evaporation and transpiration;
- Groundwater water diversions from all non-domestic wells;
- Infiltration from streams;
- Groundwater discharge to streams; and
- The calculated recharge credits.

That the final determination of available recharge credits in each cell in the basin storage area shall be made by the Chief Engineer, upon consideration of the report required in Paragraph H, above, and any recommendation by GMD #2. The Chief Engineer shall make the final determination in writing.

- I. That each ASR well shall be equipped with water flow meters, meeting the requirements of K.A.R. 5-22-4, to separately and accurately record the total quantity of water injected into and diverted by each well.
- J. That the source water used for artificial recharge shall not degrade the ambient groundwater quality use in the basin storage area, and shall comply with source water definition in K.A.R, 5-1-1; that the monitoring well network shown in Attachment 1 of this order is hereby approved; that the monitoring wells shall be drilled and completed at depths correlating to the recharge and recovery zone of the aquifer for the ASR wells for water sample collection, water level measurements and testing purposes; that the water level monitoring at any ASR well site shall be automated with a frequency not to exceed six hours; that before installation of any ASR well, the City shall submit a plan that includes water level monitoring as well as water quality monitoring to establish baseline ambient groundwater quality, which is sufficient to prevent impairment of the water quality beyond a reasonable economic limit, to GMD #2 for review and comment and the Chief Engineer for approval; that the plan should also be consistent with any requirement which KDHE may impose for any UIC permits KDHE may issue pertaining to the ASR wells.
- K. That surface water intake quantities, aquifer injection quantities and water level data shall be reported by the City to the Chief Engineer and GMD #2 as follows:
 - Each month for the first year of operation;
 - Each calendar quarter for the second year of operation;
 - By March 1 each year thereafter; or
 - Other intervals as may be required by the Chief Engineer to properly evaluate the project.
- L. That on or before June 1, of each calendar year, the City shall submit to the Chief Engineer and GMD #2, an annual accounting report for water in the basin storage area, utilizing the Model; that shall meet the requirements of K.A.R. 5-12-2.
- M. That the City of Wichita shall simultaneously submit to the Chief Engineer and GMD #2 a formal report containing a description and scaled map of the as-built aquifer storage and recovery project.

12. That the GMD #2 Board of Directors have reviewed each of the new applications listed above and recommended them for approval, subject to specific conditions. [Must get GMD 2 review].
13. That use of the proposed ASR wells be authorized by the Kansas Department of Health and Environment (KDHE) as Class V Underground Injection Control (UIC) wells and that minimum water quality standards for effluent be approved by KDHE for organic and inorganic compounds, pesticides and bacteria; that the water recharged into the aquifer through the ASR wells comply with the source water definition in K.A.R. 5-1-1.
14. That GMD #2 recommends in order to establish baseline ambient groundwater quality prior to recharge, water quality analyses shall be completed at the applicant's expense for sample collected from: a) domestic wells for which access can be obtained located within and immediately adjacent to each index cell in which recharge will occur, b) the proposed ASR wells, and c) all monitoring wells located in the index cells in which recharge will occur.
15. That there have been two previous public hearings concerning the ASR project, with the most recent held on April 29, 2009. The proposed wells described in these pending applications were depicted on a site map distributed to all who attended the meeting. In addition, there have been many other discussions and meetings with area landowners and well owners. [Modify after next hearing]
16. That the proposed applications represent only a continuance of the ASR Phase II project and the applications will be subject to the same permit conditions and limitations established for the previous files, and as modified herein.
17. That the City has conducted extensive modeling and data analysis to indicate that during a prolong drought, groundwater elevations would drop below the current minimum index levels. This would prevent the City from withdrawing recharge credits when they are most needed.
18. That the City has proposed alternative minimum index levels, which on average are approximately 12.8 feet lower than current levels. Even at these levels, the aquifer will remain 80 percent full on average across the well field.
19. That based on this data and analysis, it is proposed that the minimum index level elevations be modified as shown in Table 1, in Attachment 31.
20. That this modification in minimum index level elevations will not prejudicially or unreasonably affect the public interest, and no senior rights will be impaired.
21. That the City of Wichita currently has multiple appropriations of water related to their Aquifer Storage and Recovery Project in Harvey and Sedgwick Counties, Kansas. The Aquifer Storage and Recovery (ASR) project diverts surface water from the Little Arkansas River by means of a surface water intake (authorized under Appropriation of Water, File No. 46,627). The surface water is treated and injected into the Equus Beds Aquifer, to be later withdrawn by means of the same aquifer storage and recovery wells for municipal purposes.
22. That currently the City can only accumulate recharge credits by physically recharging treated groundwater into the aquifer. Physical recharging of the aquifer is severely limited during periods of elevated groundwater levels. The Equus Beds Wellfield has recovered to nearly 100 percent full (pre-development conditions) in large part due to the City's reduced use from their Equus Beds

Wellfield and increased use from Cheney Reservoir (USGS Scientific Investigations Report 2015-5042).

23. That physical recharge activities will continue to occur when there is adequate recharge capacity within the aquifer.
24. That the City is proposing an alternative procedure for establishing recharge credits during the periods when physical recharge of the aquifer is not feasible. Surface water from the existing Little Arkansas River ASR diversion works would be sent directly to the City's Main Water Treatment Plant and used for municipal supply. This water would offset diversions from the Equus Beds Wellfield, and allow the aquifer to remain at high levels.
25. That the City has submitted their proposal entitled "ASR Permit Modification Proposal Revised Minimum Index Levels & Aquifer Maintenance Credits". The proposal contains accounting methods for Aquifer Maintenance Credits.
26. That water left in the Equus Beds Wellfield as a result of using surface water directly would be considered as an ASR Aquifer Maintenance Credit (AMC), subject to a number of additional limitations referenced herein. The AMC accumulation rate is dependent on the quantity of water and rate of diversion authorized under Appropriation of Water, File No. 46,627, which is authorized 14,738.24 million gallons per year at a diversion rate of 41,667 gallons per minute.
27. That the total accumulation of physical recharge credits (PRCs) and AMCs combined cannot exceed 120,000 acre-feet, which represents the estimated storage available within the ASR project area during 1993.
28. That AMCs will be assigned to index cells annually through the following accounting methodology:
 - AMCs will be assigned by dividing the total volume of water diverted from the Little Arkansas River ASR diversion works to the City's Main Water Treatment Plant by the total number of points of diversion within the Equus Beds Wellfield in service that year (excluding Phase I recharge and recovery infrastructure). This will ensure equal AMC distribution across the active production wells, which could have pumped water from the aquifer.
 - A one-time, five percent (5%) initial loss will be deducted from the total number of AMCs applied in each index cell. This initial loss accounts for losses to the aquifer inherent in the injection and recovery process.
 - The gradational recurring loss would be applied across the BSA to account for the migration of recharge credits and losses from the BSA illustrated by the model and historic data. Generally, index cells on the west side would have a one percent (1%) loss, index cells in the central area a three percent (3%) loss, and index cells on the east side a five percent (5%) loss. These losses would be taken from the cumulative total beginning the year after the water is recharged, as they represent losses to migration that occur during the year (see Figure 15 – AMC Recurring Annual Credit Loss Percentage by Index Cell in the City's ASR Permit Modification Proposal).
29. That loss rates of five percent (5%) initially and one to five percent (1-5%) annually are supported by the historic accounting process modeling, the drought modeling efforts, and the hydrogeological characteristics of the aquifer.
30. That the available quantity of AMCs for each index cell would be the cumulative total of AMCs accumulated during previous years, minus any recovered quantity of AMCs from the index cell, and annual losses.

31. That recovery of AMCs, similar to PRCs, will be measured as the metered recovery of a recharge credit from an authorized point of diversion. The recharge credits will be available for recovery when water levels within their individual index cell is above the established minimum index level as measured in January of that year.
32. That the City will develop an annual ASR Operations Plan that will be used to evaluate groundwater levels in the wellfield and the aquifer's physical recharge capacity. This information will determine when AMCs can be accumulated. The Operations Plan calculations will be based on the following parameters:
 - Static Groundwater Elevations
 - Maximum Groundwater Elevations
 - Sustainable Specific Injectivity
 - Maximum Calculated Sustainable Recharge Rate
 - Maximum Well Infrastructure Recharge Rate
 - Maximum Well Infrastructure Recharge Rate
33. That AMCs are not passive recharge credits because they are using existing ASR infrastructure and require the active diversion and treatment of surface water in order to gain credits, and are subject to the rate and quantity limitations of the permit(s).

Order

NOW, THEREFORE, the following are the decisions of the Chief Engineer:

1. That applications to appropriate water for beneficial use, under File Nos. 48,704; 48,705; 48,706; 48,707; 48,708; 48,709; 48,710; 48,711; 48,712; 48,713; 48,714; 48,715; 48,716; 48,717; 48,718; 48,719; 48,720; 48,721; 48,722; 48,723; 48,724; 48,725; 48,726; 48,727; 48,728; 48,729; 48,730; 48,731; 48,732; and 48,733, shall be and are hereby approved, as set out in Attachments 1 through 30, and the City's existing appropriations of water as listed above in Findings Nos. 4 and 6, are hereby made part of this Order.
2. That passive recharge credits shall not be allowed.
3. That the basin storage area and index cells for the project are as set forth in Attachment 2 to the Original Order, In the Matter of the City of Wichita's Applications To Operate an Aquifer Storage and Recovery Project in Harvey and Sedgwick Counties, Kansas dated August 8, 2005.
4. That the locations of the index wells for the basin storage area shall be as set forth in Attachment 3 to the Original Order, In the Matter of the City of Wichita's Applications To Operate an Aquifer Storage and Recovery Project in Harvey and Sedgwick Counties, Kansas dated August 8, 2005.
5. That the index cell water levels for the basin storage area as set forth in the Original Order dated August 8, 2005 and August 1, 2006, ("Modified Order"), Attachment 4, shall be modified as set forth in this Order dated _____ 2018, as described in Table 1, Attachment 31.
6. That the Model and accounting methodology remains as previously submitted for physical recharge credits, until otherwise modified by formal written approval of the Chief Engineer.
7. That if the City develops an improved model or methodology to account for water stored in the basin storage area that is approved by the Chief Engineer after consideration of the recommendation of

the GMD #2, that the Chief Engineer may approve such improved methodology without the necessity of holding additional public hearings.

8. That the project shall be operated so that the measured water levels, and the water levels predicted by the Model, stay at or below the highest index water level any time water is being recharged into the basin storage area.
9. 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. This condition must be maintained until such time that the applicant can demonstrate that allowing recharge water to exceed this level would be in the public interest. If the applicant can document that an alternative (shallower) water level would be protective of the public interest, the applicant may petition the Chief Engineer to modify or remove this requirement. That recharge credits may be withdrawn from a cell only when recharge credits are determined to be 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.
10. That the City by June 1 each year shall report an accounting of water diverted from the surface water intake and recharged into the basin storage area in the Equus Beds Aquifer; that the Report shall be submitted to the Chief Engineer and GMD #2. The accounting shall use the Model and the accounting methodology described herein.

In addition, the accounting report shall meet the requirements of K.A.R. 5-12-2, including specifically addressing the following items for each cell in the basin storage area:

- a. Natural and artificial recharge;
 - b. Groundwater inflow and outflow;
 - c. Evaporation and transpiration;
 - d. Groundwater water diversions from all non-domestic wells;
 - e. Infiltration from streams;
 - f. Groundwater discharge to streams; and
 - g. The calculated recharge credits.
11. That the final determination of available recharge credits in each cell in the basin storage area shall be made by the Chief Engineer, upon consideration of the report required in Paragraph No. 10, above, and any recommendation by GMD #2. The Chief Engineer shall make the final determination in writing.
 12. That each ASR well shall be equipped with water flow meters, meeting the requirements of K.A.R. 5-22-4, to separately and accurately record the total quantity of water injected into and diverted by each well.
 13. That the source water used for artificial recharge shall not degrade the ambient groundwater use in the basin storage area, and shall comply with the source water definition in K.A.R. 5-1-1; that the water level monitoring at any ASR well site shall be automated with a frequency not to exceed six hours; that before operation of the proposed ASR wells, the City shall submit an operation plan that includes water level monitoring as well as water quality monitoring to establish baseline ambient groundwater quality, and which is sufficient to prevent impairment of the water quality beyond a reasonable economic limit to GMD #2 for review and comment, and the Chief Engineer for approval; that the plan should also be consistent with any requirements which KDHE may impose for any UIC permits KDHE may issue pertaining to the ASR wells.

14. That surface water intake quantities, aquifer injection quantities and water level data shall be reported by the City to the Chief Engineer and GMD #2 as follows:
 - a. Each month for the first year of operation;
 - b. Each calendar quarter for the second year of operation;
 - c. By March 1 each year thereafter; or
 - d. Other intervals as may be required by the Chief Engineer to properly evaluate the project.
15. That on or before June 1, of each calendar year, the City shall file an annual report with GMD #2, that shall contain the water balance in the basin storage area, and any additional information specified in K.A.R. 5-22-10.
16. That AMCs will be assigned to index cells annually through the following accounting methodology:
 - AMCs will be assigned by dividing the total volume of water diverted from the Little Arkansas River to the City's Main Water Treatment Plant by the total number of points of diversion within the Equus Beds Wellfield in service that year (excluding Phase I recharge and recovery infrastructure). This will ensure equal AMC distribution across the active production wells, which could have pumped water from the aquifer.
 - A one-time, five percent (5%) initial loss will be deducted from the total number of AMCs applied in each index cell. This initial loss accounts for losses to the aquifer inherent in the injection and recovery process.
 - The gradational recurring loss would be applied across the BSA to account for the migration of recharge credits and losses from the BSA illustrated by the model and historic data. Generally, index cells on the west side would have a one percent (1%) loss, index cells in the central area a three percent (3%) loss, and index cells on the east side a five percent (5%) loss. These losses would be taken from the cumulative total beginning the year after the water is recharged, as they represent losses to migration that occur during the year.
17. That if the City develops an improved model or methodology to account for AMCs that is approved by the Chief Engineer after consideration of the recommendation of the GMD #2, that the Chief Engineer may approve such improved methodology without the necessity of holding additional public hearings.
18. That the AMC project shall be operated when index cell water levels are at elevations that limit physical recharge into the basin storage area.
19. That AMCs may be withdrawn from a cell only when recharge credits are determined to be available from the cell and the static water level at its index well is at or above the lowest index level.
20. That the City by June 1 each year shall report an accounting of water diverted from the ASR surface water intake and sent directly to the City's Main Water Treatment Plant. The report shall include the available quantity of AMCs for each index cell, based on the AMCs accumulated during previous years, minus any recovered quantity of AMCs from the index cells, and annual losses. The report shall be submitted to the Chief Engineer and GMD #2. The accounting shall use the accounting methodology described herein.

21. That the final determination of available AMCs in each cell in the basin storage area shall be made by the Chief Engineer, upon consideration of the required annual report, and any recommendation by GMD #2. The Chief Engineer shall make the final determination in writing.
22. That each AMC diversion well shall be equipped with a water flow meter, meeting the requirements of K.A.R. 5-22-4, to separately and accurately record the total quantity of water diverted from the aquifer and counted as an AMC.
23. That surface water intake quantities and direct municipal supply quantities shall be reported by the City to the Chief Engineer and GMD #2 as follows:
 - Each month for the first year of operation;
 - Each calendar quarter for the second year of operation;
 - By March 1 each year thereafter; or
 - Other intervals as may be required by the Chief Engineer to properly evaluate the project.
24. That the City's proposal entitled "ASR Permit Modification Proposal Revised Minimum Index Levels & Aquifer Maintenance Credits", is adopted by reference.

List of Attachments to Order

1. Approval of Application and Permit to Proceed, File No. 48,704
2. Approval of Application and Permit to Proceed, File No. 48,705
3. Approval of Application and Permit to Proceed, File No. 48,706
4. Approval of Application and Permit to Proceed, File No. 48,707
5. Approval of Application and Permit to Proceed, File No. 48,708
6. Approval of Application and Permit to Proceed, File No. 48,709
7. Approval of Application and Permit to Proceed, File No. 48,710
8. Approval of Application and Permit to Proceed, File No. 48,711
9. Approval of Application and Permit to Proceed, File No. 48,712
10. Approval of Application and Permit to Proceed, File No. 48,713
11. Approval of Application and Permit to Proceed, File No. 48,714
12. Approval of Application and Permit to Proceed, File No. 48,715
13. Approval of Application and Permit to Proceed, File No. 48,716
14. Approval of Application and Permit to Proceed, File No. 48,717
15. Approval of Application and Permit to Proceed, File No. 48,718
16. Approval of Application and Permit to Proceed, File No. 48,719
17. Approval of Application and Permit to Proceed, File No. 48,720
18. Approval of Application and Permit to Proceed, File No. 48,721
19. Approval of Application and Permit to Proceed, File No. 48,722

20. Approval of Application and Permit to Proceed, File No. 48,723
21. Approval of Application and Permit to Proceed, File No. 48,724
22. Approval of Application and Permit to Proceed, File No. 48,725
23. Approval of Application and Permit to Proceed, File No. 48,726
24. Approval of Application and Permit to Proceed, File No. 48,727
25. Approval of Application and Permit to Proceed, File No. 48,728
26. Approval of Application and Permit to Proceed, File No. 48,729
27. Approval of Application and Permit to Proceed, File No. 48,730
28. Approval of Application and Permit to Proceed, File No. 48,731
29. Approval of Application and Permit to Proceed, File No. 48,732
30. Approval of Application and Permit to Proceed, File No. 48,733

31. TABLE 1. PROPOSED MINIMUM INDEX GROUNDWATER ELEVATIONS FOR THE CITY OF WICHITA AQUIFER STORAGE & RECOVERY PROJECT

Draft for initial review, March 22, 2018
Example proposed individual approval for one of the new applications

APPROVAL OF APPLICATION
and
PERMIT TO PROCEED

(This Is Not a Certificate of Appropriation)

This is to certify that I have examined Application, **File No. 48,704** of the applicant

CITY OF WICHITA
PUBLIC WORKS & UTILITIES-WTP
455 N MAIN ST 8TH FLOOR
WICHITA KS 67202

for a permit to appropriate water for beneficial use, together with the maps, plans and other submitted data, and that the application is hereby approved and the applicant is hereby authorized, subject to vested rights and prior appropriations, to proceed with the construction of the proposed diversion works (except those dams and stream obstructions regulated by K.S.A. 82a-301 through 305a, as amended), and to proceed with all steps necessary for the application of the water to the approved and proposed beneficial use and otherwise perfect the proposed appropriation subject to the following terms, conditions and limitations:

1. That the priority date assigned to such application is **July 23, 2013**.
2. That the water sought to be appropriated shall be used for municipal use within the City of Wichita and immediate vicinity; within the City of Andover and immediate vicinity, within the City of Bel Aire and immediate vicinity, within the City of Benton and immediate vicinity, within the City of Derby and immediate vicinity; within the City of Kechi and immediate vicinity; within the City of Park City and immediate vicinity; within the City of Rose Hill and immediate vicinity; within the City of Valley Center and immediate vicinity; within the City of Bentley and immediate vicinity, within the boundaries of Rural Water District No. 1, Sedgwick County; within the boundaries of Rural Water District No. 2, Sedgwick County; within the boundaries of Rural Water District No. 3, Sedgwick County; and within the boundaries of Rural Water District No. 8, Butler County; within a tract of land in Sedgwick County, Kansas, beginning at the Southeast corner of Section 25, Township 28 South, Range 2 East, then West a distance of 22 miles to the Southwest corner of Section 28, Township 28 South, Range 2 West, then North a distance of 16 miles to the Northwest corner of Section 9, Township 26 South, Range 2 West, then East a distance of 22 miles to the Northeast corner of Section 12, Township 26 South, Range 2 East, then directly South a distance of 16 miles to the point of beginning.
3. That the authorized source from which the appropriation shall be made is groundwater recharge credits accumulated in the Equus Beds aquifer, that may be recovered pursuant to the operation of the approved aquifer storage and recovery project, and any subsequent modifications, to be withdrawn by means of one (1) well located in the Northwest Quarter of the Northwest Quarter of the Northwest Quarter (NW¼ NW¼ NW¼) of Section 29, more particularly described as being near a point 5,060 feet North and 5,100 feet West of the Southeast corner of said section, in Township 23

South, Range 2 West, Harvey County, Kansas, located substantially as shown on the topographic map accompanying the application.

4. That the appropriation sought shall be limited to a maximum diversion rate not in excess of **1,500 gallons per minute** (3.34 c.f.s.) and to a quantity not to exceed **162.93 million gallons** (500.0 acre-feet) of water for any calendar year.
5. That installation of works for diversion of water shall be completed on or before **December 31, 2019** or within any authorized extension thereof. The applicant shall notify the Chief Engineer and pay the statutorily required field inspection fee of \$400.00 when construction of the works has been completed. Failure to timely submit the notice and the fee will result in revocation of the permit. Any request for an extension of time shall be submitted prior to the expiration of the deadline and shall be accompanied by the required statutory fee of \$100.00.
6. That the proposed appropriation shall be perfected by the actual application of water to the proposed beneficial use on or before **December 31, 2038** or any authorized extension thereof. Any request for an extension of time shall be submitted prior to the expiration of the deadline and shall be accompanied by the required statutory fee of \$100.00.
7. That the applicant shall not be deemed to have acquired a water appropriation for groundwater from the Equus Beds aquifer, except for recovery of water recharged pursuant to the approved aquifer storage and recovery project, any subsequent modifications, and any accumulated Aquifer Maintenance Credits, in excess of the amount approved herein nor in excess of the amount found by the Chief Engineer to have been actually used for the approved purpose during one calendar year subsequent to approval of the application and within the time specified for perfection or any authorized extension thereof.
8. That the use of water herein authorized shall not be made so as to impair any use under existing water rights nor prejudicially and unreasonably affect the public interest.
9. That the right of the appropriator shall relate to a specific quantity of water and such right must allow for a reasonable raising or lowering of the static water level and for the reasonable increase or decrease of the streamflow at the appropriator's point of diversion.
10. That this permit does not constitute authority under K.S.A. 82a-301 through 305a to construct any dam or other obstruction; nor does it grant any right-of-way, or authorize entry upon or injury to, public or private property.
11. That all diversion works constructed under the authority of this permit into which any type of chemical or other foreign substance will be injected into the water pumped from the diversion works shall be equipped with an in-line, automatic quick-closing, check valve capable of preventing pollution of the source of the water supply. The type of valve installed shall meet specifications adopted by the Chief Engineer and shall be maintained in an operating condition satisfactory to the Chief Engineer.
12. That an acceptable water flow meter shall be installed and maintained on the diversion works authorized by this permit in accordance with Kansas Administrative Regulations 5-1-4 through 5-1-12 adopted by the Chief Engineer. This water flow meter shall be used to provide an accurate quantity of water diverted as required for the annual water use report (including the meter reading at the beginning and end of the report year).

13. That the applicant shall maintain accurate and complete records from which the quantity of water diverted during each calendar year may be readily determined and the applicant shall file an annual water use report with the Chief Engineer by March 1 following the end of each calendar year. Failure to file the annual water use report by the due date shall cause the applicant to be subject to a civil penalty.
14. That no water user shall engage in nor allow the waste of any water diverted under the authority of this permit.
15. That failure without cause to comply with provisions of the permit and its terms, conditions and limitations will result in the forfeiture of the priority date, revocation of the permit and dismissal of the application.
16. That the right to appropriate water under authority of this permit is subject to any minimum desirable streamflow requirements identified and established pursuant to K.S.A. 82a-703c for the source of supply to which this water right applies.
17. That the proposed recovery of water by the City shall only occur when recharge credits are determined to be available in Cell No. 6, and the static water level is above elevation 1,370 mean sea level (msl).
18. That static water level is defined as the water level measured early in the calendar year prior to the irrigation season, and after allowing time for natural aquifer recovery.
19. That operation of the aquifer storage and recovery well authorized herein, shall not impair existing water rights nor prejudicially and unreasonably affect the public interest.
20. That if the Chief Engineer determines that impairment of an existing prior water right is caused by operation of the aquifer storage and recovery well, the City of Wichita shall either regulate the aquifer storage and recovery well's diversion to secure water to satisfy all prior rights, or comply with any other requirement as specified by the Chief Engineer to prevent impairment or protect the public interest.
21. That the recharge system is constructed, operated, and monitored to prevent groundwater contamination, not impair existing water rights, nor prejudicially affect the public interest.
22. That if water quality in a nearby, existing domestic well meets the current drinking water standards and the water quality is subsequently changed by the ASR project such that the water no longer meets the current drinking water standards, the City will provide and install a home water treatment system to bring the water back to drinking water standards or provide other appropriate remedies to replace the domestic water supply with water that meets the drinking water standard without additional cost to the resident.
23. That if a domestic water well, existing before the filing of this application for permit and within 660 feet of an existing or new ASR well, is adversely impacted by drawdown from such well, the City will re-drill or take other appropriate, affirmative action to restore productivity of such domestic well to the same rate and quality as existed before.

Draft for initial review, March 22, 2018
Example Proposed F &O amending terms & conditions of an
existing ASR Phase II permit

FINDINGS AND ORDER
IN THE MATTER OF
PERMIT CONDITIONS UNDER
APPROPRIATION OF WATER, FILE NO. 46,714

After due consideration, the Chief Engineer, Division of Water Resources, Kansas Department of Agriculture (hereinafter referred to as the "Chief Engineer"), makes the following findings and order:

FINDINGS

1. That on September 18, 2009, the Chief Engineer approved Appropriation of Water, File No. 46,714, for permit to appropriate groundwater recharge credits accumulated in the Equus Beds aquifer for municipal use, authorizing the applicant, subject to vested rights and prior appropriations, to proceed with the construction of the proposed diversion works and to proceed with all steps necessary for the application of the water to the approved and proposed beneficial use.
2. That per Paragraph No. 19 of the Approval of Application and Notice to Proceed for Appropriation of Water, File No. 46,714, the permit was issued with the condition that "the proposed recovery of water artificially recharged by the City shall only occur when recharge credits are determined to be available in Cell No. 6, and the static water level is above elevation 1,387 mean sea level (msl)." This elevation was based on what was considered to be the lowest aquifer water level for this cell as determined by January 1993 water level measurements (i.e. the bottom of the Basin Storage Area).
3. That on May 6, 2015, the Chief Engineer approved a Findings and Order, which defined "static water level" as the water level measured early in the calendar year (normally in January) prior to the irrigation season, and after allowing time for natural aquifer recovery. In addition, the Order modified the minimum index level (groundwater elevation) for Cell No. 6 to be 1,388.74 feet mean sea level.
4. That the City has conducted extensive modeling and data analysis to indicate that during a prolonged drought, groundwater elevations would drop below the current minimum index levels. This would prevent the City from withdrawing recharge credits when they are most needed.
5. That the City has proposed alternative minimum index levels, which on average are approximately 12.8 feet lower than current levels. Even at these levels, the aquifer will remain 80 percent full on average across the well field.
6. That based on this data and analysis, it is proposed that the minimum index level elevation for Cell No. 6 should be modified to 1,370.0 mean sea level.
7. That this modification in the minimum index level elevation will not prejudicially or unreasonably affect the public interest, and no senior rights will be impaired.

8. That per Paragraph No. 7 of the Approval of Application and Notice to Proceed for Appropriation of Water, File No. 46,714, the permit was issued with the condition that “the applicant shall not be deemed to have acquired a water appropriation for groundwater from the Equus Beds aquifer, except for recovery of water recharged pursuant to the approved aquifer storage and recovery project, and any subsequent modifications, in excess of the amount approved herein nor in excess of the amount found by the Chief Engineer to have been actually used for the approved purpose during one calendar year subsequent to approval of the application and within the time specified for perfection or any authorized extension thereof.”
9. That this approval was prior to the concept and approval of Aquifer Maintenance Credits (AMCs), which can be accumulated in the Equus Beds Wellfield.
10. That Paragraph No. 7 should be modified to allow for the recovery of AMCs as follows: “That the applicant shall not be deemed to have acquired a water appropriation for groundwater from the Equus Beds aquifer, except for recovery of water recharged pursuant to the approved aquifer storage and recovery project, any subsequent modifications, and any Aquifer Maintenance Credits, in excess of the amount approved herein nor in excess of the amount found by the Chief Engineer to have been actually used for the approved purpose during one calendar year subsequent to approval of the application and within the time specified for perfection or any authorized extension thereof.”
11. That Paragraph No. 19 should be modified to “the proposed recovery of water by the City shall only occur when recharge credits are determined to be available in Cell No. 6, and the static water level is at or above elevation 1,370.0 mean sea level (msl).”
12. That in order to protect nearby, existing domestic well owners, the City has agreed that if the water quality in an existing domestic well meets the current drinking water standards and the water quality is subsequently changed by the ASR project such that the water no longer meets the current drinking water standards, the City will provide and install a home water treatment system to bring the water back to drinking water standards or provide other appropriate remedies to replace the domestic water supply with water that meets the drinking water standard without additional cost to the resident.
13. That in order to protect nearby, existing domestic well owners, the City has agreed that if a domestic water well, existing before the filing of this application for permit and within 660 feet of an existing or new ASR well, is adversely impacted by drawdown from such well, the City will re-drill or take other appropriate, affirmative action to restore productivity of such domestic well to the same rate and quality as existed before.

ORDER

NOW, THEREFORE, It is the decision and order of the Chief Engineer, Division of Water Resources, Kansas Department of Agriculture, that effective the date of this order, Appropriation of Water, File No. 46,714 is conditioned as follows:

Paragraph No. 7 should read as follows: “That the applicant shall not be deemed to have acquired a water appropriation for groundwater from the Equus Beds aquifer, except for recovery of water recharged pursuant to the approved aquifer storage and recovery project, any subsequent modifications, and any Aquifer Maintenance Credits, in excess of the amount approved herein nor in excess of the amount found by the Chief Engineer to have been actually used for the approved purpose during one calendar year subsequent to approval of the application and within the time specified for perfection or any authorized extension thereof.”

