STATE OF KANSAS
BEFORE THE DIVISION OF WATER RESOURCES,
KANSAS DEPARTMENT OF AGRICULTURE

In the Matter of the City of Wichita's Phase II Aquifer Storage and Recovery Project in Harvey and Sedgwick Counties, Kansas.	))))	Case No. 18 WATER 14014

Pursuant to K.S.A. 82a-1901 and K.A.R. 5-14-3a.

RECOMMENDATIONS ON THE CITY OF WICHITA'S PROPOSED MODIFICATION OF THE AQUIFER STORAGE AND RECOVERY PROJECT PHASE II WATER APPROPRIATION PERMITS

These recommendations are issued pursuant to authority delegated by the Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture, in accordance with K.A.R. 5-14-3a, to serve as Presiding Officer over an administrative hearing and issue written recommendations to the Chief Engineer at the completion of the hearing. Pursuant to that regulation, the Presiding Officer's recommendations shall contain a statement of the recommended decision and the facts and conclusions of law upon which the recommended decision is based. K.A.R. 5-14-3a(s)(1). The subject matter of the hearing is the City of Wichita's proposal to modify certain conditions of their water appropriation permits authorizing the Aquifer Storage and Recovery Project, Phase II.

The following parties participated in the formal phase of these proceedings, through counsel, as indicated: the City of Wichita (City), represented by Brian K. McLeod; the Kansas Department of Agriculture's Division of Water Resources (DWR), represented by Aaron B. Oleen and Stephanie (Murray) Kramer (Mr. Oleen withdrew during the pendency of the matter, due to a change in employment); Equus Beds Groundwater Management District No. 2 (GMD2),

represented by Thomas A. Adrian, David J. Stucky, and Leland Rolfs; Richard Basore, Josh Carmichael, Judy Carmichael, Bill Carp, Carol Denno, Steve Jacob, Terry Jacob, Michael J. McGinn, Bradley Ott, Tracy Pribbenow and David Wendling (Intervenors), represented by Tessa M. Wendling.

As stated above, the purpose of this hearing process was to address the City of Wichita's proposal to modify certain conditions of the water appropriation permits approved under Phase II of the City's Aquifer Storage and Recovery project. This matter is highly complex, publicly controversial and of no small consequence. As evidenced in the extensive record, this process included 15 days of formal witness testimony, several large binders of exhibits, over 3600 pages of testimony, approximately 70 official written and verbal comments from the public, numerous prehearing conferences, prehearing motions with resulting orders, prehearing and post-hearing briefs and replies thereto. The undersigned Presiding Officer was delegated to conduct this hearing approximately one year after the proposal was submitted to DWR, following the exchange of numerous filings by the parties, preliminary orders by the Chief Engineer at the time, and the submission of several public comments.

Brief Summary of ASR Project Context and Proposal

This matter involves water appropriation permits and water rights governed by the Kansas Water Appropriation Act, K.S.A. 82a-701, *et seq.* A few preliminary basics of the KWAA may be helpful here. Under this law, all uses of water (except domestic use and certain exceptions that do not apply here) are only lawful if authorized by a permit by the Chief Engineer of DWR. The fundamental principle of the water rights system in Kansas is the prior appropriation doctrine, in which "first in time is first in right." In times of shortage, the older (senior) water right has priority to the use of water over the newer (junior) water right. A water

right, when fully developed, is a real property right, but only to the use of water if available, not to ownership of the water. Water rights are developed through an application process; approval of an application allows the user to begin his or her water use as approved. Actual use of water as authorized over a set period of time creates, or "perfects" a full water right. Each permit or water right contains seven fundamental attributes: priority date and time, annual maximum quantity, maximum rate of diversion, authorized place of use, authorized point of diversion, authorized use made of water (type of beneficial use), and authorized source of supply. Each permit and water right contains additional conditions as the Chief Engineer deems appropriate. The case at hand involves permits approved by the Chief Engineer for artificial recharge in the City of Wichita's Aquifer Storage and Recovery (ASR) Project.

This administrative matter has an extensive history, roughly beginning with the creation of the state's first aquifer storage and recovery project known as the City of Wichita ASR Project Phase I (ASR Phase I), as approved by the Chief Engineer of the Division of Water Resources in 2005. (Discussions that led to the development of this initial ASR project in the State of Kansas occurred for some time prior to that date.) The Chief Engineer approved the second phase (ASR Phase II) in 2009.

Both phases involve the City of Wichita diverting overflows of surface water from the Little Arkansas River, treating the water for municipal use, and injecting it into recharge and recovery wells in the City's groundwater wellfield to store for later municipal use by the City. This diversion, treatment and storage of water earns the City aquifer recharge credits, which the City may use in the future (under certain conditions) to pump a related amount of groundwater from the City's wellfield. The procedures used by the City to apply for, and receive DWR approval for, the permits comprising these two phases are set forth in statute and regulation. The

approvals of ASR Phase I and ASR Phase II are not at issue here. Their facts are included where relevant.

The matter before us is a request by the City of Wichita to modify conditions of the water appropriation permits authorizing the ASR Phase II project in the following two ways: (1) to lower the minimum index levels as proposed; and (2) to allow the adoption and use of new Aquifer Maintenance Credits as the City has described and proposed. The City's request for these two changes will be referred to as the Proposal.

Brief Summary of Recommendations

Upon a thorough review of the record, the testimony, public comments, the facts and the applicable law, the Presiding Officer recommends the Chief Engineer dismiss the Proposal on the grounds that the Kansas Water Appropriation Act, K.S.A. 82a-701, *et seq*., does not allow the proposed fundamental changes to the City's water appropriation permits to be requested absent the filing of new applications pursuant to K.S.A. 82a-711. In the event the Chief Engineer declines to adopt those recommendations, the presiding officer recommends the Chief Engineer deny the Proposal on the grounds that the City has not met its burden to demonstrate, by a preponderance of the evidence, that the requested changes will not impair existing water rights or prejudicially and unreasonably affect the public interest, pursuant to K.S.A. 82a-708b, K.S.A. 82-711, and all other applicable statutes and regulations.

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Procedural History Overview

1. On August 8, 2005, David Pope, Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture (DWR) approved the City of Wichita's Aquifer Storage and Recovery Project Phase I (ASR Phase I), pursuant to the Kansas Water Appropriation Act, K.S.A. 82a-701, *et seq*.

2. On September 24, 2009, David Barfield, Chief Engineer of DWR approved the City of Wichita's Aquifer Storage and Recovery Project Phase II (ASR Phase II), pursuant to the Kansas Water Appropriation Act, K.S.A. 82a-701, *et seq*. (Pope had since retired as Chief Engineer.) This approval included permits for 24 recharge and recovery wells. On September 28, 2010, Chief Engineer Barfield issued an approval of seven additional new applications for permit to appropriate water for recharge and recovery wells relative to the ASR Phase II project.

3. On March 12, 2018, the City of Wichita submitted to DWR its "ASR Permit Modification Proposal, Revised Minimum Index Levels & Aquifer Maintenance Credits," with attachments A through J (Proposal). The City also filed, on or about this same date, related applications for permit to appropriate water, File Nos. 48,704 through 48733.

4. On June 28, 2018, Chief Engineer Barfield conducted a public informational meeting regarding the Proposal in Halstead, Kansas.

5. On September 27, 2018, pursuant to the City's request, DWR dismissed the City's new applications, File Nos. 48,704 through 48,733. (Order to Modify Hearing and Schedule, September 27, 2018.)

6. On October 15, 2018, Tessa M. Wendling entered her appearance as counsel of record for a group of Intervenors.

7. On October 26, 2018, Chief Engineer Barfield approved of the appearance of the following individuals as an official party (Intervenors): Richard Basore, Josh Carmichael, Judy Carmichael, Bill Carp, Carol Denno, Steve Jacob, Terry Jacob, Michael J. McGinn, Michael P. and Susannah M. McGinn, Bradley Ott, Tracy Pribbenow, Robert Seiler, and David Wendling, all represented by Tessa M. Wendling. (Order Regarding the Designation of Parties for the Formal Phase of the Public Hearing.)

8. On November 5, 2018, Chief Engineer Barfield granted the motion to withdraw as parties, without prejudice, from Michael P. and Susannah M. McGinn and Robert Seiler. (Order Regarding the Withdrawal of Parties for the Formal Phase of the Public Hearing.)

9. During the fall of 2018 and extending into December 2018, the parties filed various motions and responses, addressing such matters as discovery procedures and deadlines. (Numerous motions and responses were submitted by the parties throughout the entire pendency of this matter; all pleadings are a matter of agency record and need not be specifically identified here.)

10. On December 11, 2018, Chief Engineer Barfield conducted a public comment hearing in Wichita, Kansas, regarding the Proposal.

11. On December 21, 2018, Chief Engineer Barfield, as Presiding Officer, issued an order to establish deadlines for general discovery, submission of expert reports, prehearing motions and prehearing briefs. The order also set the formal phase of the hearing for March 26 and 27, 2020. (Notice of Final Hearing Schedule.)

12. On March 11, 12 and 18, 2019, the parties submitted numerous filings to DWR, including motions, responses to motions, witness and exhibit lists and prehearing briefs.

13. On March 19, 2019, Chief Engineer Barfield, pursuant to K.A.R. 5-14-3a, delegated Constance C. Owen "as presiding officer for these proceedings. She shall be delegated the authority to conduct a hearing among the formal parties and to provide written recommendations to the Chief Engineer based on the record after such hearings are complete." The letter of delegation, issued the same date, stated, "it is the purpose of these hearings to determine if and under what circumstances such modifications to the existing ASR project should be made." The delegation order also postponed the hearing scheduled to take place on March 26 and 27, 2020, and stated that "all motions currently pending shall be considered by Ms. Owen in due time, and she shall set a scheduling conference as soon as possible." (Notice of Delegation and Temporary Postponement.)

14. On May 28, 2019, the undersigned Presiding Officer held a prehearing conference at the Harvey County Courthouse in Newton, Kansas, at which the parties presented arguments regarding pending motions and responses.

15. On July 24, 2019, the undersigned Presiding Officer issued an order addressing pending motions, resolving most of them with the exception of GMD2's Motion to Dismiss and Intervenors' motion in support, which were taken under advisement.

16. The formal phase of the hearing began on December 10, 11, and 12, 2019, followed by a public comment session on December 13, 2019, all in Halstead, Kansas. The formal phase of the hearing was not completed during this time.

17. The formal phase of the hearing continued on February 10, 11 and 12, 2020, and March 2 through 6, 2020, at the same location in Halstead, Kansas. The formal phase of the hearing was not completed during this time.

18. On February 28, 2020, Chief Engineer Barfield retired from his position.

19. On March 2, 2020, Acting Chief Engineer Chris Beightel issued a notice, pursuant to K.A.R. 5-14-3a, affirming the delegation to Constance Owen "the authority to serve as the presiding officer in this matter as previously delegated in the order dated March 19, 2019."

20. On November 2, 2020, Chief Engineer Earl D. Lewis issued a notice, pursuant to K.A.R. 5-14-3a, affirming the delegation to Constance Owen "the authority to serve as the presiding officer in this matter as previously delegated in the order dated March 19, 2019 and affirmed on March 2, 2020."

21. The impacts of the COVID-19 pandemic delayed the continuation of the formal phase until February 3, 4, and 5, 2021, when the hearing was held partially in-person at the Kansas Learning Center for Health in Halstead, Kansas, and partially in an electronic remote format. On December 30, 2020, due to pandemic restrictions and pursuant to agreement of the parties, Chief Engineer Lewis waived K.A.R. 5-12-3 to allow the in-person component of the hearing to take place outside the boundaries of GMD2.

22. Closing arguments, held in an exclusively virtual format on February 19, 2021, brought the formal phase to a close.

23. Written public comments were accepted throughout this entire period, until the deadline of 5:00pm on February 26, 2021.

24. On July 30, 2021, all four parties timely submitted proposed findings and conclusions, and briefs in support. Three of the four parties opted to file briefs in reply, which were submitted by the deadline of October 4, 2021.

Public Comments

Oral comments received on December 11, 2018, at the American Ag Credit Building, Wichita, Kansas, as documented in the Transcript of Proceedings for that date, were provided by:

Kent Askren, Kansas Farm Bureau	Charles Peaster	Eddie Weber
Jim Roberts	David Carp	David Mueller

Jon Kerschen, Sedgwick County Farm Bureau Agriculture Association

Oral public comments were provided on December 13, 2019 by (documented in Transcript of Proceedings for that date):

Brad Banz	Beth Vanatta	Toyia Bulla
Tommy Logue	Ruth Jacob	Stephen Owens
Esley Schmidt	Michael Koehn	Rosetta Durner
Frank Harper	David Weninger	Joe Bergkamp
Alvin Neville	Anthony Seiler	Gary Stecklein
Jack Queen	Joe Trego	Dan Andrew
Gina Bell	Floyd Holle	Bruce Seiler
Edward Weber	Daniel Dyck	Josh Mueller
Jeff Bender	Charles Esfeld	Alan Jackson

Ted Saranchuk

Written public comments received at the in-person comment hearing on December 13, 2019, were provided by:

Ruth Jacob, letter dated December 13, 2019

Michael Koehn, letter

Frank Harper, letter

Jack Queen, President/GM of Farmers' Cooperative Elevator Company, Halstead, KS, letter

Dan Andrew, letter

Bruce Seiler, letter

Floyd Holle, copy of letter to Floyd Holle from Equus Beds GMD No. 2, dated January 9, 1980

Additional written comments received by DWR were provided by:

Scott and Katie Rowe, email dated January 16, 2021

Sam, Marcia and Andy Goering, email dated August 24, 2020

City of Halstead, letter dated February 10, 2020

Beth Vannatta, email dated January 19, 2020

James Loyd, email December 17, 2019

Rod and Judy Berger, email December 9, 2019

Kent Askren, Kansas Farm Bureau, letter December 11, 2018

David Mueller, email dated December 11, 2018

Philip Lorenz, email dated December 10, 2018

John Reimer, letter dated December 10, 2018

D. Keith Jacob, Citizens for Conservation of the Equus Beds, letter KDA-stamped December 10, 2018

Dr. Kate E. Jacob, email dated December 7, 2018

Laurie Hartke, letter dated November 5, 2018, KDA-stamped November 13, 2018

Ted Saranchuk, email dated May 20, 2019

Board of Harvey County Commissioners, letter dated March 25, 2019, KDA-stamped March 29, 2019

Galen Fast, email dated March 26, 2019

Gary Fair, email dated March 23, 2019

Joseph Trego, email dated March 13, 2019

Tommy R. Logue, letter KDA-stamped March 13, 2019

Gary Stecklein, email dated March 7, 2019

Toyia Bulla, email dated February 25, 2019

Susan Krehbiel William, email dated February 8, 2019

Richard Basore, letter dated January 22, 2019

Gary Stecklein, email dated January 10, 2019

Beth Vannatta, email dated December 27, 2018

This Presiding Officer has carefully considered each of the comments from the public, whether provided in writing at any time prior to the issuance of these recommendations, or in person at one of the public comment opportunities in the area of the ASR project (Wichita and Halstead) in 2018 and 2019. These comments represent an investment of time and effort and no small measure of passion and concern. Every comment received urged the denial of the City's requested changes to the Phase II ASR project.

The reasons for seeking denial included the following concerns and arguments, including allegations of what would result from approval of the City's proposed changes:

(1) greater migration of chlorides into the groundwater in the area, fatally contaminating all uses of water, including domestic, irrigation and livestock;

(2) the City will be allowed to pump more groundwater than currently authorized, which would be unfair to other water right and permit owners who are not allowed by law to do so;

(3) the City would be allowed to pump more groundwater than currently allowed, aggravating the problem of over-appropriation of water in the area and causing the water table levels to drop more than they already have;

(4) if the City is allowed to divert more water in dry periods, it would cause the water table to drop and even a drop of a few feet would have major negative impacts on the ability of nearby irrigation wells to pump water when it is needed most;

(5) the resulting contamination and/or shrinking of the water supply would force irrigators to reurn to dryland farming, reducing local revenue in the affected communities by approximately 77% (according to the crop revenue calculations of Jack Queen, President/GM of Farmers Cooperative Elevator Company in Halstead, Kansas);

(6) the resulting contamination and/or shrinking of the water supply would force people who use domestic wells or irrigation wells or both to leave the property where they live and where their families have lived for many generations;

(7) the resulting contamination and/or shrinking of the water supply would negatively impact recreational uses of the water and income from recreational uses (such as hunting at duck ponds);

(8) the City would be in violation of the Memorandum of Understanding containing conditions essential to the approval of the ASR project in Phase I and Phase II (setting the minimum index levels at the 1993 levels, not allowing passive recharge credits, and establishing a hydraulic barrier to slow chloride migration from the Burrton contamination area);

(9) if the City is allowed to pump more water, whether from groundwater or surface water, the City would likely sell that water to other communities, in addition to the water they

currently sell to cities and other entities, which does not comprise a need sufficient to justify the changes;

(10) allowing the City to earn credits for diverting water from the Little Arkansas River and piping it directly to the City instead of storing it, does not promote the recovery of the aquifer, because this use would happen at times the aquifer storage is already at capacity, and therefore is not appropriate for an Aquifer Storage and Recovery project;

(11) the area has been over-appropriated for years, to the point where farmers are denied approval to use more groundwater, and thus the City should be held to the same standard;

(12) the City has the opportunity to purchase water from El Dorado Lake as an alternative to the ASR changes, and should pursue that option instead of the ASR changes;

(13) the City of Wichita should encourage or require its citizens and industrial users to conserve water more, thereby reducing or eliminating the need for the proposed ASR changes;

(14) some aspects of the City's ASR project have not operated as originally described, with some sites apparently abandoned, rendering their credibility for seeking approval of future projects such as this one questionable; and

(15) the City has not specifically detailed the actions it would take to provide safe, adequate water supplies to all potentially-affected domestic and non-domestic water users in the event that the proposed changes harm other users' ability to access safe sufficient water.

This list of allegations and arguments is not exhaustive, but represents the majority of the concerns expressed. The individuals who provided comments come from a variety of backgrounds, including local residents, irrigators, livestock operators, well-drillers, professional engineers, retirees, as well as the Board of Harvey County Commissioners and representatives from the Kansas Farm Bureau and the Sedgwick County Farm Bureau. As noted at the public

comment hearing held on December 13, 2019, all those who commented, whether in person or in writing, are to be commended for participating in this process. Their input, where it is corroborated by other evidence submitted in the formal process, has helped inform the recommendations expressed herein.

Applicable Statutes, Regulations and Legal Standards

"Administrative agencies are creatures of statute and their power is dependent upon authorizing statutes, therefore any exercise of authority claimed by the agency must come from within the statutes. There is no general or common law power that can be exercised by an administrative agency. (Citation omitted.)". *American Trust Administrators, Inc. v. Kansas Insurance Dept.*, 273 Kan. 694, 698, 44 P.3d 1253 (2002).

Properly promulgated administrative regulations have the force and effect of law. *Mitchell v. Petsmart, Inc.*, 291 Kan. 153, 168, 239 P.3d 51 (2010). Agencies generally may not disregard their own rules and regulations. *Schmidt v. Kansas Bd. of Technical Professions*, 271 Kan. 206, 221, 21 P.3d 542 (2001).

This proceeding arises under the Kansas Water Appropriation Act (KWAA), K.S.A. 82a-701, *et seq.;* the administrative regulations administering the KWAA, K.A.R. 5-1-1, *et seq.*; the Groundwater Management District Act (GMDA), K.S.A. 82a-1020 through 82a-1042; and the regulations administering the GMDA relative to Equus Beds Groundwater Management District No. 2, K.A.R. 5-22-1, *et seq.* The relevant provisions of those statutes and regulations include, but are not limited to, in pertinent part where excerpted, the following:

K.S.A. 82a-708b. Application for change in place of use, point of diversion or use; fee; review of action on application. (a) Any owner of a water right may change the place of use, the point of diversion or the use made of the water, without losing priority of right, provided such

owner shall: (1) Apply in writing to the chief engineer for approval of any proposed change; (2) demonstrate to the chief engineer that any proposed change is reasonable and will not impair existing rights; (3) demonstrate to the chief engineer that any proposed change relates to the same local source of supply as that to which the water right relates; and (4) receive the approval of the chief engineer with respect to any proposed change. The chief engineer shall approve or reject the application for change in accordance with the provisions and procedures prescribed for processing original applications for permission to appropriate water.

K.S.A. 82a-711. Permits to appropriate water; standards for approval of use; review of action on application. (a) If a proposed use neither impairs a use under an existing water right nor prejudicially and unreasonably affects the public interest, the chief engineer shall approve all applications for such use made in good faith in proper form which contemplate the utilization of water for beneficial purpose, within reasonable limitations except that the chief engineer shall not approve any application submitted for the proposed use of fresh water in any case where other waters are available for such proposed use and the use thereof is technologically and economically feasible. Otherwise, the chief engineer shall make an order rejecting such application or requiring its modification to conform to the public interest to the end that the highest public benefit and maximum economical development may result from the use of such water.

(b) In ascertaining whether a proposed use will prejudicially and unreasonably affect the public interest, the chief engineer shall take into consideration: (1) Established minimum desirable streamflow requirements; (2) the area, safe yield and recharge rate of the appropriate water supply; (3) the priority of existing claims of all persons to use the water of the appropriate

water supply; (4) the amount of each claim to use water from the appropriate water supply; and (5) all other matters pertaining to such question.

(c) With regard to whether a proposed use will impair a use under an existing water right, impairment shall include the unreasonable raising or lowering of the static water level or the unreasonable increase or decrease of the streamflow or the unreasonable deterioration of the water quality at the water user's point of diversion beyond a reasonable economic limit.

K.S.A. 82a-701(f) "Appropriation right" is a right, acquired under the provisions of article 7 of chapter 82a of the Kansas Statutes Annotated and amendments thereto, to divert from a definite water supply a specific quantity of water at a specific rate of diversion, provided such water is available in excess of the requirements of all vested rights that relate to such supply and all appropriation rights of earlier date that relate to such supply, and to apply such water to a specific beneficial use or uses in preference to all appropriations right of later date.

K.S.A. 82a-701(g) "Water right" means any vested right or appropriation right under which a person may lawfully divert and use water. It is a real property right appurtenant to and severable from the land on or in connection with which the water is used and such water right passes as an appurtenance with a conveyance of the land by deed, lease, mortgage, will, or other disposal, or by inheritance.

K.S.A. 82a-705. Acquisition of a new appropriation right to use water other than domestic; approval. No person shall have the power or authority to acquire a new appropriation right to the use of water for other than domestic use without first obtaining the approval of the chief engineer, and no water rights of any kind may be acquired hereafter solely by adverse use, adverse possession, or by estoppel.

K.A.R. 5-1-1(e) "Aquifer storage" means the act of storing water in an aquifer by artificial recharge for subsequent diversion and beneficial use.

K.A.R. 5-1-1(f) "Aquifer storage and recovery system" means the physical infrastructure that meets the following conditions: (1) Is constructed and operated for artificial recharge, storage, and recovery of source water; and (2) consists of apparatus for diversion, treatment, recharge, storage, extraction, and distribution.

K.A.R.5-1-1(g) "Artificial recharge" means the use of source water to artificially replenish the water supply in an aquifer.

K.A.R. 5-1-1(uu) "Minimum index level" means 20 feet above the bedrock elevation or an alternatively proposed minimum elevation for storage within a basin storage area or, if the basin storage area is subdivided, a smaller subdivided area.

K.A.R. 5-1-1(mmm) "Recharge credit" means the quantity of water that is stored in the basin storage area and that is available for subsequent appropriation for beneficial use by the operator of the aquifer storage and recovery system.

K.A.R. 5-1-1(vvv) "Safe yield" means the long-term sustainable yield of the source of supply, including hydraulically connected surface water or groundwater.

K.A.R. 5-1-1(yyy) "Source water" means water used for artificial recharge that meets the following conditions: (1) Is available for appropriation for beneficial use; (2) is above base-flow stage in the stream; (3) is not needed to satisfy minimum desirable streamflow requirements; and (4) will not degrade the ambient groundwater quality in the basin storage area.

K.A.R. 5-1-1(oooo) "Water balance" means the method of determining the amount of water in storage in a basin storage area by accounting for inflow to, outflow from, and changes in storage in that basin storage area.

K.A.R. 5-12-1. Aquifer storage and recovery permitting. (a) An operator may store water in an aquifer storage and recovery system under a permit to appropriate water for artificial recharge if the water appropriated is source water. The requirements of this article shall be in addition to any requirements of the Kansas department of health and environment concerning underground injection wells.

(b) Each application for a permit to appropriate water for artificial recharge shall describe the horizontal and vertical extent of the basin storage area in which the source water will be stored. (1) The horizontal extent shall be determined by a closed boundary within which the recharge system used to store the water will be physically located. The recharge system may include recharge pits, recharge trenches, recharge wells, or other similar systems that cause source water to enter the storage volume of the basin storage area, either by gravity flow or by injection. The basin storage area may be subdivided into smaller areas representative of the areas that may be recharged by the individual recharge systems. (2) The vertical extent shall be defined by a minimum index level and a maximum index level for the basin recharge storage area, or for each subdivided area within the basin storage area if the basin storage area is subdivided. The maximum index water level shall represent the maximum storage potential for the basin storage area.

(c) Each application for a permit to appropriate water for artificial recharge shall specify the maximum annual quantity and maximum rate of diversion of source water.

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

storage and recovery system, each application shall use the same methodology for accounting for water stored in the basin storage area. The accounting of the water balance of all water entering and leaving the basin storage area shall be determined by using sound engineering methods based on actual measurements, generally accepted engineering methodology, or a combination of both.

(2) Approval of any application for a permit to appropriate water for artificial recharge shall be contingent upon the chief engineer's approval of the method for accounting for the basin storage area.

(e) Each applicant for recovery of water stored by the holder of a permit to appropriate water for artificial recharge to store water in a basin storage area shall obtain a permit separate from the aquifer storage permit to appropriate water for beneficial use for each well used to recover the water stored. The maximum annual quantity of water that may be appropriated for this purpose shall be no more than the maximum cumulative recharge credits available to the operator of the aquifer storage and recovery system. These credits shall be determined by the accounting methodology approved under a permit to appropriate water for artificial recharge pertaining to the aquifer storage and recovery system.

K.A.R. 5-12-2. Aquifer storage and recovery accounting. (a) In addition to annual water use reporting requirements pursuant to K.S.A. 82a-732, and amendments thereto, on June 1 of each year the permit holder of an aquifer storage or recovery system shall report an accounting of water in the basin storage area to the chief engineer and to any groundwater management district identified in subsection (c) of this regulation. The annual report for the preceding calendar year shall account for all water entering and leaving the basin storage area and shall specifically compute the amount of recharge credits held in the basin storage area.

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

(1) Natural and artificial recharge;

(2) groundwater inflow and outflow;

(3) evaporation and transpiration;

(4) groundwater water diversions from all nondomestic wells;

(5) infiltration from streams;

(6) groundwater discharge to streams;

(7) the calculated recharge credits; and

(8) any other information that in the opinion of the chief engineer is pertinent to the basin storage and surrounding areas.

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

K.A.R. 5-22-1(c) "Aquifer storage" means the act of storing water in the unsaturated portion of an aquifer by artificial recharge for subsequent diversion and beneficial use.

K.A.R. 5-22-1(d) "Aquifer storage and recovery system" means a physical infrastructure that meets the following conditions: (1) Is constructed and operated for artificial recharge, storage, and recovery of source water; and (2) consists of apparatus for diversion, treatment, recharge, storage, extraction, and distribution.

K.A.R. 5-22-1(f) "Artificial recharge" means the use of source water to artificially replenish the water supply in an aquifer.

K.A.R. 5-22-1(l) "Basin storage area" means the portion of the aquifer's unsaturated zone used for aquifer storage that has defined horizontal boundaries and is delimited by the highest and lowest index water levels.

K.A.R. 5-22-1(m) "Basin storage loss" means that portion of artificial recharge naturally flowing or discharging from the basin storage area.

K.A.R. 5-22-1(y) "Index water level" means water-level elevations established spatially throughout a basin storage area to be used to represent the maximum volume of a basin storage area and the volume of stored water available for recovery, based upon accounting methodology and the conditions of the permit.

K.A.R. 5-22-1(ee) "Recharge credit" means the quantity of water that is stored in a basin storage area and that is available for subsequent appropriation for beneficial use by the operator of the aquifer storage and recovery system.

K.A.R. 5-22-1(ff) "Safe yield" means the total quantity of groundwater meeting the following conditions: (1) Can be artificially withdrawn from an aquifer; and (2) naturally discharges to a stream without exceeding the aquifer recharge value for the area of consideration and without impairing the water rights diverting from the aquifer.

K.A.R. 5-22-1(mm) "Water balance" means the method of determining the amount of water in storage in a basin storage area by accounting for inflow to, outflow from, and changes in storage in that basin storage area.

K.A.R. 5-22-2. Well spacing requirements. (a) Except as specified in subsections (d) and (e), the minimum spacing of all nondomestic and nontemporary wells described in an

application for permit to appropriate water for beneficial use, an application for a term permit, or application to change the point of diversion shall be the following: (1) 1,320 feet from all nondomestic wells, groundwater pits, and baseflow nodes; and (2) 660 feet from all domestic wells.

K.A.R. 5-22-7. Safe yield. (a) Except as specified in subsection (b), the approval of each application for a change in the point of diversion, term permit, and permit to appropriate water for beneficial use shall be subject to the following requirements: (1) The sum of prior appropriations shall include all of the following: (A) The proposed application; (B) vested rights; (C) appropriation rights; (D) term permits; (E) earlier priority applications; and (F) baseflow nodes. The sum of prior appropriations shall not exceed the allowable safe-yield amount for the area of consideration. The non-consumptive use of groundwater previously authorized by the chief engineer shall be excluded from the sum of prior appropriations.

(b) The following shall not be subject to this regulation . . . (7) an application for an aquifer storage and recovery well.

K.A.R. 5-3-9. Public interest. (a) In accordance with K.S.A. 82a-711(b)(5), as amended, in ascertaining whether a proposed use will prejudicially and unreasonably affect the public interest, the chief engineer shall also take into consideration the quantity, rate and availability of water necessary to: (1) satisfy senior domestic water rights from the stream; (2) protect senior water rights from being impaired by the unreasonable concentration of naturally occurring contaminants; and (3) over the long term reasonably recharge the alluvium or other aquifers hydraulically connected to the stream. (b) Unless otherwise provided by regulation, it shall be considered to be in the public interest that only the safe yield of any source of water supply, including hydraulically connected sources of water supply, shall be appropriated.

This administrative hearing is governed by K.A.R. 5-14-3a. Pursuant to that regulation, the rules of evidence are not to be strictly adhered to in the formal phase of the hearing, and the presiding officer shall apply all rules and procedures so as to provide all parties to this action a reasonable opportunity to be heard and present evidence.

The City shall bear the burden of proof, proving by a preponderance of the evidence, that the proposed changes to the project should be approved. K.A.R. 5-14-3a(n)(1). The proposed changes must meet the requirements set forth for Aquifer Storage and Recovery projects in pertinent statute and regulation. These requirements include demonstrating that the proposed changes will meet the criteria of K.S.A. 708b and K.S.A. 82a-711 (will not cause impairment to existing water rights, are related to the same local source of supply, and will not unreasonably and prejudicially affect the public interest). (Prehearing Order, May 1, 2019; Order to Modify Hearing and Schedule, September 27, 2018; Pre-Hearing Conference Order, July 23, 2018.)

Administrative Notice

Prior to the start of the hearing in December of 2019, the undersigned Presiding Officer took administrative notice of the following: the Kansas Water Appropriation Act, K.S.A. 82a-701, *et seq*., and other Kansas statutes; Kansas Administrative Regulations promulgated by the Chief Engineer of DWR; and orders issued by, or on behalf of, the Chief Engineer, including the approved water appropriation permits for the City of Wichita ASR Phase I and II projects; and official written explanations, transmission documents and findings and orders related to those permits. (Tr., p.11; Prehearing Order on Final Status Conference, November 24, 2019.) During the hearing, the undersigned Presiding Officer took administrative notice of prior iterations of K.A.R. 5-1-1. (Tr., p.2782.)

Expert Testimony at the Hearing

The following expert witnesses presented testimony at the hearing. The record citations to admitted expert reports are noted where applicable.

City's Expert Witnesses:

John Winchester, Professional Engineer with High Country Hydrology

Daniel W. Clement, Staff Hydrogeologist with Burns and McDonnell

Luca DeAngelis, Professional Engineer and Professional Geologist with Burns and McDonnell

Joe Pajor, Deputy Director of Public Works for the City

Don Henry, Assistant Director of Public Works and Utilities for the City

Paul McCormick, Professional Engineer, Associate Geological Engineer with Burns and McDonnell (Rebuttal Expert Report, City Ex. 29.)

Scott Macey, Professional Engineer with the City's Public Works Division

GMD2 Expert Witnesses:

Masih Akhbari, Ph.D., Professional Engineer with Larry Walker Associates (Expert Report at GMD Exs. 64, 66.)

Tim Boese, Manager, Equus Beds Groundwater Management District No. 2 (Expert Report at GMD Exs. 39, 83.)

David L. Pope, P.E, Former Chief Engineer for DWR (1983-2007) (Expert Report at GMD Exs. 1, 2).

DWR Expert Witnesses:

Lane Letourneau, Program Manager for DWR's Water Appropriation Program (DWR's Pre-Hearing Brief and Written Testimony, filed March 18, 2019; Deposition at GMD Ex. 20.)

Intervenors' Expert Witnesses:

George A. Austin, Professional Engineer, d.b.a. Aqueous Fortis Consulting (Expert Report at Int. Exs. 2, 3)

GMD2 and Intervenors' Shared Expert Witness

Dave Mark Romero, President of Balleau Groundwater, Inc., Certified Professional Hydrologist (Expert Report at GMD Exs. 68, 69.)

I. FINDINGS OF FACT

Based on a comprehensive review of the record as a whole, and based on substantial competent evidence within that record, the following facts are found to be true. The facts (and relevant evidence in support) are grouped herein by issue or topic for ease of reference; however, many facts and evidentiary components are relevant to more than one issue or topic.

A. Background on City of Wichita's Water Rights and Water Supply

1. The City of Wichita ("City") owns water rights in the Equus Beds well field, located in Harvey and Sedgwick Counties, Kansas, between the Arkansas and Little Arkansas Rivers. (Vested Water Right, File No. HV-006, Water Rights, File Nos. 388 and 1006). These water rights in the Equus Beds well field authorize the diversion of up to 40,000 acre-feet of groundwater per year from the Equus Beds Aquifer ("Aquifer") (Letourneau, Tr. p.1245.). The City also owns water rights that allow it to divert a maximum of approximately 60,000 to 70,000 acre-feet of surface water annually from Cheney Reservoir, and additional groundwater rights in the E&S Wellfield and the Bentley Reserve Wellfield. (See Letourneau, Tr. p.1774.)

2. The City also owns water rights that allow it to divert a maximum of 45,230 acre-feet annually from the Little Arkansas River for the combined uses of municipal and artificial recharge. (Permit File No. 46,627.)

3. The groundwater in the Aquifer is also authorized for use under other existing water rights in the area, including irrigation. [City Exh. 1, Att. E, USGS Scientific Investigations Report (SIR) 2013-5042.]

4. The City's total annual water use is approximately 60,000 to 70,000 acre-feet. (Letourneau, Tr. p.1775.)

5. From 1989 to 1992 the City used an average of 38,500 acre-feet of water per year from the Equus Beds, essentially pumping its available water rights of 40,000 acre-feet per year. (October 10, 2008, letter from City to GMD2; GMD Ex. 53.)

6. According to the 2013 USGS report, "[s]ubstantial water-level declines in the Equus Beds aquifer have resulted from pumping groundwater for agricultural and municipal needs, as well as periodic drought conditions since 1940." (USGS SIR 2013-5042, p.1.)

7. Following a drought in 1991-1992, Aquifer depletion and a continuing water level decline led the City to implemented an Integrated Local Water Supply Plan (ILWSP). This ILWSP involved a "conscious transition" from using groundwater in the Aquifer as its primary source to relying primarily on surface water from Cheney Reservoir (these uses were authorized under the City's existing water rights). The purpose was to take "as much water as possible from surface water supply and reducing our dependence on the groundwater resource in the Equus Beds." (Pajor, Tr. p. 145.)

8. The City's integrated local water supply plan resulted in the City using surface water from Cheney Reservoir to meet 60% of the City's needs, instead of the previous 40%. (Pajor, Tr. p.146.)

9. Prior to 1993, the City's primary use of Equus Beds groundwater, as opposed to surface water from Cheney Reservoir, contributed to the depletion of the aquifer. As stated in the

Proposal, "Prior to implementation of the ILWSP, the EQBW supplied 60 to 70 percent of the City's annual municipal water supply. The over-appropriation and heavy utilization of groundwater with the EBWF began to cause groundwater level declines and concerns about long-term yield and water quality of the aquifer." (City Ex. 1., p.3-2; see also Letourneau, Tr. p.1429.)

10. The City's shift to reliance on surface water and the reduced use of groundwater, as well as the use of less than the maximum authorized quantity by irrigators in the area, contributed to a substantial increase in water levels in the Aquifer between 1993 and 2016. (City Ex. 1, Fig. 13; Boese, Tr. p2208; GMD Ex. 43, p.61.)

11. Another issue facing the City and other area water users was the migration of the Burrton salt plume, a column of chloride contamination moving towards the Equus Beds well field from the northwest. (USGS SIR 2013-5042, p.1.)

B. City's ASR Project Phase I

12. In March 2006, the City began construction of the Equus Beds ASR project to store and later recover groundwater, and to form a hydraulic barrier to the known chloride plume near Burrton, Kansas. (USGS SIR 2013-5042, p.1.) The Aquifer Storage and Recovery project (Project) would allow the City to divert surface water flows from the Little Arkansas River during times of high flows, treat that water to drinking water standards, inject it into the Aquifer, and later withdraw a corresponding amount of water from the Aquifer.

13. David L. Pope was Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture at the time the City initiated discussions with him about creating an aquifer storage and recovery (ASR) program under Kansas regulatory law. (Pope, Tr. pp.2702-

03). Consequently, under his statutory authority as Chief Engineer (K.S.A. 82a-706a), Pope promulgated regulations to govern ASR projects. (*Id*.)

14. On July 3, 2003, the City filed applications with the Chief Engineer seeking approval of Phase I of their ASR project. The applications sought appropriation permits to divert high flows of surface water from the Little Arkansas River, to be treated and injected into the Equus Beds Aquifer by means of three wells and three recharge basins, to be later withdrawn by means of the same aquifer storage and recovery wells for municipal purposes. Chief Engineer Pope approved the applications, detailing the conditions, in a Findings and Order dated August 8, 2005. ("In the Matter of the City of Wichita's Applications to Operate an Aquifer Storage and Recovery Project in Harvey and Sedgwick Counties, Kansas"; GMD Ex. 26.) This approved project is referred to herein as ASR Phase I.

15. The Phase I order contained a number of findings and conclusions, including the following:

a. "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." (Finding No.4.)

b. That the City and Equus Beds Groundwater Management District No. 2 (GMD2) entered into a Memorandum of Understanding (MOU Phase I) documenting the agreements related to the proposed installation and operation of the ASR project, a final version of which was filed with the office of the Chief Engineer. (Finding Nos.5, 26.) Other findings referenced aspects of MOU Phase I, and the fact that in accordance with that MOU, GMD2 recommended approval of the City's

applications for the ASR project, subject to conditions set out in its recommendations. (Finding No.43.)

c. 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 level for that index well, the public interest in not diverting Equus Beds groundwater will be protected." (Conc. No.13.)

d. "That passive recharge credits should not be allowed because they are not 'artificial recharge' as defined in K.A.R. 5-1-1, because no source water is being artificially recharged to create those credits." (Conc. No.3.)

e. The ASR project was determined to be in the public interest because it would (1) make the City's long-term water supply more reliable, (2) delay or stop the Burrton salt plume from entering the area and contaminating the fresh water source of supply, and (3) raise the water level in general which in turn saves water users in the area energy and money. (Conc. No.26.)

16. The City's Proposal which is the subject of these proceedings does not request any modification to the ASR Phase I approval.

17. A primary purpose for the ASR Phase I project was to create a hydraulic barrier to prevent movement of the Burrton chloride plume. (City, Ex. 19, p.4; USGS SIR 2013-5042, p.1.)

C. City's ASR Project Phase II

18. In November of 2006 and February of 2007, the City of Wichita filed applications with the Chief Engineer seeking approval of Phase II of its ASR project. The applications sought to divert high flows of surface water from the Little Arkansas River by means of a surface water

intake, treat the water to drinking water standards and inject it into the Equus Beds Aquifer, for later withdrawal by means of the same aquifer storage and recovery wells for municipal purposes. (GMD Ex. 28.)

19. In a letter to the GMD2 Board of Directors dated October 10, 2008, the City requested a waiver or exemption from the well-spacing requirements of K.A.R. 5-22-2(a): "whereas ASR water rights may be utilized only when water levels exceed the level observed in 1993, and whereas without the exemption on well spacing, the extensive number of existing domestic and non-domestic wells will make it impossible for the City to install an adequate number of recharge wells in the project area, the City requests that ASR wells be determined to be exempt from well spacing requirements". (GMD Ex. 53, p.2.)

20. The Chief Engineer has the authority to waive regulations adopted by the Chief Engineer if it is shown that granting the exemption or waiver will not prejudicially nor unreasonably affect the public interest and will not impair an existing water right. K.A.R. 5-10-4.

21. Chief Engineer David Barfield approved the 2006 and 2007 ASR applications, detailing the conditions in a Findings and Order dated September 18, 2009. ("In the Matter of the Findings and Order For the City of Wichita's Aquifer Storage and Recovery Project – Phase II"; GMD Ex. 28.) This approved project is referred to herein as ASR Phase II.

22. The Phase II approval contained a number of findings, including the following:

a. This order contained the same definition of "aquifer storage and recovery" as detailed in the Phase I approval. (Finding 6.)

b. That the City and Equus Beds Groundwater Management District No. 2 (GMD2) entered into a Memorandum of Understanding (MOU), dated December 3, 2008, documenting the agreements related to the proposed permitting, installation and

operation of the ASR Phase II project, a final version of which was filed with the office of the Chief Engineer. (Finding 7.) Other findings referenced aspects of the MOU, and the fact that in accordance with the MOU, GMD2 recommended a waiver of the applicable well spacing requirements, and approval subject to specific conditions. (Findings 12, 15.)

c. "That as referenced by GMD #2 in their recommendation of approval, and to maintain consistency with the Phase I ASR project," this approval incorporated the pertinent conditions established in the Phase I orders, including the following:

   i. "That passive recharge credits shall not be allowed."

   ii. That the locations of the index wells and index water levels for the basin storage area shall be as set forth in attachments to the Phase I order.

   iii. "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."

   iv. That water shall only be injected into the basin storage area by means of the injection wells when the water level within 660 feet of an injection well is 10 feet or more below the land surface elevation.

   v. That recharge credits may be withdrawn from an index 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.

vi. That water may be recharged when the static water level is below the lowest index level in that well.

vii. The City shall annually report an accounting of water diverted from the surface water intake and recharged into the basin storage area in the Equus Beds Aquifer, per specifications outlined in the approval.

23. The Phase II approval contained specific order provisions which applied the findings listed immediately above (and others) as mandatory aspects of the approval.

24. The Phase II approval was comprised of the following:

a. An Approval of Application and Permit to Proceed authorizing the City to divert a total combined maximum of 45,320 acre-feet of surface water per year from the Little Arkansas River during times of high flows, for artificial recharge and municipal use. (Water Right File No. 46,627.) This permit allowed for two types of use: (1) diversion for immediate municipal use by the City, and (2) injection into the Aquifer for artificial recharge for which a recharge credit is earned. The former contributes to perfection for municipal use; the injection of water (and simultaneous accumulation of an ASR credit) contributes to perfection for artificial recharge. (Letourneau, Tr. p.1809.)

b. An Approval of Application and Permit to Proceed for each of 24 additional initial applications authorizing the withdrawal of "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." (Water Right File Nos. 46,714 to 46,733 and 47,718 to 47,181). Each of these permits authorized recovery of recharge credits up to a maximum annual quantity of 500

acre-feet each. Under these permits, the withdrawal of recharge credits from storage in the Aquifer, for use in the City, would contribute to perfection for municipal use. (Letourneau, Tr. p.1811.)

c. Each of the recovery approvals includes provisions similar to the following excerpt from File No. 46,714: "19. 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)." A similar requirement reflecting the 1993 levels for each index cell is included for each of the recovery permits. (Boese, Tr. pp.2102-2103; Water Right File Nos. 46,714 to 46,733 and 47,718 to 47,181, *et al.*).

d. Each of the recovery approvals includes provisions similar to the following excerpt from File No. 46,714: "7. That the applicant shall not be deemed to have acquired a water appropriation right for groundwater from the Equus Beds aquifer, except for recovery of water recharged pursuant to the approved aquifer storage and recovery project". (Water Right File Nos. 46,714 to 46,733 and 47,718 to 47,181, *et al.*).

e. Each of the recovery approvals includes provisions similar to the following excerpt from File No. 46,714: "25. That this approval of application is subject to the terms, conditions, and limitations of the Memorandum of Understanding between Equus Beds Groundwater Management District No. 2 and the City of Wichita, Kansas, dated December 3, 2008". (Water Right File Nos. 46,714 to 46,733 and 47,718 to 47,181, *et al.*).

f. Seven additional permits authorizing one recharge well each were approved for ASR Phase II on September 28, 2010, with conditions essentially identical to the first 24 Phase II permits; one notable exception is that these seven permits authorized a total maximum annual recharge quantity of 1000 acre-feet each, as compared to the 500 acre-feet limit for the first 24 permits. (Permit Nos. 47,400, 47,448 to 47,453.) The sum of the maximum authorized quantities under the initial 31 permits yields a total of 19,000 acre-feet maximum authorized for each recharge year.

25. The ASR Phase II approval initially authorized a total maximum quantity of 19,000 acre-feet in artificial recharge credits which the City could pump each year (if the recharge credits were available). (Boese, Tr. p.2962.) This maximum authorized quantity would be in addition to the City's 40,000 acre-feet of native water rights in the Equus Beds Aquifer. (Letourneau, Tr. p.1247.) The recharge credits could only be pumped to the extent that the City has earned them through physical injection into the Aquifer. (*Id.)*

26. The Phase II approval expressly requires compliance with the MOU between the City and GMD2 as a condition of the approval. This MOU is dated December 3, 2008. ("Memorandum of Understanding Between Equus Beds Groundwater Management District No. 2 And The City of Wichita, Kansas Regarding Wichita's Proposed Aquifer Storage and Recovery Project, Phase II"; GMD Ex. 27.) This MOU detailed eight Items of Understanding upon which the City and GMD agreed, including:

"Issue 5. How can the City protect domestic water wells from changes in water quality standards? Commitment: 'If water quality in existing or future domestic wells meet the then-current drinking water standards and the water quality is subsequently

changed by the Project such that those standards are not met, the City will provide and install a home water treatment system to bring the water back to drinking water standards or provide other remedies . . . without additional cost to the resident.'"

"Issue 6. How will the City protect domestic water wells within 660 feet of a Project recharge and recovery well from adverse drawdown impacts that may result from operation of the well? Commitment: 'Because the Project recharge and recovery wells can only be pumped if water levels in the aquifer are higher than the historic low level, no impairment is expected. Nonetheless, if a domestic water well, existing before the approval of this MOU and within 660 feet of an existing or new Project 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.'"

27. The MOU further stated the agreement between the City and GMD2 that, as to water permit applications filed by the City which, in all other respects comply with GMD2 regulations and for which the proposed wells are to be used for aquifer recharge as defined by regulation and withdrawal of water for an authorized use, GMD2 agreed to recommend waiver of applicable well spacing requirements. The City would need to submit a petition for such waiver to GMD2; said petition would be granted by GMD2 upon a finding that the conditions set out above did exist and that the granting of the waiver would not unreasonably impair the public interest.

28. Tim Boese, Manager of GMD2, testified that the "conditions set out above", referenced in the MOU, included the wells into which water would be injected for artificial recharge and then withdrawn at a later time. (Boese, Tr. pp.2156-2157.)

29. Boese testified that, as to well spacing regulations, domestic well owners may consent to a waiver of those regulations when a proposed well is within 1320 feet of their domestic well, but a waiver of the spacing regulations for a non-domestic well must go before the GMD2 board of directors for recommendation. (Boese, Tr. p.2959.)

30. Between 2006 and 2016, pursuant to the approved ASR process, 9844.91 acre-feet of treated surface water was injected into the Aquifer, resulting in total accumulated ASR credits (for that period) of 6372.2 acre-feet. (McCormick, Tr. pp.1177-1178; GMD Ex. 75, Table 2.3.)

D. City's Proposal to Modify ASR Phase II Permits

31. On March 12, 2018, the City submitted to the Chief Engineer of DWR, "ASR Permit Modification Proposal Revised Minimum Index Levels & Aquifer Maintenance Credits" ("Proposal"). (City Ex. 1.) The Proposal consists of two requests: (1) obtain a new type of recharge credit, called an Aquifer Maintenance Credit (AMC) based on water left in storage in the Aquifer (adjusted for imputed initial and recurring losses), when the Aquifer is at or near capacity, through the diversion of surface water from the Little Arkansas River that is sent directly to the City for municipal use, and (2) lower the minimum index levels at which the City can withdraw recharge credits. (City Ex. 1.)

32. Also, on March 12, 2018, the City submitted a cover letter with its Proposal, containing attachments that listed (1) the thirty existing ASR Phase II permits for which it hoped to modify, (2) the thirty new ASR Phase II applications for recharge and recovery wells, and (3) the nine existing permits excluded from consideration of modified permit conditions.

33. The Proposal seeks to modify thirty of the ASR Phase II recharge well permits and identifies them by file number in the City's cover letter to Chief Engineer Barfield dated March 12, 2008. (City Ex. 1.) This list does not include File No. 47,400, which was one of the permits

approved as part of the ASR Phase II project on September 28, 2010. The combined total annual maximum quantity authorized for recharge withdrawal under the thirty permits (for which modification is sought) is 18,000 acre-feet. (See Permit File Nos. 46,714 to 46,733, 47178 to 47,181, 47,488 to 47,453; Boese, Tr. pp.2266-2267.)

34. The thirty new applications, if approved, would increase the City's authorized maximum annual withdrawal of recharge credits from 18,000 acre-feet to 30,000 acre-feet. (Letourneau, Tr. pp.1822-1823.)

35. The Proposal's lower minimum index levels and the AMC concept, if approved, would apply to future applications that the City may file related to the City's ASR Phase II project. (Tr. Vol.XI, pp.3008-3009; City Ex. 1, p.3-6.)

36. The record contains GMD2's initial evaluations of the 30 additional applications that the City filed simultaneously with the submission of the Proposal, including safe yield and well spacing evaluations; none of these applications met regulatory safe yield requirements. (GMD Ex. 41; Boese, Tr. 2992.)

37. In an order issued September 27, 2018, Chief Engineer Barfield stated, "Upon request of the City of Wichita, the new applications filed by the City and originally scheduled to be considered at the public hearing in this matter, will be dismissed." ("Order to Modify Hearing and Schedule", Sept. 27, 2018.)

38. The Proposal does not account for significant water being available to the City from the Bentley Reserve Wellfield or the E&S Wellfield; Daniel Clement of Burns and McDonnell testified that the E&S Wellfield is an alluvial wellfield that relies on surface water flows in the Arkansas River for support and the Bentley Reserve Wellfield wells have permit conditions tying

their use to flows in the Arkansas River, therefore neither source would be "a firm source" during low flows. (Clement, Tr. pp.882-883; See McCormick, Tr. p.1368.)

E. Over-Appropriation

39. The City's well field is over-appropriated. (Pope, Tr. p.2727; Boese, Tr. p.2261; Pajor, Tr. p.219-20.) This means that more than the total water available from the Equus Beds Aquifer is already appropriated for someone's use. (Pajor, Tr. p. 333-334; Letourneau, Tr. p.1820; Boese, Tr. p.2407.)

40. Lane Letourneau, Program Manager for DWR's Water Appropriation Program, testified that, due to over-appropriation, new applications are not being approved for the Equus Beds well field. (Letourneau, Tr. p.1820.)

41. Letourneau testified that, even though the Equus Beds Aquifer may be approximately 80 percent full now, new applications are not being approved because of the extent to which the area exceeds safe yield. (Letourneau, Tr. pp.1820-1821.)

42. Boese testified that the Wichita well field central area has effectively been closed to new appropriations since the district's safe yield regulation went into effect, with the possible exception of some small use permits. (Boese, Tr. p.2395.)

F. City's Drought Planning

43. The City approved a Drought Response Plan on October 8, 2013, identifying 4 stages of response, depending on the severity of drought. (City Ex. 16; Henry, Tr. p.519.) Stage 1 involves voluntary conservation; Stage 2 imposes some mandatory timed restrictions on outdoor water usage, discretionary conservation measures by the City, and reducing diversions from Cheney Reservoir; Stage 3 bans all outdoor water usage for residential, wholesale and most business customers, exempting businesses that rely on outdoor water usage for their core

economic activity; Stage 4 bans all outdoor watering and customers (other than hospitals) would be required to reduce their demand by 15%. (City Ex. 16.)

44. According to Joe Pajor, the Deputy Director of Public Works for the City, the City's strategic plan for water supply (2014) focused on meeting the goal of lasting through a one percent exceedance drought without having to impose Stage 3 and 4 of their Drought Response Plan. Don Henry, Assistant Director of Public Works and Utilities for the City of Wichita, corroborated this statement. (Pajor, Tr. p.156; City Ex. 18; Henry, Tr. p.522.)

45. The goal of lasting through a one percent exceedance drought without having to impose Stage 3 or 4 restrictions would be achieved by increasing the water supply by 10 million gallons per day (mgd) and conserving .35%. (Ex. 9; Pajor, Tr. p.156.)

46. Pajor testified that the rationale for the current Proposal is twofold: (1) the Aquifer recharged from 1993 levels to nearly functionally full to predevelopment conditions, and (2) the only water the City needs in addition to Cheney Reservoir's surface water and the Equus Beds well field is water during a severe drought, so "the ASR's mission today is to become that supply" during protracted severe drought to meet customer demands "that our native rights in our water sources do not meet." (Pajor, Tr. p.297-298; See Henry, Tr. p.523; Letourneau, Tr. p.1240.)

47. Pajor testified, "In non drought (sic) conditions we have sufficient supplies in our native water rights to meet customer demand throughout the 50 year planning period." (Pajor, Tr. p.152.)

48. The City anticipates using approximately 50,000 acre-feet of recharge credits, in addition to its native Equus Beds water rights of 40,000 acre-feet over its modeled eight-year drought period. (City Ex. 1, Table 2-5; Pajor, Tr. p.209.)

49. The City's Strategic Plan for water supply did not include AMCs or changing the minimum index levels. (Pajor, Tr. p.252-253.)

50. The State of Kansas requires communities to plan for a minimum of a two percent drought, which occurs roughly every 50 years. (Henry, Tr. p.521; City Ex. 18, p.1.)

G. Aquifer Maintenance Credits (AMCs)

51. In its Proposal, the City describes the groundwater level recovery in the Aquifer that has occurred since 1993, noting the general benefit of a fuller Aquifer to the City and other groundwater users in the area. (City Ex 1, p.3-1.)

52. The Proposal states, "It is clear that higher groundwater levels directly limit the physical recharge capacity of the City's Aquifer Storage and Recovery program." (City Ex. 1, pp.3-1.) This statement reflects the fact that, when the Aquifer is more full, the City has limited room to inject surface water, and thereby has a limited ability to earn recharge credits to use later. The ASR Phase I and II permits prohibit the City from injecting treated surface water into the basin storage area when the water level within 660 feet of an injection well is 10 feet or more below the land surface elevation. (GMD Exs. 26, 28.)

53. The City's requested solution to allow it the ability to earn more credits for future use is to divert surface water from the Little Arkansas River (at times of high flows) and directly send the surface water to the City's main treatment plant for consumption for municipal use by the City, bypassing the act of storing the water in the Aquifer. The City would thereby earn a new kind of recharge credit for "water left in storage", on the theory that the City could have pumped, but did not pump, water they previously injected into the Aquifer. (Pajor, Tr. pp.242-243; McCormick, Tr. p. 123; City Ex. 1, p.3-1.) The City calls this new kind of credit an Aquifer Maintenance Credit (AMC). The City could then use its Aquifer Maintenance Credit at a later

date to pump water from the Aquifer and send it to the City to be consumed for municipal use; that same water would be water that had already earned the City an ASR credit based on its earlier physical injection into the Aquifer. (*Id*.; Pajor, Tr. p.330.)

54. The Proposal extends the AMC concept to include the diversion of surface water from two sources: a surface water diversion on the Little Arkansas River and bank storage wells. (City Ex. 1., p.3-6.)

55. The accumulation of AMCs is not limited by, or correlated to, the amount of water the City could have pumped, but did not, under the AMC scenario. (Letourneau, Tr. pp.1828,1984.)

56. AMCs are not referenced in, or authorized by, existing statutes or regulations. This fact is uncontroverted.

57. Letourneau testified that, in his 33 years of working for DWR, the concept of AMCs is "new" and he had never seen anything like this elsewhere in the state. (Letourneau, Tr. p.1526.)

58. The six steps in the City's currently approved ASR process are: (1) at times of high flows, surface water is diverted from the Little Arkansas River; (2) this water is then treated in the ASR treatment facility; (3) after treatment, the water is injected into the Aquifer; (4) the injected water is stored in the basin storage area of the Aquifer; (5) the amount of that stored water lost to seepage, etc., is determined; and (6) to the extent that water was not lost, the water would then be withdrawn and sent to the City for municipal use. (Letourneau, Tr. p.1315.)

59. Of the six steps involved in the ASR process, several of those steps do not occur in the AMC process. (Letourneau, Tr. p.1746.)

60. The current physical ASR process involves two beneficial uses: (1) artificial recharge use when surface water is taken out of the Little Arkansas River and injected into the Aquifer, and (2) municipal use when the recharge credit (earned by physically injecting the water into the

aquifer) is withdrawn such that groundwater is taken to the City to be used in the municipal water supply. (Letourneau, Tr. pp.1317-1318.)

61. Pajor testified that the City's policy preference is to keep the Aquifer as full as the City can keep it. (Pajor, Tr. p.186).

H. Passive Recharge Credits

62. The Approval orders for ASR Phase I and Phase II both expressly forbid passive recharge credits. (GMD Ex. 26, p.14 of 21; GMD Ex. 28, p.5.) The ASR Phase I and Phase II approval orders contain the following declaration, "That passive recharge credits shall not be allowed." (GMD Ex. 26, p.14 of 21; GMD Ex. 28, p.5.)

63. David L. Pope, Chief Engineer from 1983 to 2007, who was a key developer of the City's ASR Project, approved ASR Phase I and promulgated the ASR regulations, testified that, during the creation of the ASR regulations and during the review of the ASR Phase I applications, the concept of passive recharge was extensively reviewed and carefully considered; it was ultimately determined that the passive recharge concept was not consistent with the law because no physical recharge would actually occur. (Pope, Tr. p.2707.)

64. Pope testified that his understanding of passive recharge credits is that they would "result in recharge credits being accrued as a result of not pumping water from the City's existing wells" in the well field. (Pope, Tr. p.2707.)

65. Pope testified that the concept of passive recharge was an important issue during his development of the ASR regulations and was a "front and center issue" in the development of the City's ASR Phase I project, that the City wanted to earn recharge credits for physical recharge and for not pumping their wells. (Pope, Tr. pp.2812-2815.)

66. Pope testified that, in the context of whether passive recharge hinges on whether the water comes from Cheney Reservoir or another source, where the water comes from is not as important as the fact that water would be taken directly to the City without physical recharge, the latter being the "fundamental difference." (Pope, Tr. p.2832.)

67. The term "passive recharge credit" is not defined in statute or regulation, but the definition is actually obtained from the ASR Phase I and Phase II approval orders. (Letourneau, Tr. p.1633.)

68. The ASR Phase I approval order uses the following language to clarify the concept of "passive recharge": "water which the City could have legally pumped but did not pump" and "credits for not pumping City wells in the basin storage area". (GMD Ex. 26, pp.2 and 9 of 21.)

69. The ASR Phase I approval order contained the following conclusion: "That passive recharge credits should not be allowed because they are not 'artificial recharge' as defined in K.A.R. 5-7-1, because no source water is being artificially recharged to create those credits." (GMD Ex. 26, p.11 of 21.)

70. Letourneau testified that the ASR Phase I order required source water to be physically injected into the Aquifer as part of the ASR project, and if source water was not going to be physically injected into the Aquifer, then it would be considered a passive recharge credit. (Letourneau, Tr. p.1631.)

71. Letourneau testified that he had no reason to believe that the definition of passive recharge credits would have changed between the ASR Phase I and Phase II approval orders. (Letourneau, Tr. p.1636.) Boese testified that the same definition of passive recharge applied to both Phase I and II orders. (Boese, Tr. p.2107.)

72. Letourneau testified that DWR still agrees with the definition or implied definition of passive recharge credits as found in the ASR Phase I order. (Letourneau, Tr. pp.1637-1638.)

73. Letourneau testified that it is still DWR's position that passive recharge credits should not be allowed. (Letourneau, Tr. p.1636.)

74. Pope testified that the use of AMCs would be a form of passive recharge credits, which are not authorized under the Kansas Water Appropriation Act, are not allowed pursuant to the ASR regulations, and are prohibited by the ASR Phase I and II approval orders. (Pope, Tr. 2729; GMD Ex. 2, pp.10-11.)

75. Boese testified that the AMC concept in the City's Proposal constitutes passive recharge credits, "I believe that's exactly what it is." (Boese, Tr. p.2205.)

76. Letourneau testified that other users of Equus Beds water may use less than their maximum authorized quantities, but they do not receive any credits for the water they leave in the aquifer because they are not part of an ASR project. (Letourneau, Tr. p.1829.)

77. Pajor testified that the basis of an AMC is that the City has left a quantity of water in the Aquifer, that the water forming the basis of an AMC is water that the City left there in a prior period." (Pajor, Tr. p. 194.) Pajor testified that the existence of an AMC depends on the City having left water in the Aquifer to satisfy a credit earned in an earlier period. (Pajor, Tr. p.194.)

78. Pajor testified that, in the AMC concept, no source water would be put into the Aquifer. (Pajor, Tr. p.241.)

79. Pajor testified that in the AMC concept, no physical recharge of the Aquifer would occur. (*Id*.)

80. Pajor testified that he does not have any knowledge of what qualifies as a passive recharge credit.

81. Clement stated that, under the AMC concept, the City "wouldn't get an AMC credit for anything you could physically inject". (Clement, Tr. p.760)

82. Letourneau testified that, under the Proposal, when an AMC is accumulated, no physical recharge is occurring and no source water actually enters the Aquifer. (Letourneau, Tr. pp.1453-1454; See Boese, Tr. p.2238.) Boese corroborated this statement. (Boese, Tr. p.2238.)

83. Letourneau testified that an AMC represents water left in storage, and when an AMC is used, physical water would be withdrawn from the Aquifer. (Letourneau, Tr. p.1515.)

84. McCormick asserted that he is familiar with passive recharge credits and that the AMC concept does not constitute passive recharge credits. (McCormick, Tr. pp.1121-1122.) McCormick explained that, in his view, AMCs are not passive recharge credits because the City's act of treating the surface water and use of the ASR infrastructure defeats a characterization of AMCs as "passive". (McCormick, Tr., p.1123-1125.) McCormick also opined that AMCs do not constitute passive recharge credits because they involve the diversion of Little Arkansas River flows that could potentially be injected into the Aquifer. (McCormick, Tr. p.1128.)

I. Accounting for Aquifer Maintenance Credits

85. The Proposal describes a distinction between accounting for physical ASR credits and AMCs: "using the current accounting process for AMCs would be impractical as the physical ASR recharge accounting relies on a comparison of groundwater modeling results that utilize actual metered physical recharge values compared to actual water levels. There would be no observed water levels to compare the AMC results against, since the location of the AMC recharge would be theoretical." (City Ex. 1., p.4-1.)

86. Letourneau testified that, under the AMC concept, there is no ability to meter the water as it enters the Aquifer because there is no physical water injected into the Aquifer. (Letourneau, Tr. p.1444.)

J. AMCs' Compatibility with ASR Regulations

87. Letourneau testified that the AMC concept does not require water to be put into the unsaturated portion of the Aquifer. (Letourneau, Tr. p.1733.)

88. Letourneau testified that, under the AMC concept, when aquifer maintenance credits are withdrawn, the source of the water that is withdrawn is water left in storage in the aquifer, not source water from the Little Arkansas River. (Letourneau, Tr. p.1735.)

89. Letourneau testified that, under the AMC concept, for every gallon of water that is taken from the Little Arkansas River and sent directly to the City, another gallon can also be pumped from that Aquifer at a later point in time (minus a bit lost to leakage). (Letourneau, Tr. p.1737.)

90. Boese testified that, in the application of statutes and regulations in his role as GMD2 manager, he interprets the following to be requirements; he further testified that, according to his experience in interpreting and applying regulations, the Proposal's AMC concept does not meet these requirements:

a. "aquifer storage and recovery", as the term is used in regulations, to require physical storage of water in the aquifer, meaning physical injection of source water into the aquifer [Boese, Tr. p.2233; GMD Ex. 39, p.6; K.A.R. 5-12-1(a).];

b. "aquifer storage and recovery system" to include three steps, physical injection of source water, the storing of that source water, and the eventual recovery of that source water [Boese, Tr. p.2236; GMD Ex. 39, p.6; K.A.R. 5-22-1(d) and K.A.R. 5-1-1(f).];

c. the aquifer storage and recovery regulations to require the act of physically injecting source water into the aquifer and storing it there [Boese, Tr. p.2237-2238; GMD Ex. 39, pp.6-7; K.A.R. 5-1-1(g); 5-22-1(c), 5-1-1(e), 5-22-1(ee), 5-1-1(yyy).];

d. the injection into the unsaturated part of the aquifer is required (Boese, Tr. pp.2239-2241; GMD Ex. 39, p.6; K.A.R. 5-1-1(e); and

e. the ASR accounting process requires reporting the amount of artificial recharge, which refers to the impact of the source water injected into the aquifer [Boese, Tr. p.2247; K.A.R. 5-12-2(b)].

91. According to Pope's expert report, based on his experience spanning his career and his specific authority over the creation of the ASR program, the Proposal's AMC concept is not consistent with the Kansas Water Appropriation Act, K.S.A. 82a-701, *et seq.*, nor is it consistent with, or authorized by, the regulations K.A.R. 5-1-1, K.A.R. 5-12-1 through 5-12-4, K.A.R. 5-22-1, K.A.R. 5-22-10 and K.A.R. 5-22-17, which include regulations he adopted as Chief Engineer. (GMD Ex. 2, p.10; Pope, Tr. pp.2712-2713; 2728-2729.)

92. Pope testified that it is within the Chief Engineer's authority to modify accounting under the ASR permits, but that the AMC proposal is not just an accounting issue, and that it is very inconsistent with the Phase I and Phase II approvals. (Pope, Tr. p.2760**.)**

93. Pope testified that his final conclusion is that the City's Proposal should not be approved in its current form. (Pope, Tr. pp.2731-2732; GMD Ex. 2, p.11.)

94. Boese testified that the AMC concept would involve an as-yet undefined source of supply, (based on groundwater left in storage), which would be different from the source of supply identified and authorized under the ASR Phase II permits ("groundwater recharge credits

accumulated in the Equus Beds aquifer … recovery of water recharged"). (Boese, Tr. pp.2253-2254; Water Right File No. 46,714). He opined that the Proposal's use of a different source of supply violates the requirement that the Proposal "relate to the same local source of supply". (Boese, Tr. p.2254-2255; Order to Modify Hearing and Schedule, September 9, 2018; Prehearing Order, May 1, 2019.)

K. Other AMC Considerations

95. Pajor testified that the purpose of AMCs is to provide water during a drought. (Pajor, Tr. p.269).

96. The Proposal's list of proposed conditions does not include a restriction that the City only earn AMC credits during a time of drought. (City Ex. 1, p.3-6; Boese, Tr. pp.2177-2178.)

97. The Proposal's list of proposed conditions does not include a restriction that the City only withdraw ASR or AMC credits after exhausting its 40,000 acre-feet of native water rights. (City Ex. 1, p.3-6.) DWR has recommended this issue be addressed in the event that the Proposal is approved. (DWR Ex. 3, p.7.)

98. Letourneau testified that it is possible that, under the AMC concept, there would be two beneficial uses occurring from the same water at the same time, that water is directly used in the City for municipal use and simultaneously earning a recharge credit for future use. (Letourneau, Tr. p.1921.) Letourneau stated that, in his 28 years of looking at applications and permits and applying statutes and regulations to them, he has never seen approval of two types of uses for the same quantity of water at the same time; he testified that it cannot be done. *(Id.*)

99. Boese testified that, under the AMC concept, when water is taken from the Little Arkansas River and sent directly to the City, it creates two types of uses of the same quantity of

water at the same time: municipal and recharge credit, that it would be a "two for one" situation. (Boese, Tr. pp.2272-2274.)

L. Safe Yield

100. Letourneau testified about regulation K.A.R. 5-22-7, which refers to the rule of safe yield and how it is applied to various water right applications within GMD2, and the regulation's exemption for aquifer storage and recovery wells. (Letourneau, Tr. pp.1319-1323.) Letourneau testified that this regulation was based on the concept of actual physical injection of water into the aquifer. (*Id.*, Tr. p.1322.) Letourneau testified that ASR wells are exempt from safe yield requirements because the water pumped from them is not new water from the Aquifer, but water that originated in the Little Arkansas River that's been induced to the Aquifer. (*Id.*, Tr. p.1323.)

101. The GMD2 safe yield regulation has not been modified to account for AMCs. (Letourneau, Tr. p.1500.)

102. Letourneau testified that it is GMD2's role to make the initial determination as to whether safe yield applies to an application or not. (Letourneau, Tr. p.1512.)

103. Boese testified that he performed a safe yield analysis on all 30 of the existing ASR Phase II permits for purposes of this hearing process. (Boese, Tr. p.2210.) Boese concluded that none of them meets meet safe yield; some of them exceed safe yield substantially; if ASR quantities were factored in, the areas would be "even more grossly over-appropriated"; and he would not recommend them for approval. (Boese, Tr. p.2222-2223; GMD Ex. 59.)

104. Boese testified that, per regulations, ASR wells (with physical injection of water into the aquifer) are exempt from safe yield requirements because they add water to the aquifer from a source outside the aquifer, which the AMC concept does not do. (Boese, Tr. p.2211.) Boese stated that this is an over-appropriated area in which all the water is already dedicated to other

users, so that to be able to gain a new appropriation, one must add water to the system. (Boese, Tr. p.2213.) Boese stated that because an AMC would not add water into the aquifer, it would be subject to regulatory safe yield requirements. (Boese, Tr. p.2214.)

M. "Pumping a hole" in the Aquifer

105. The Proposal states that AMCs would provide the City the benefit of an "alternative procedure for establishing recharge credits during periods of high groundwater levels. *In lieu of implementing a pumping strategy to increase the storage capacity within the EBWF*", the quantity of water pumped from the Little Arkansas River that could not be physically recharged would be sent directly to the City for municipal use. (Emphasis added.) (City Ex. 1, p.3-5.) As described, without AMCs, the City would pump groundwater for the purpose of creating space for injecting source water into the Aquifer to earn more ASR credits, which the City would then do more frequently than otherwise to continue to create space for earning more ASR credits.

106. Letourneau testified that the City has other options for additional water supply instead of "pump[ing] a hole in the aquifer", and that this strategy is not required by the ASR permits, but, rather, is a management decision of the City. (Letourneau, Tr. p.1832.)

107. Boese testified that a potential decision on the part of the City to pump more groundwater during times when the Aquifer is fuller, in order to create more room in the Aquifer to accumulate more recharge credits, is not required by the City's permits or by GMD2, and such a decision would be a management and stewardship choice by the City. (Boese, Tr. pp.2373, 2385.) Boese testified that he views such a decision as not good stewardship of the resource. (Boese, Tr. p.2385.)

108. Dave Mark Romero, President of Balleau Groundwater, Inc., (expert witness who provided modeling and analysis for GMD2 and the Intervenors), testified that if the City pumped

its full 40,000 acre-feet of native Equus Beds water rights to lower the aquifer levels to 1998 levels in order to create space in the aquifer to facilitate physical recharge credits, the pumping would cause 29 non-city wells in the basin storage area to lose their water columns, an impact that would not occur if the City did not take that action. (Romero, Tr. p.2602.)

109. Romero testified, "If you're trying to prevent migration of chloride from the area of Burrton and the area of the Little Arkansas, maintaining higher water levels that don't change prevents migration more than if you cycle water levels up and down." (Romero, Tr.p.2637.) He further testified that the USGS has concluded that chloride migration is occurring in that area and not lowering water levels slows that process down. (Romero, Tr. p.2638.)

N. "Functional Equivalent"

110. **110.** According to Pope's expert report, "The concept of a 'functionally equivalent method' to accumulate and account for recharge credits would not be in the public interest and should not be allowed, due to the potential adverse impacts to the aquifer and other water right holders, especially during periods of extensive drought." (GMD Ex. 2, p.11.)

111. Letourneau testified that, to his knowledge, neither the Chief Engineer or any DWR staff has ever applied the concept of a "functional equivalent" in any context (other than former Chief Engineer Barfield's use of the term regarding AMCs and physical recharge credits). (Letourneau, Tr. p.1394.)

112. Letourneau testified that, regarding applicants other than the City, DWR has never attempted to apply the concept of a "functional equivalent" to any other applicant. (Letourneau, Tr. p.1395.)

113. Boese testified that, in his role reviewing water applications and permits, he has not used the concept of "functional equivalent" ("it either meets the regulations or it does not" and he has

never seen the term "functional equivalent" used (before this Proposal) in relationship to any water permit applications. (Boese, Tr. pp.2249-2250.)

O. AMC 120,000 Acre-feet Cap on Credits

114. The current ASR permits limit the amount of physical recharge credits the City is authorized to withdraw each year to a total of 18,000 acre-feet, limited by the amount of credits the City has earned through physical injection of source water into the Aquifer. (GMD Ex. 15; Pajor, Tr. p.306, See Finding of Fact No.25.)

115. The City's Proposal contains a suggested permit condition imposing a 120,000 acre-feet cap on the total amount of recharge credits that the City may accumulate of both ASR physical recharge credits and the suggested AMC credits combined. (City Ex.1 p.3-6.)

116. The current ASR permits do not contain a cap on the amount of physical recharge credits that can be accumulated. (Letourneau, Tr. p.1279.) Letourneau testified that the current ASR Phase II permits impose no total cap on withdrawing credits because, for each gallon the City withdraws (minus annual or gradational losses) the City had physically added a gallon of water to the Aquifer. (Letourneau, Tr. p.1491.)

117. Boese testified that some cap on ASR Phase II physical recharge credits is better than no cap at all, but that 120,000 acre-feet seems excessive. (Boese, Tr. pp.2263-2264.)

118. Boese testified that other water users in the already over-appropriated area utilize groundwater from the 120,000 acre-feet of storage space that the City has identified as its basis for the cap on recharge credits. (Boese, Tr. pp.2264-2265.)

119. Letourneau testified that, if the City accumulates 120,000 acre-feet of credits pursuant to ASR credits and AMCs, at least some of that 120,000 acre-feet of water would not be water the City injected into the aquifer. (Letourneau, Tr. p.1493.)

120. The testimony yielded conflicting explanations for how this 120,000 acre-feet cap was derived, including the following:

a. Henry testified that the 120,000 acre-feet cap was derived at the time of the development of the ASR program, from an estimate of the central well field storage area, based on 1993 levels. (Henry, Tr. p.545.) He said the cap also represents an estimated 11.7% of the total aquifer storage capacity within the central well field storage area. (*Id;* Henry, Tr., p.591; See Clement, Tr. p.975.)

b. Pajor testified that the 120,000 acre-feet cap was based on the estimated 60,000 acre-feet the City would need for the 1% drought protection during the 50-year planning period, although he performed no calculations or analysis to reach this conclusion. (Pajor, Tr. p.195, 225-26.)

c. McCormick testified that the 120,000 acre-foot cap was derived, by an entity other than Burns and McDonnell, by starting with the approximately 60,000 acre-feet of ASR credits the City would like to hold for a 1% drought "and then a contingency was added onto that, bumping it up to 120, which also happened to coincide with the volume of storage that had been depleted and seemed like a good target." (McCormick, Tr. pp.1155-1156.) He did not believe the cap size had been based on the available storage in the aquifer after depletion. (*Id*.)

121. Romero testified that his water budget analysis of the impact of the Proposal's lower minimum index levels showed, if the City's full 40,000 acre-feet of native right is pumped each year during the eight-year modeled drought, the remaining space in the aquifer is closer to 94,400 acre-feet. (Romero, Tr. p.2506.)

122. Letourneau testified that DWR did not perform independent modeling or calculations to determine if the 120,000 acre-foot number was accurate. (Letourneau, Tr. p.1478.)

123. The Proposal indicates that the City plans to monitor physical recharge capacity of the ASR recharge well network over time. (City Ex. 1, p.3-7.)

124. Letourneau testified that the 120,000 acre-foot cap is not dependent on actual capacity as monitored. (Letourneau, Tr. p.1484.)

P. Lowering Minimum Index Levels

125. The ASR Phase II orders contained the following condition, "That recharge credits may be withdrawn from an index 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." (See Finding of Fact No. 22, above.) The lowest index levels referenced in the Phase I and Phase II orders are the 1993 water levels (the levels to which the Aquifer dropped as a result of the 1991-1992 drought and the use preceding and during it). These 1993 levels are collectively referred to throughout these proceedings as the "minimum index level" approved under the ASR Phase I and Phase II orders. (Boese, Tr., p.2095.) The Proposal's second request is to change this permit condition to allow the City to withdraw recharge credits (when available) when the water level is lower than the currently approved 1993 levels. (City Ex. 1.)

126. In a letter to Chief Engineer Barfield dated May 24, 2013, Michael G. Jacobs, Interim Water Resources Engineer for the City, requested DWR remove the restrictions limiting recharge withdrawal to when aquifer levels are above the 1993 levels. (City Exh. 19.) In support, Jacobs explained that the City had seen aquifer levels declining despite the City's use of only about 50% of its Equus Beds water rights, attributing the levels to a recent drought and irrigation use. He asserted that if surface water became depleted, and the use of the Aquifer caused it to drop below

1993 levels, the City would be unable to withdraw its recharge credits when it needed them most. Jacobs requested DWR to "revise" the ASR Phase II permits regarding this limitation. (*Id;* See Henry, Tr. p.523.)

127. The Proposal states that the results of the one percent drought simulation were used to calculate the lowest groundwater elevation for each index well site throughout the eight-year simulated drought. (City Ex. 1, p.2-16.) It further states that an additional contingency was added to the calculated lowest groundwater elevations to derive a proposed lower index level for each index cell. (City Ex. 1, p.2-23; Tables 2-10, 2-11). The Proposal also states that an average remaining aquifer saturated thickness was derived for each index cell under the proposed levels as a percentage of predevelopment aquifer thickness. (City Ex. 1, Fig. 11.) (For facts regarding the modeling process, see "Modeling" section.)

128. Boese testified that the ASR permitting regulation in effect at the time the ASR Phase II applications were filed required (for purposes of the minimum index levels), the use of the lowest water level within ten years of filing an ASR application, and that those were the levels used in the ASR Phase II approval, although some of the measurements had been taken prior to 1993. (Boese, Tr. pp.2330-2331).

129. The City's index well levels did not fall to, or below, the 1993 levels during the drought of 2011-2012. (Pajor, Tr. p.173; Henry, Tr. p.509.)

130. Letourneau testified that the condition setting the current minimum index levels at the 1993 levels is a "fundamental aspect of ASR Phase I and Phase II orders" and the requested change would be a "fundamental modification" of the permits. (Letourneau, Tr. p.1687.)

131. Henry testified that the City and DWR agreed during the Phase I discussion and approval process that designating the 1993 water levels as the bottom of the basin storage area was reasonable. (Henry, Tr. p.575-76.)

132. In a letter dated October 10, 2008, David R. Warren, Director of Utilities for the City, requested the GMD2 Board of Directors to grant a waiver of the applicable well spacing requirements for the ASR Phase II applications. (GMD Exh. 53.) This letter acknowledges that the GMD staff had recommended denial of the applications because Phase II ASR well applications failed to meet well spacing requirements set forth in K.A.R. 5-4-4 and 5-22-2. As a justification for his request, Warren stated, "whereas ASR water rights may be utilized only when water levels exceed the level observed in 1993." (*Id.*)

133. Boese recommended to the GMD2 Board of Directors that they approve a waiver of the well spacing requirements in reliance on the commitment from the City that recovery of ASR credits would not take place if the minimum index well levels dropped below the 1993 levels. (Boese, Tr. p.2158.) Boese testified that GMD2's agreement in the MOU to recommend a waiver of the well spacing requirement was expressly conditioned on the project being an aquifer storage and recovery project in which water was injected into the aquifer and withdrawn later. (Boese, Tr. p.2156-57.)

134. As part of the ASR Phase II application process, the City sent letters to owners of domestic wells less than 660 feet from proposed ASR recharge/recovery wells, seeking the owners' consent to waive the well spacing regulations that would otherwise prevent approval for those wells. (GMD Ex. 57.) These letters provided assurances to the recipients, including the statement, "Withdrawals will not be permitted if water levels are below the 1993 base line established by the ASR permit." The letter further stated, "the City has also entered into a

Memorandum of Understanding with GMD2 that more rigorously protects the interests of domestic well owners." (*Id.*; See Letourneau, Tr. pp.1307-1308.)

135. The ASR Phase II permits expressly contain the following condition: "That this approval of application is subject to the terms, conditions, and limitations of the Memorandum of Understanding between Equus Beds Groundwater Management District No. 2 and the City of Wichita, Kansas, dated December 3, 2008". (See Finding of Fact No. 24, above.)

136. Henry testified that the conditions under which the well spacing waivers were granted are "important conditions." (Henry, Tr. p.620.) He agreed that to the extent the waivers were granted as part of the Phase II approval, and those conditions are in place, the same conditions should apply to the AMC proposal and to the lowering of the index levels. (*Id.;* See Pajor, Tr. p.322.)

137. Boese recommended at the hearing that the City should seek new well spacing waivers from the GMD2 Board and should send new letters requesting the well owners' consent to the Proposal because the previous recommendation and consents were provided in exchange for assurances of conditions the City now seeks to change. (Boese, Tr. pp. 2163-2164, 2165-2166.)

138. In the letter to Chief Engineer Barfield dated May 24, 2013 (referenced above), Jacobs acknowledged, "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." (City Ex. 19.) Jacobs further stated, "A primary purpose of the [Phase I] ASR Project was to begin formation of a freshwater barrier to the salt water contamination moving towards the wellfield (sic) from the Burrton area. Both Conclusion No. 13 and Order No. 8 [setting the 1993 standards for minimum index levels] 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." (City Ex. 19, p.4)

139. Henry testified regarding concerns reflected in the May 24, 2013 Jacobs letter that withdrawing credits below the 1993 water levels would deteriorate any established hydraulic barrier created from recharge injection, "The higher the water level is, the more effective the barrier." (Henry, Tr. p.579; City Ex. 19.)

140. Henry declined to offer an opinion as to whether dropping the minimum index levels for the Phase II wells below the 1993 levels would impact water quality. (Henry, Tr. p.582.)

141. Boese testified in relation to the USGS Report, "Preliminary Simulation of Chloride Transport in the Equus Beds Aquifer and Simulated Effects of Well Pumping and Artificial Recharge on Groundwater Flow and Chloride Transport near the City of Wichita, Kansas, 1990 through 2008," (USGS SIR No. 2016-5165) to which he contributed, and described the modeled impacts to chloride movement of six different possible pumping scenarios. (Boese, Tr. pp.2178, 2183-2184.) He testified that, according to the study, the scenario with the most pumping (double the City's pumping plus existing irrigation) increased the movement of chloride from the Burrton saltwater plume and the Arkansas River saltwater contamination into the Wichita well field area. (Boese, Tr. p.2184.) Boese testified that this high level of pumping resulted in lowering the water table, which increased the movement of chloride from both locations, and that, if the City were allowed to pump below the 1993 levels, that activity would increase the

hydraulic gradient, which, in turn, would increase the rate of chloride movement. (Boese, Tr. p.2184.)

142. Henry testified that the minimum index levels should not be based on the amount of water the City wants. (Henry, Tr. p.611.)

143. Pajor testified that in the case of a one percent drought in which the City pumped water so as to cause the water level to decline to the new proposed lower levels, there could be an adverse impact to other wells. (Pajor, Tr. p. 308.)

144. The Proposal contains no condition to restrict the City's pumping (that would reduce the water levels to the new lower levels) to only occur in the event of a significant drought. Contrary evidence is seen in McCormick's supplemental expert report, which states that this restriction would apply to the Proposal. (City Ex. 29; McCormick, Tr. p.3534.)

145. The City's evidence reveals inaccuracies in the Proposal's assertions of the retention rate for physically injected ASR water. The Proposal states, and McCormick testified, that between 80% and 85% of the water injected into the basin storage area during the time the ASR project has been in operation has been retained in the basin storage area. (Proposal, p.4-2; McCormick, Tr. p.1090.) McCormick testified about the City's ASR accounting report for 2016, an excerpt of which is provided in GMD Exhibit 75. (McCormick, Tr. pp.1176-1180.) That excerpt shows that 9,844.91 acre-feet of water was physically recharged to the Aquifer by the City during the period 2006 to 2016. (GMD Ex. 75, p.2-4.) The total number of ASR recharge credits accumulated during the period 2006 to 2016 was reported by the City to be 6,372.2 acre-feet. (*Id*., p.4-10.) These facts indicate 64.7% of the water physically injected into the aquifer was retained as a recharge credit. Based on the accounting report, McCormick corrected his mistake in having testified that the retention rate was 80% to 85%. (McCormick, Tr. p.1178.) He also

agreed that the retention rate for 2017 would be even lower, approximately 63.4%. (McCormick, Tr. p.1180.) McCormick agreed that when water is injected into the Aquifer, the historic retention for the purpose of ASR credits, is in the range of 63% to 64%. *(Id*.)

146. The ASR Phase II permits do not dictate the timing of when the City may withdraw ASR credits (other than requiring the City to have earned them in the first place, the limitations on lower and upper water levels, and the 18,000 acre-feet maximum annual quantity); whether the City decides to pump more ASR credits when the water level nears the minimum index level so as to avoid "stranding" them is a management choice on the part of the City. (Letourneau, Tr. p.1431.)

147. The Proposal's list of proposed conditions does not include a limitation or declaration as to when, in this sense, the City would be permitted to withdraw ASR or AMC credits. (City Ex. 1., p.3-6.)

148. Letourneau testified that DWR had done no independent modeling or calculations regarding the proposed lowering of the minimum index levels. (Letourneau, Tr. p.1528.)

149. Letourneau testified that he was unaware if DWR had quantified the difference in the amount of water the City would be able to access if the minimum index levels are lowered, as compared to the current minimum index levels. (Letourneau, Tr. p.1761.)

150. Letourneau testified that, based on the significant discrepancies between practical saturated thicknesses of four index cells as revealed by driller's logs compared to modeled results shown in Figures 10 and 11 of the Proposal, the proposed drop of minimum index levels by an amount of 9 feet to 23 feet gives him cause for concern. (Letourneau, Tr. pp.1588-1589.) He testified that a drop of 23 feet in Index Cell No. 1, where the practical saturated thickness is 30 feet could cause a significant effect. (*Id.)*

151. Romero analyzed the potential impact to aquifer levels resulting from the City pumping groundwater to the proposed lower levels. (Romero, Tr. pp.2529-2532; GMD Exh. 68, pp.7-8 of 16.) (See additional related facts in "Modeling" "Additional Water" and "Public Interest" sections.)

152. Romero testified that, if the City pumps its full 40,000 acre-feet of native water rights each year during the modeled 1% drought in combination with ASR credits, and the City is allowed to pump down to the proposed lower index levels, the additional amount of recharge water that could be pumped (as compared to the current index levels) would be 79,500 acre-feet. (GMD Ex. 68, p.6 of 16; Romero, Tr. p.2531.)

Q. Modeling

153. The City hired John Winchester to adjust the City's existing model and put it into a form for the City's staff to use. (Winchester, Tr. p. 134.) Winchester testified that he transferred data from the City's RESNET model into a MODSIM model. (Winchester, Tr. pp. 78, 134.)

154. Winchester used Palmer Drought Severity Index (PDSI) values, which create an index for the quantitative assessment of droughts so that droughts from different times and places can be compared. (Winchester, Tr. p.19.) Using reconstructive techniques with PDSI data, he concluded that a 1% exceedance drought would have a duration of eight years and could be modeled using data from actual records from 1933 to 1940, when an actual drought had occurred. (Winchester, Tr. p.52.) He also stated a 1% drought does not have to be eight years long. (Winchester, Tr. p. 121-122.)

155. Winchester stated that the PDSI data is based on approximations and was developed for the entire United States; that it may not be an accurate reflection across different regions, as it

doesn't account for variations in record density, variables like snow and ice, whether recharge events are sudden or slow, or the contours of the land. (Winchester, Tr. pp. 87-99.)

156. Scott Macey, Water Resources Engineer for the City, testified that he put together the demand projections that were placed on the Equus Beds portion of the Proposal as a result of his work in MODSIM simulations. (Macey, Tr. p. 626.)

157. Macey modified Winchester's model to reflect the City's shift in use during a drought to less reliance on Cheney Reservoir and more on Equus Beds groundwater. (Macey, Tr. p.628.) All of his modeling for this drought was with the initial condition of Cheney Reservoir at 100% full; the value of 110% in Table 2-5 is an error. (Macey, Tr. p.635.)

158. Macey testified that he implemented future demand as adjusted for planned conservation, which resulted in a future projected demand of 81,690 acre-feet in 2060. (Macey, Tr. p.634.)

159. Table 2-3 of the Proposal shows the MODSIM DSS model's results for the distribution of the City's water sources to meet demands during the eight-year drought period. (City Ex. 1, p.2-5). The future demand figure (81,690 acre-feet) is shown as reduced each year through the eight-year simulated drought, with the relative adjustments for water use as between the Equus Beds groundwater (native water right and ASR credits) and Cheney Reservoir surface water.

160. Macey explained that as he modeled it, in a one percent drought, using recharge credits and reduced demand, the City would last through the drought without depleting Cheney Reservoir. (Macey, Tr. p. 639; Table 2-3.)

161. Daniel Clement, licensed professional geologist with Burns and McDonnell, testified the City hired him to take the USGS model and provide inputs to it that would simulate the 1% drought. (Clement, Tr. pg. 710.)

162. Clement looked at the cumulative PDSI that Winchester derived for the entire 1930's drought period and tried to find years that would sum up to the same cumulative PDSI; Clement used the years 2011 and 2012, applied 4 times back-to-back, to achieve that. (Clement, Tr. p. 714.)

163. Clement testified that using Winchester's work, Burns and McDonnell identified the 1930's drought as the one they would want to simulate. However, the USGS model did not contain information for years prior to 1939, which would be necessary when trying to simulate Winchester's target years of 1933 to 1940. Initially, Clement discovered that hydrogeologic data (precipitation and streamflow data) for those years was not available. Using PDSI data from the National Atmospheric and Oceanic Administration for years 1933 through 1940 (in six month and twelve month periods), Clement added those values to find cumulative PDSI and compared it to 2011 and 2012, two drought years for which data was available. Using the PDSI values for 2011 and 2012 and adding them together 4 times back-to-back (to create an eight-year drought period), created a cumulative PDSI comparable to the PDSI values for the 1930s. The six-month cumulative comparison was closer, with the 1930's value of -21.58 and the 2011 and 2012 quadrupled value of -23.45; the twelve-month comparison was not as well aligned, with values of -21.09 and -15.64, respectively. (Clement, Tr. p.712-713; City Exh. 1, Table 2-4.)

164. Paul McCormick, licensed professional engineer with Burns and McDonnell, testified that he conducted the modeling and sat in on the concept development of the Proposal and provided input throughout the process. (McCormick, Tr. p. 1084; City Ex. 28.)

165. McCormick testified that the City had hired Burns and McDonnell because the City wanted to lower the 1993 index levels to the new proposed minimum index levels and to develop

the aquifer maintenance concept and an accounting method to account for using the AMC concept. (McCormick, Tr. p. 1194.)

166. McCormick described how Burns and McDonnell used the MODFLOW model in their drought modeling. Burns and McDonnell took the existing model and repeated the 2011 and 2012 hydrologic conditions four times to create an eight-year stress period and then added two years of the hydrologic conditions from 2010 to the end of it; they ran the model to "forecast what the water levels would be after – or the lowest water levels that we'd see during that drought period." (McCormick, Tr. p.1084; See Clement, Tr. pp.717-718.) Clement described the two additional years as recovery years, for which 2010 data was used, because 2010 was a relatively wet year. (Clement, Tr. pp.717-718.)

167. McCormick testified that he did all of the MODFLOW modeling with some assistance from Clement. (McCormick, Tr. p. 1109.)

168. McCormick testified that, in their modeling process, Burns and McDonnell also used Groundwater Vistas, a graphical interface to make the data more user-friendly. (McCormick, Tr. p.1085.)

169. Romero testified that he examined the MODFLOW portion of the USGS model used by Burns and McDonnell, as provided by the City to Intervenors' counsel, and he reviewed the modeling performed by the City as compared to the USGS model files. (Romero, Tr. pp.2448-2450.) Romero testified that, although the USGS model is described in the Proposal as being unchanged, he discovered a change in the model files he received relative to the USGS model files. (Romero, Tr. p.2451.) Romero testified that he corrected the change between the City's model and the USGS model, analyzed to see how much of a difference it would make and found that, in the City's modeling of minimum index levels in one percent drought scenario, the

discrepancy in the model made a difference of about three feet or less in how water levels would change. (Romero, Tr. pp.2451-2452.) He stated the difference did not change his conclusions. (Romero, Tr. pp.2453, 2455.)

170. Romero testified that the USGS model, upon which the City's model is based, assumed the river would not dry up. (Romero, Tr. pp.2518-2520.) However, Romero testified that the actual conditions during 2011 and 2012, which the City used for its model, included the Little Arkansas River being dry 15% of the time; the City's model did not account for these years of no flow. (*Id*.)

171. Romero testified that it is possible to conduct a sensitivity analysis that accounts for the impact of a river drying up, and that he recommends the City secure such an analysis regarding this Proposal. (Romero, Tr. p.2524-2525.)

172. Luca DeAngelis, Professional Engineer and Professional Geologist with Burns and McDonnell, stated that the purpose of the groundwater model was to predict an aquifer response to a new stress that would be introduced to the aquifer. (DeAngelis, Tr. p.449.)

173. DeAngelis testified that his role was to serve as a peer review person assisting with calibration and other modeling issues; he was not the primary modeler for the City. (DeAngelis, Tr. pp.446-447, 463.)

174. DeAngelis testified that, when measuring groundwater levels, given the choice between actual and simulated data, actual data is preferrable. (DeAngelis, Tr. pp.475-476.)

R. <u>Limitations of Model in Predicting Impacts at Individual Well Locations</u>

175. At the hearing, DeAngelis described USGS' calibration for their model, the process by which one demonstrates that the mathematical model being developed represents the actual physical system. (DeAngelis, Tr. pp.448; 452-453; City Ex. 1, Att.E, USGS SIR 2013-5042.)

He opined that the USGS Equus Beds groundwater model is well-calibrated and useable for predicting water levels for a one percent drought. (DeAngelis, Tr. p. 458.)

176. DeAngelis testified that in its Scientific Investigations Report (SIR) No. 2013-5042, the USGS applied a type of analysis (root-mean-square error of 10% or less) that is generally applied basin-wide, and in this study, the USGS applied it to the entire region being studied. (DeAngelis, Tr. pp.467-468.) DeAngelis testified that the USGS report did not analyze any kind of error that would be determined at individual monitoring wells. (DeAngelis, Tr. p.468.)

177. USGS SIR No. 2013-5042, which forms the basis for the City's modeling, lists a number of limitations, including the following, "To correctly interpret model results, the following limitations of the model should be considered . . . The groundwater-flow model was discretized using a grid with cells measuring 400 ft by 400 ft. Model results were evaluated on a relatively large scale and *cannot be used for detailed analyses such as simulating water-level drawdown near a single well. A grid with smaller cells would be needed for such detailed analysis*." (Emphasis added.) (City Ex. 1, Att. E., p.72.)

178. DeAngelis testified that the USGS model is a regional scale model; he was aware of no analysis done by the City or any of its consultants to ensure that the calibration error was acceptable at individual wells. (DeAngelis, Tr. pp.485, 480.)

179. DeAngelis testified that the model results in USGS SIR No. 2013-5042 cannot be used to determine what will happen to the water levels in individual pumping wells, including domestic wells. (DeAngelis, Tr. pp. 489-490.)

180. McCormick testified that the USGS model can be used to accurately measure water levels in specific locations within the 400-by-400 foot grid and there are numerous tools that can be used with the MODFLOW model to interpolate specific location water levels, but that Burns

and McDonnell did not attempt to evaluate individual drawdown impacts on surrounding wells within the model. (McCormick, Tr. p.3508, 3545; City Ex. 29.)

181. DeAngelis testified that the USGS calibration for the modeling reported on in SIR 2013-5042 would have been before the 2013 publication date, and, to his knowledge, the model has not been calibrated since that time. (DeAngelis, Tr. pp.491-492.)

182. DeAngelis further testified that recalibration would only be necessary if there was a new purpose for the model; he stated that "the USGS report was developed with the intention to come up with an accounting mechanism for ASR credits and the model was used to implement an accounting mechanism for ASR credits." (DeAngelis, Tr. pp.492-493.) DeAngelis testified that using the model to identify proposed new lower minimum index levels would not be a change in purpose to justify recalibration of the model because developing an ASR credit accounting methodology is sufficiently similar to determining water level impacts of a lower minimum index level. (DeAngelis, pp.493-495.) There was no evidence offered to substantiate the alleged similarity between the two apparently distinct purposes.

183. Akhbari testified that he was hired by GMD2 to review the documents associated with the groundwater flow model, specifically the USGS report, to review the model itself, its performance and the City's proposal to modify the ASR project. (Akhbari, Tr. pp.384-385.)

184. In his analysis, Akhbari used the Burns and McDonnell model that was modified by the City. He found the model to be a good tool to make decisions on the total volume of water that can be extracted from the basin in a year, but he found the model lacks the capacity for specifying water levels at the locations of specific wells. (Akhbari, Tr. pp.385-386.) He stated that the USGS model is incapable of predicting water levels at individual wells. (Akhbari, Tr. p.396.)

185. George Austin, Professional Engineer, echoed the concerns of Akhbari in that the City's MODFLOW model, in relying on the USGS information that only addresses basin-wide groundwater level impacts, does not analyze individual well impacts in scale or location. (Interv. Ex. 2, p.2.)

186. Akhbari compared actual groundwater level data from 2001 (the year where observed data was starting to be acquired) to the model's simulations for 1998 water level data. (Akhbari, Tr. pp.387-388.) Across the 38 index wells, on average the 2001 water levels were 11.85 feet higher than the simulated 1998 results. (*Id*.). He testified that he derived more precise model outputs than the City because he used observed data, rather than simulated. (*Id*.)

187. Akhbari testified that the USGS model, used by the City, takes the average of errors across the entire basin, an average that is not applicable to the location of specific well draws. (Akhbari, Tr. p.389.) He analogized this situation to attempting to determine when a specific location in the United States reaches the freezing point by taking an average temperature of the entire United States; the resulting average will not accurately reflect both Chicago and San Diego. *(Id*.)

188. Akhbari downloaded the simulated versus observed data and compared those at each index location; he concluded that on average there is about 30% of error at the location of each index level, with some errors as high as 68%. (Akhbari, Tr. p.390.) He testified that these results led him to conclude that the City's model, at its current status, "cannot be used to set groundwater elevations at individual wells." (*Id*.)

189. Akhbari testified that his analysis demonstrated that out of 20 monitoring wells in the basin, 16 (60%) have underestimated groundwater levels in the simulated results, compared to observed results. (Akhabari, Tr. p.392; GMD Ex. 64, Table 3.)

190. Akhbari testified that his conclusions that the model was underestimating resulting water levels means that the impact of these errors in the model and the underestimations exaggerate the severity of the drought's impact on water levels. (Akhbari, Tr. p.421.)

191. Akhbari testified that the USGS model used by the City is not fit for establishing new minimum index levels, that this model cannot be used for setting specific elevations at a specific level. (Akhbari, Tr. pp.431-432.)

192. Akhbari testified that the City's model is set up correctly for large scale. (Akhbari, Tr. p.432.)

193. Akhbari distinguished "available" from "suitable," in the context of whether, if the model is the best tool available, it would be adequate; he analogized driving a truck in a sports car race to illustrate that the truck may be available, but it would not be suitable. (Akhbari, Tr. p.397.)

194. Akhbari testified that the City's model can be calibrated to identify impact of the City's proposed use at specific well locations, using more observed data and more technical work on calibrating the model. (Akhbari, Tr. pp.435-436.)

195. DeAngelis testified that he has no opinion on how the one percent drought was calculated and how that impacted the City's model. (DeAngelis, Tr. p.486.)

S. Errors/Typographical Mistakes in the Proposal

196. Clement testified that, before they could do their modeling, Burns and McDonnell first needed the City to tell them how much groundwater the City anticipated pumping from the Equus Beds (native rights and ASR credits) by 2060; this information was provided by the City's MODSIM DSS model. (Clement, Tr. pp.915-916.) Burns and McDonnell used this information to predict what water levels they wanted to look at for a change to a reasonable lower index

level; Burns and McDonnell used the Equus Beds Groundwater Model to make this prediction. (*Id*.)

197. In generating the Equus Beds Groundwater Model, Clement set up the pumping and most of the inputs and then created all of the figures and the maps in the Proposal. (Clement, Tr. p.721.)

198. Clement testified that the value listed for the amount of ASR recharge credit pumping projected for 2064 in Table 2-5 of the Proposal, as provided by the City's MODSIM DSS model, is wrong. It lists 15,552 acre-feet of pumping, but it should show 16,579 acre-feet of pumping. (Clement, Tr. p.715.) The value should be the difference when 40,000 acre-feet of native rights is subtracted from total pumping (native rights and ASR credits) of 56,579 acre-feet. (*Id*.) Macey, whose work involved allocation of resources between Cheney and the Equus Beds, also characterized this error as a typo. (Macey, Tr. pp.658-659.)

199. Clement testified that the City also provided (from the MODSIM DSS model) the values in Table 2-5 for the use of Cheney Reservoir, which is shown as starting at 110% full. (Clement, Tr. pp.719-720.) Clement testified that the value of 110% is wrong, and is a typo, and should be 100%. (*Id*.) Correspondingly, Table 2-3 in the Proposal, showing the MODSIM DSS model results, also includes the starting level for Cheney Reservoir at 110% full. (City Ex. 1, p.2-5.)

200. In a letter to the City dated September 18, 2017, Chief Engineer Barfield inquired how the value of 110% for Cheney Reservoir was determined; Macey testified that he couldn't explain why the error had not been corrected by the City before submitting their Proposal in 2018. (Macey, Tr. pp.684-687; City Ex. 24.)

201. In an email to the City dated July 18, 2017, Boese asked why the City's starting value for Cheney Reservoir was at 110% for the one percent drought simulation for the MODSIM DSS

update; Macey testified that he did not know if the City ever responded to Boese. (Macey, Tr. pp.687-688; City Ex. 25.)

202. The record does not demonstrate that the City ever attempted to correct this error.

203. Clement stated that the errors in the tables in the Proposal are simply errors in stating the tabulated results, and do not impact the proposed levels or modeling results. (Clement, Tr. p. 1065.)

204. Relative to Table 2-5, Clement was asked at the hearing why the apparent City water use would increase from year three to year four, when, for year four, the City would impose Stage 2 of the City's Drought Response Plan, increasing conservation measures, which would result in reduced use of water compared to year three. (Clement, Tr. p.908.) Clement's response included a reference to the change in hydrologic components of the years during the 1930's drought that were used in the MODSIM DSS model ("we're using the drought years of the 1930s drought, so we're seeing hydrologic conditions change"; in the MODSIM model, "Mr. Winchester and the City, Mr. Macey did, make those values mirror what actually occurred in the 1930's drought". (Clement, Tr. pp.909-910, 913.) He reiterated that the MODSIM model used "historical" data from 1993 through 1940. (Clement, Tr. p.1021.) These answers appear to be inconsistent with Clement's testimony that hydrologic data for the 1930's (prior to 1939) was not available for development of the model, and his description that "we can't use the 1930's data because it doesn't exist". (Clement, Tr. pp.711; pp.916-917.)

T. <u>Aquifer Recovery</u>

205. The Proposal did not provide modeling data as to how the Aquifer would recover from the proposed pumping in Tables 2-3 and 2-5. (Letourneau, Tr. p.1796.)

206. Letourneau testified that, based on his real world experience, after the drought of 2011 through 2012, it took the Aquifer about six to seven years to recover. (Letourneau, Tr. p.1796.)

U. Contingencies Added to Modeled Lower Index Levels/Table 2-10

207. The Proposal states that the groundwater model's one percent drought simulation was used to calculate the lowest groundwater elevation for each index well site throughout the eight-year simulated drought, and that a contingency was subtracted from that level to arrive at the proposed new lower minimum index levels, as seen in Table 2-10. (City Ex. 1, pp.2-16, 2-23, 2-24.)

208. Romero's expert report explains that "the [Burns and McDonnell] 1% drought analysis results in some water levels in the basin storage area dropping below the current minimum index level, thereby preventing the City from diverting ASR credit water. . . [T]he revised minimum index levels in the Proposal do not directly represent the modeled water levels in the [Burns and McDonnell] drought analysis. To determine the revised minimum index level in the Proposal, Burns and McDonnell added a contingency to the water levels modeled at the end of the drought simulation. That is, the proposed minimum index levels are at a lower elevation than that modeled in the 1% drought analysis." (GMD Ex. 68, p.4 of 16.)

209. Clement testified regarding the proposed minimum index levels for the 38 index wells, as seen in Table 2-10 of the Proposal. In the table, a ten-foot contingency is shown as having been included for each well, except for a 20-foot contingency added for well IW01C. (City Ex. 1, p.2-24.) In his testimony, Clement confirmed that the contingency for well IW01C should have been 23.42 feet, instead of 20 feet, and the contingency for well IW02C should have been 20.52 feet instead of 10 feet. (Clement, Tr. pp.741,794.)

210. Boese testified, regarding the values seen in Table 2-10, that he does not agree that a 10-foot contingency is needed, and that a 20- or 23-foot contingency is "certainly" not needed in some aspects. (Boese, Tr. p.2152.) As an example, Boese cited the entry for IW5C, for which the current minimum level is 1407.23 feet and the modeled new lower level would be 1408.21, making the difference between the existing and modeled level approximately 1 foot. (Boese Tr. p.2153.) Boese characterized the contingency of 10 feet, being 10 times the modeled difference, as excessive for a "safety net." (Boese, Tr. pp.2153-2154.)

211. Romero testified that the difference of three feet or less (resulting from the modeling with USGS files as compared to the City's model files) would add to variance in the contingencies used in the Proposal's modeling. (Romero, Tr. pp.2458-2459; City Ex. 1, Table 2-10.)

212. Romero testified that in most models he has worked with, the contingency has been on the order of "plus or minus twenty-ish" percent. (Romero, Tr. p.2460.) Some of the contingencies used in the Proposal's Table 2-10 appear higher than the twenty percent tolerance. (Romero, Tr. pp.2461-2462.)

213. Romero testified that he would expect a contingency to be established in a "plus or minus" manner, rather than the one-directional approach as seen in the Proposal. (Romero, Tr. p.2571; City Ex.1, Table 2-10.)

214. Romero testified that, in reviewing the Proposal and all the data provided to him by the City, he saw no scientific justification for the contingencies used in the Proposal. (Romero, Tr. 2458; City Ex. 1, Table 2-10.)

V. Table 2-9 in the Proposal/1998 Starting Point

215. Clement generated Table 2-9 in the Proposal, entitled, "Groundwater Modeling Results for 1% Drought Simulation," which shows the model's results for the effect on groundwater

levels during different stress periods during the 10-year simulated period. (Clement, Tr. p.722-723; City Ex. 1, p.2-16.) The chosen starting conditions were water levels observed in 1998. (*Id*.) The model indicated that, by year eight, a drop of 8.2 feet would be seen across the entire basin storage area and a drop of 11.6 feet on average within the central well field storage area. (*Id*.)

216. Table 2-9 in the Proposal assigns a starting value for the aquifer (basin storage area) as the water level that existed in 1998. (Clement, Tr. p.723.)

217. Clement testified that the aquifer level before the 1930s drought was probably about 100% full (considered predevelopment), but in simulating the 1930s drought, the model used the level of a declining aquifer in 1998. (Clement, Tr. pp.1052-1053.) Clement testified that the 1998 value was collectively chosen as the aquifer starting point by the City and Burns and McDonnell. (*Id*.)

218. When asked for a scientific reason to believe that when the next severe drought occurs, the aquifer would be at 1998 levels, McCormick testified, "You could pick any number and say that's a reasonable starting point for the next drought because you don't know when a drought is going to occur." (McCormick, Tr. p.1202.) McCormick further testified that the changes in the aquifer caused by an eight-year drought would be directly related to your starting water level. (McCormick, Tr. p.1203.)

219. McCormick testified as to how the 1998 level was chosen as a starting point for the drought simulation: when water levels were at a level that allowed the City to inject 30 million gallons per day, the modeling showed the amount retained would be slightly over 95% of what is injected; he further stated that the associated 5% loss was to mimic the actual physical recharge retention rate at a level where the City could inject 30 million gallons per day. (McCormick, Tr.

pp.1186-1187.) He further testified that the City used operational and testing data for recharge wells to determine possible injection rates and possible levels at which that injection could occur, then compared those to the modeled level needed to inject 30 million gallons per day and he found that 1998 matched the closest. (*Id.*)

220. McCormick testified that, to his knowledge no analysis has been done as to whether the 1998 aquifer levels would be considered an average aquifer condition, but that such an analysis could be done. (McCormick, Tr. p.1202.)

W. Table 2-9/Other Considerations/Practical Saturated Thickness

221. Romero testified that the City modeling indicates that water level drawdowns associated with a one percent drought are comparable to existing minimum index levels, and in some cells the level will drop below the 1993 levels, which forms the basis for the City wanting to lower the index levels. (Romero, Tr. p.2465.)

222. Testimony explaining the inputs for the model results as shown in Table 2-9 was confusing and inconsistent.

a. Clement testified that the model inputs used to generate the values in Table 2-9 were the conditions from 2011 for stress period one, then conditions from 2012 for stress period two, and then repeated these yearly values in an alternating manner for the next six stress periods. (Clement, Tr. p.723.)

b. Clement also testified that Table 2-9 shows the modeled effects if the City were to pump the "theoretical number the City believes that they would have to take out based on a projection through 2060" (as shown in Table 2-5), not the City's use in 2011 and 2012. (Clement, Tr. p.725-726.)

c. Clement further testified that, in addition to the City's use, the model adds an estimated impact of water usage by industrial and irrigation users based on what their use was in 2011 and 2012 ("the pumping that's shown in stress periods one through ten is the combination of kind of everybody doing what we anticipate they would do in 2060"). (Clement, Tr. p.727.)

d. Clement later testified that the model did not apply actual reported irrigation use for 2011 and 2021, contrary to his previous statement, but that net irrigation values were applied instead. (*Id.*)

e. Clement also stated the model additionally took into account municipal use from Halstead, Newton and others. (Clement, P.1019.)

f. Clement also testified that the model did not take into account domestic use or other use that had not been reported to the Division of Water Resources. (Clement, Tr. pp.1019-1020.)

223. Clement testified that, using a repeating pattern of data from 2011 and 2012 in the groundwater model did not consider variable streamflows that could occur over an eight-year period of time, that this factor could have been modeled and, if reduced streamflow had been modeled, the results would have shown a greater impact to the aquifer. (Clement, Tr. p.960.)

224. Table 2-9 shows, according to the groundwater model, how full the Aquifer would be each year in an eight-year drought, as a percentage compared to predevelopment conditions, based on saturated thickness (ST). (Clement, Tr. p.987). Saturated thickness is basically the saturated portion of an aquifer, existing between and among geologic layers, between the upper layers and the bedrock below. (Clement, Tr. p.984.)

225. Practical saturated thickness (PST) differs from ST in that PST accounts for actual geologic layers that act to reduce the amount of water that is actually accessible from an aquifer. For example, clay layers do not readily yield water, but sand does. (Clement, Tr. p.985.) For example, if there is 100 feet of saturated thickness, but within that 100 feet, there is 50 feet of sand and 50 feet of clay, then the practical saturated thickness would only be 50 feet. (*Id.*)

226. The groundwater model, the results of which are depicted in Table 2-9, did not take into account any practical saturated thickness information. (Clement, Tr. p.988.)

227. Figure 10 in the Proposal, entitled, "Average Aquifer Conditions by Index Cell at the End of Simulated Drought Stress Period 8," shows the modeled saturated thickness for each index cell at the end of the modeled eight-year drought; it did not take into account any practical saturated thickness information relative to the index cells. (Clement, Tr. pp.991-993.)

228. Clement could not recall that anyone with Burns and McDonnell or the City analyzed the practical saturated thickness for the individual index cell monitoring wells or any specific wells. (Clement, Tr. p.994.)

229. Clement testified that practical saturated thickness was not taken into account partly because "we were just trying to convey here is (sic) the general statistics for someone to take on and digest by themselves." (Clement, Tr. p.997.)

230. McCormick testified that information from actual individual well logs is required to determine PST. (McCormick, Tr. p.1171.)

231. McCormick testified that, in the modeling process he looked at individual well logs, but that the saturated thickness they were concerned with was average saturated thickness of an index cell, which is a four-mile square area. (McCormick, Tr. p.1171-1172.) He did not look at

individual well logs within index cells to determine whether or not that measured data matched up with the modeled results for the index cells as part of the drought modeling process. (*Id.*)

232. Clement testified that the results shown in Figure 10 were derived exclusively from the model, that no comparison was done to actual well log data. (Clement, Tr. p.995.)

233. Figure 11 in the Proposal, entitled, "Average Aquifer Conditions by Index Cell at Modified ASR Minimum Index Level Elevations," shows the modeled saturated thickness for each index cell resulting from lowering the minimum index levels as proposed by the City; it did not take into account any practical saturated thickness information relative to the index cells. (Clement, tr. p.997.)

234. Letourneau testified about a driller's lithologic well log for well IW1C, the City's monitoring well in Index Cell No.1 and the relative layering of clays, sands and gravels reported. (Letourneau, Tr. pp.1552-1556, GMD Ex. 80.) He explained that the log revealed a maximum of 30 feet of practical saturated thickness. (*Id.*, at p.1556.) In contrast, the Proposal's Figure 10 shows 163 feet of saturated thickness in that cell at the end of the eight-year drought, and Figure 11 indicates 131 feet of saturated thickness in that cell relative to the lower index levels. (City Ex. 1.)

235. Letourneau also testified about the comparison between the driller's lithologic log for well IW-2C showing 40 feet of practical saturated thickness and the Proposal's model indicating 187 feet of saturated thickness in Figure 10 and 171 feet in Figure 11. (Letourneau, Tr. p.1566; GMD Exhs. 60, 80.) Letourneau testified that the monitoring well IW-2C is located in the middle of its index cell. (*Id.* at p.1562.)

236. Letourneau also testified about the comparison between the driller's lithologic log for well IW-10C showing 70-75 feet of practical saturated thickness and the Proposal's model

indicating 175 feet of saturated thickness in Figure 10 and 165 feet in Figure 11. (Letourneau, Tr. pp.1572-1573, GMD Exs. 60, 80.) Letourneau testified that the monitoring well IW-10C is located in the middle of its index cell. (*Id*. at p.1562.)

237. Letourneau testified, in reliance on hydrographs of lithologic data, discrepancies exist between the practical saturated thickness values for well IW-21C of 46 feet and the City's modeled results of 154 feet in Figure 10 and 146 feet in Figure 11. (Letourneau, Tr. p.1582-1583.)

238. Romero testified that the Proposal's conclusion the Aquifer would still be 80% full at the end of the modeled one percent eight-year drought does not contemplate the data of lithologic layers (clay, silt sand) in the USGS report on which the model was based. (Romero, Tr. pp.2658-2659; GMD Ex. 46, Figs. 17-20; City Ex. 1, Att. E.) Letourneau acknowledged this fact, as well. (Letourneau, Tr. p.1797.)

239. Romero testified that Figure 11 in the Proposal is useful, but doesn't describe the detail of regions within the modeled saturated thickness "where the aquifer would not be as productive, areas where there may be clay versus areas where there's sand." (Romero, Tr. p.2645.)

240. Romero testified about the USGS report on which the City's MODFLOW model was based; he stated that the USGS study used lithologic data (clay, silt, sand) for model layers one, two and three in the well field, creating a composite lithology for each layer, which was used in developing the Proposal's Figure 11; but the saturated thickness represented in Figure 11 does not indicate what portions of the thickness is a clay. (Romero, Tr. pp.2646-2648; GMD Ex. 46, Figs. 70-20; City Ex. 1, Att. E.)

241. Romero testified that water in the area of the well field generally moves faster horizontally than vertically. (Romero, Tr. p.2650.)

242. Romero testified that, if pumping groundwater for recharge credits from the index cells is redistributed as compared to the values used in Figure 11, the resulting values for drawdown would change. (Romero, Tr. p.2655.)

X. ASR Modeled Accounting

243. McCormick testified that the MODFLOW model is also used for ASR accounting purposes. (McCormick, Tr. p.1086.)

244. The Proposal outlines an accounting methodology for quantifying the accumulation of AMCs, accounting for annual losses; losses naturally occur with physical water injection and must be quantified in the current ASR accounting process, utilizing a comparison of actual metered physical recharge and actual water levels. (City Ex. 1. p.4-1) As stated in the Proposal, without physical recharge under the AMC concept, "there would be no observed water level changes to compare the AMC results against, since the location of the AMC recharge would be theoretical." (City Ex. 1. p.4-1.) (See Findings of Fact No. 85 and 86.)

245. As a basis for its modeled AMC recharge accounting methodology, the Proposal states that during the 2006 to 2015 period, 85% of water recharged to the Aquifer has been retained as a recharge credit. (City Exh. 1, p.4-2) McCormick, in reviewing an excerpt from the 2016 ASR accounting report, corrected this value: he testified that the percentage for 2006 to 2016 was actually approximately 64%, not 85%. (McCormick, Tr. p.1178; GMD Exh. 75.) McCormick further testified that the retention rate for the period 2006 to 2015 was actually 73%, not 85%. (McCormick. Tr. p.1190.)

246. The Proposal's accounting methodology relies on an outcome of the City's modeling which states that 95% of the water recharged would be retained as recharge credits. (City Ex. 1, p.4-2.) This 95% retention rate forms the basis for the Proposal's assignment of an initial

theoretical recharge loss rate of 5%, with a graduated annual theoretical loss rate across the basin of five percent, three percent and one percent, respectively from east to west. (City Ex. 1. p.4-3; Letourneau, Tr. p.1456.)

247. The City's Proposal indicates that the difference in losses (leakage) that occurs with ASR credits from physically stored source water, as compared to theoretical AMCs, is greater the fuller the aquifer becomes; this difference is because the Proposal does not use the larger loss values seen in actual physical recharge as the aquifer becomes fuller. (City Ex. 1., Fig.16; McCormick, Tr. pp.1096-1097; Austin, Tr. pp.3168-3171.)

248. Austin's expert report indicates that he was hired by counsel for the Intervenors to review any aspects of the input and output data of the City's models used to simulate the effects of the groundwater pumping and recharge elements and accounting methodology for the City's ASR Project. (Interv. Ex. 2, pg.1.)

249. Austin testified regarding the relationship between groundwater and surface water; if groundwater levels increase, it means more water will be discharged into the stream and, conversely, if a drought situation happens and pumping occurs at levels deeper than historically reached, there will be less flow from the aquifer into the stream. (Austin, Tr. p.3114.) This deeper pumping with its resulting lower stream flow can affect the ability of in-stream users to access water. (Austin, Tr. p.3115.) In this way, groundwater pumping can impact surface water rights. (Austin, Tr. p.3118.)

250. Austin testified that he has concerns about the Proposal's use of theoretical recharge losses for AMCs that are intentionally less than the losses that occur with physically stored source water: "it [using losses that occur with physically stored source water] is simply reflecting the actual conditions of the aquifer. . .rather than trying to artificially find a (sic) aquifer level

that minimizes that effect. If you're going to store water, recharge water or, by theory put recharge water in there, then the losses should be reflected – reflective of the actual conditions." (Austin, Tr. p.3168.) He stated that the leakage rate is higher in the actual conditions than it would be under the proposed accounting method. (Austin, Tr. p.3169.)

251. Austin testified that he had concerns about the City's proposed ASR credit accounting methodology, which he found used lower loss percentages for injected recharge water than were derived from previous years' ASR model-based accounting. (Austin, Tr. pp.3110-3112.) He explained that the City's previous accounting tabulations reflected losses closer to eight percent or nine percent of initial loss, as compared to the Proposal's five percent loss, and that the previous tabulations reflected cumulative annual losses after the initial period closer to ten percent as compared to the Proposal's three percent annual loss figure. (Austin, Tr. pp.3111-3112.) Austin concluded that the initial and annual losses from recharge to the stream would be higher than reflected in the proposed accounting methodology. (Austin, Tr. p.3113.)

252. Austin testified that he has another concern about the City's proposed ASR accounting methodology in that the calibration used yearly averages of pumping time and did not account for peak periods of pumping; he stated that the potential for impairment of other wells would be greater during shorter periods of maximum pumping, and that the model may underestimate that impact because it uses annual pumping periods. (Austin, Tr. pp.3146, 3149.)

253. Austin testified that the annual water level measurements (on which the model relies) are taken in January and February of each year, and not during the period of greatest pumping, which is typically in the summer; as a consequence, the model will not necessarily show what the maximum impairment might have been. (Austin, Tr. pp.3193-3194.) He stated that, when evaluating for impairment, one looks at whether the potentially-impaired water right user can use

the water right for its intended purposes, which, for nearby irrigation users, would require data from the summer pumping season. (Austin, Tr. p.3194.)

Y. GMD Role

254. Tim Boese, Manager of GMD2 since 2007 and employee of GMD2 since 1992, testified that, in his role, he has drafted rules and regulations and made presentations about rules and regulations to the GMD2 Board of Directors and the Kansas State Legislature. (Boese, Tr. pp. 2030, 2033-2034.) He has also given presentations to the GMD2 board on wide variety of matters, including recommendations to DWR regarding pending water right applications for which the applicant was seeking an exemption to regulation. (Boese, Tr. p.2030.)

255. Boese testified that, regarding new applications for water rights or applications to change water rights, he and GMD2 staff review the application and make recommendations to DWR for approval, denial, and/or relevant conditions for approval. (Boese, Tr. pp.2036-2037.) If the recommendation is for denial based on the failure to meet regulations, the applicant can seek review by the GMD2 Board of Directors and request an exemption. (*Id*.) Next, Boese provides a recommendation to the Board, the Board decides which recommendation to make to DWR, and then DWR makes the actual decision whether to approve or deny the application. (*Id*.)

256. Boese testified that DWR agrees with his recommendations "almost always." (Boese, Tr. p.2038.) Boese testified that this was true for his recommendations to DWR regarding the applicability of the district's safe yield regulation and exemptions to it. (Boese, Tr. p.2041.)

257. Boese testified that, it is his position, on his own behalf and on behalf of GMD2, that the Proposal should be denied. (Boese, Tr. p.2276.)

Z. Additional Water as a Purpose of the Proposal

258. The record and testimony establish that a purpose of the Proposal is an increase in water supply for the City, specifically, in times of drought. The City's Strategic Plan, under "Water Supply Objectives and Strategies," indicates that "[c]urrent supplies would require significant quality of life disruptions in the event of a 1% drought, resulting in the need for "a combination of new water supply and long-term conservation" to meet the City's projected needs in the event of an extended 1% drought. (City Ex. 9, p.29; Pajor, Tr. 156.) The Strategic Plan indicated 10 million gallons per day (mgd) in new water supply would be needed to meet demands. (*Id*.)

259. Pajor testified that "the only water we need in addition to our annual native rights from Cheney Reservoir and the Equus Beds well field, is water during severe drought." (Pajor, Tr. p.298.) Pajor testified that, as originally envisioned, the City would need the ASR project to meet routine needs of its customers, but reduced demand and changes in water usage demonstrated that the City now has sufficient water in its native water rights (Cheney Reservoir and the Equus Beds) in all but extreme drought conditions for the entire 50-year planning period. (Pajor, Tr. p.165.)

260. Pajor testified that, with the discovery that the City could meet its customers' needs with its native water rights alone, the only purpose for which the City still needs to recover ASR credits is to meet demand during extreme drought events to avoid employing stage 3 and 4 restrictions in its Drought Response Plan. (Pajor, Tr. pp.165-166.)

261. Clement testified that the City is not seeking an increased allocation of water; however, he characterized the Proposal as the City "bringing new water to the table. As part of the proposal, we are capturing transient water from the Little Arkansas River". (Clement, Tr. p.1062.)

262. The Proposal expressly requests the application of the lower minimum index levels to "potentially future ASR infrastructure" and that the AMC concept would apply to future bank storage wells, in addition to direct surface water diversion from the Little Arkansas River. (City Ex. 1, p.2-23, 3-6; Clement, Tr. p.744.)

263. The Proposal extends the AMC concept to include the diversion of surface water from two sources: a surface water diversion on the Little Arkansas River and bank storage wells. (City Ex. 1., p.3-6.)

264. Letourneau described bank storage wells as wells that are completed in the alluvium that capture flow and then delay the flow moving downstream; the water stored in those bank storage wells is still considered surface water. (Letourneau, Tr. p.1449.)

265. Letourneau testified that if the City were to construct new bank storage wells, it would increase their capacity to capture overflow water from the Little Arkansas River. (Letourneau, Tr. pp.1450-1451.)

266. The City has previously applied for grants to help fund an ASR Phase III Project, which would include the placement of additional bank storage wells along the Little Arkansas River; if approved, those additional bank storage wells would increase the City's capacity to accumulate AMCs in the future. (Pajor, Tr. p.348-349.)

267. Neither the ASR Phase I nor Phase II orders guaranteed the City a specified amount of credits. (Letourneau, Tr. p.1832.)

268. Neither the ASR Phase I nor Phase II orders guaranteed that within ten years the City would have enough recharge credits to meet their supply needs. (Letourneau, Tr. p.1832.)

269. Letourneau testified that the City's model was based on the City's current limit of withdrawing a maximum of 19,000 acre-feet in credits annually, but that this limit would not

apply if the City filed and received approval for new applications. (Letourneau, Tr. pp.1822-1823.) He further stated that the City had filed new applications to raise that limit to 30,000 acre-feet, but that the City had withdrawn them. *(Id.*) [Note that the total maximum authorized annual recharge quantity has been determined to be 18,000 acre-feet.]

270. In its March 12, 2018 Proposal cover letter to DWR, the City stated, " 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." (City Ex. 1.)

271. Boese testified that, under the AMC concept, the City would be able to expand their recharge capabilities as compared to the current ASR project, that AMCs would create more recharge credits which would allow the City to pump more. (Boese, Tr. pp.2387-2388.)

272. Boese testified that the ASR Phase II permits are junior in priority to all existing water rights and permits in the Wichita well field, and if the AMC concept is approved, the AMC credits would be junior in priority to all existing water rights and permits in the well field, because they would allow expansion of the ASR Phase II recharge credits. (Boese, Tr. pp.2402-2403.)

273. Romero testified that, if the City were to pump its full 40,000 acre-feet of native water rights each year during the modeled one percent drought in combination with ASR credits, and the City is allowed to pump down to the proposed lower index levels, the additional amount of

recharge water that could be pumped (as compared to the current index levels) would be 79,500 acre-feet. (GMD Exh. 68, p.6 of 16; Romero, Tr. p.2531.)

274. Romero testified that the Proposal is not seeking to only pump the amounts reflected in Tables 2-3 and 2-5 and that, under the Proposal, the City could pump more than the amounts reflected in Tables 2-3 and 2-5. (Romero, Tr. p.2671.) He testified that the table is "one realization of multiple model scenarios that they looked at . . .it could be variable depending on what their needs are." (*Id*.)

275. Romero testified that lowering the minimum index levels would effectively be a new diversion of groundwater with associated impacts to nearby rivers and neighboring wells. (Romero, Tr. p.2468.)

276. If the City wanted to pump recharge credits in excess of the currently-approved maximum quantity, the City would need to file a new application and obtain an approval of a new permit. (Letourneau, Tr. p.1290.) Letourneau testified that an expansion of the maximum quantity authorized by a permit or water right requires a new water permit application. (Letourneau, Tr. pp.1657-1658.) Boese agreed. (Boese, Tr. p.2168.)

277. Pope testified, "it's been long-standing practice, both in Kansas and elsewhere in states in general that follow the prior appropriation doctrine, that once a permit is issued, and the time to perfect that water right has occurred, and in the case of vested rights, once the vested rights were determined, that the extent of the use cannot be enlarged." (Pope, Tr. p.2716.)

278. Pope testified, "In general, as the years went by, the consumptive use could not be increased under that water right," referencing regulation K.A.R. 5-5-3. (Pope, Tr. pp.2717-2718.)

279. Pope testified that it was his understanding that approval of the proposed AMC concept would likely result in an increase in consumptive use. (Pope, Tr.p.2718.) Pope further testified that AMCs would likely result in an increase in consumptive use because under the AMC concept, physical artificial recharge of source water does not occur, credits would typically be created during a wetter period of time when streamflow is available and water levels are high in the aquifer, but the AMCs would typically be withdrawn during a much drier period of drought. (Pope, Tr. p.2719.)

280. Pope testified that the values shown in the Proposal's Table 2-3 indicate the City's water use demand from the Equus Beds well field and the ASR project during the one percent simulated drought could reach as high as 59,907 acre-feet in one year alone, which is significantly more than the 40,000 acre-feet per year of native water rights authorized for the City's well field, and if the difference was not supplied by actual physical injection of water, that would amount to more water being taken from the system and over time the AMCs could reach an amount that adversely affects the ability of other water users to exercise their rights. (Pope, Tr. p.2731; GMD Ex. 2, p.11.)

281. Pope testified that the combination of lowering the minimum index levels and not requiring physical recharge could have the effect of increasing consumptive use. (Pope, Tr. p.2720.)

282. Letourneau testified that a water right or permit does not guarantee the holder access to water whenever they want it. (Letourneau, Tr. pp.1761-1762.)

283. Letourneau testified that, in the context of deciding whether to approve a new application for a water appropriation, DWR requires the described need to be "reasonable." (Letourneau, Tr. p.1759.) If an application meets all the other criteria and is reasonable, it can be approved, but

the extent of the water right is developed ("perfected") based on demonstrated need as shown through actual use according to the terms of the permit. (Letourneau, Tr. p.1759.)

AA. Change Application per K.S.A. 82a-708b

284. The City has not filed an application to change a water right pursuant to K.S.A. 82a-708b; this fact is uncontroverted.

285. Boese testified that a change application under K.S.A. 82a-708b could not be used to modify the ASR Phase II permits in the ways requested by the City's Proposal, because the Proposal does not request a change in point of diversion, place of use or use made of water. (Boese, Tr. p.2173.) Letourneau agreed. (Letourneau, Tr. p.1657.)

286. Pope and Boese each testified that a change application under K.S.A. 82a-708b is required for, and limited to, changing a water right's point of diversion, place of use or use made of water. (Pope, Tr. pp.2714-2715; Boese, Tr. pp. 2167-2168.)

287. Boese testified that he agreed with Letourneau that reducing the authorized quantity or correcting a typographical error on a water right does not require a change application under K.S.A. 82a-708b. (Boese, Tr. p.2167.)

288. Boese testified that there are aspects of permits and water rights that can be changed without filing a change application under K.S.A. 82a-708b, such as correctional orders for typographical errors. (Boese, Tr. p.2172.) Boese testified to a non-exhaustive list of modifications or corrections the Chief Engineer is authorized to make without the need for a change application under K.S.A. 82a-708b:

a. administrative corrections of the legal description of an authorized place of use or point of diversion if certain criteria are met, pursuant to K.A.R. 5-5-6(b), 5-5-6c (Boese, Tr. p.2370, 2862.);

b. approval of conservation plans, pursuant to K.S.A. 82a-733(f) and K.A.R. 5-3-5l (Boese, Tr. p.2865.);

c. reduction of an existing water right, pursuant to K.A.R. 5-7-5 (Boese, Tr. pp.2866-2867);

d. exemptions from the requirement of a flowmeter, pursuant to K.A.R. 5-1-7(c)(5)(F)(Boese, Tr. pp.2868-2870.);

e. division of a water right pursuant to K.S.A. 82a-742 (Boese, Tr. p.2870);

f. distribution of water between users when a prior right is being impaired, pursuant to K.A.R. 5-4-1(e)(Boese, Tr., pp.2871-2872);

g. enrollment in the water rights conservation program tier 2, pursuant to K.A.R. 5-7-4b (Boese, Tr., p.2872.)

289. Boese testified that a correctional order was previously issued for the ASR Phase II permits to correct the specific 1993 water levels in accordance with new data that was discovered. (Boese, Tr. p.2173.) The requirement that 1993 water levels be used as the lower minimum index level was not changed.

290. Boese testified that major changes of a water right, other than one of the three changes covered by K.S.A. 82a-708b, require a new application [under K.S.A. 82a-711]. (Boese, Tr. p.2169.)

291. Boese testified that, in order to request lower minimum index levels as presented in the Proposal, the City would need to file a new application(s) because that request seeks a fundamental change to the permits; he also stated a change application would not be appropriate for this request because the request to lower the minimum index levels is not one of the three aspects listed under K.S.A. 82a-708b. (Boese, Tr. p.2174.)

292. Boese testified that, in order to request approval of the AMC concept, as presented in the Proposal, there would need to be a determination as to whether the concept is legal, and if so, the City would need to file a new application because how the City can obtain recharge credits and when it can use them are fundamental aspects of the permits and therefore not subject to correctional or ministerial modification. (Boese, Tr. p.2175.)

BB. City's Burden to Demonstrate Criteria for Approval, K.S.A. 82a-708b and K.S.A. 82a-711

293. The record unequivocally shows, from the inception of the proceedings, the City bears the burden of proving that the Proposal meets the criteria expressed in K.S.A. 82a-711 and K.S.A. 82a-708b.

294. The Prehearing Order, dated May 1, 2019, stated, "As previously ordered in the Order to Modify Hearing and Schedule, issued September 27, 2018 and the Pre-Hearing Conference Order, issued July 23, 2018, the City shall bear the burden of proof, proving by a preponderance of the evidence that the proposed changes to the project should be approved. K.A.R. 5-14-3a(n)(1). The proposed changes must meet the requirements set forth for Aquifer Storage and Recovery projects in K.A.R. 5-12-1, *et al.*, and the requirements set forth in K.S.A. 82a-708b, including that the proposed changes are reasonable and will not cause impairment and that the proposed changes relate to the same local source of supply. Whether or not a change is reasonable should consider the effect upon the public interest."

295. The Order to Modify Hearing and Schedule, dated September 27, 2018, issued by then-Chief Engineer Barfield states, "As previously stated in the Pre-Hearing Conference Order, the City shall bear the burden of proof, proving by a preponderance of the evidence that the proposed changes to the project should be approved. The proposed changes must meet the

requirements set forth for Aquifer Storage and Recovery projects in K.A.R. 5-12-1, et al., and the requirements set forth in K.S.A. 82a-708b, including that the proposed changes are reasonable and will not cause impairment and that the proposed changes relate to the same local source of supply. Whether or not a change is reasonable should consider the affect upon the public interest."

296. Letourneau and Boese agreed in their respective testimony that the City must show or demonstrate that the Proposal will not cause impairment to existing water rights and that DWR considers impairment to be as set out in K.S.A. 82a-706b and 82a-711. (Letourneau, Tr. pp.1669-1671; Boese, Tr. p.2171.)

297. Letourneau acknowledged that the City must show or demonstrate that the Proposal will not cause an unreasonable raising or lowering of the static water level, an unreasonable increase or decrease of the streamflow, and an unreasonable deterioration of the water quality. (Letourneau, Tr. pp.1670-1671.)

298. Letourneau acknowledged that the City must show or demonstrate that the Proposal will not prejudicially and unreasonably affect the public interest, which includes minimum desirable streamflow and the priority of existing rights. (Letourneau, Tr. p.1672, 1673.)

CC. <u>Public Interest/Impairment</u>

299. The Proposal asserts the benefit of its AMC concept would be keeping the Aquifer fuller, which would provide "local and regional water quality benefits by limiting migration of the Burrton chloride plume, limiting natural chloride intrusion from the Arkansas River, and through enhancement of base flow to creeks, streams, and rivers." (City Ex. 1. pp.3-10 to 3-11.)

300. The Proposal's Table 3-1 lists "Benefits to Multiple Aquifer Users and Water Resources from AMCs". (City Ex. 1. p.3-11.) This table asserts that benefits from AMCs, as opposed to harm related to not having AMCs, would be:

a. Regarding ASR Phase I: "ASR Phase I permits would not be modified, regional groundwater levels can be managed to the benefit of water quality and all users" because the levels would not be "lowered from pumping in the core of the City's wellfield."

b. Regarding ASR Phase II and Future: "Regional groundwater levels can be managed at near full conditions, improved groundwater quality and resource availability for all users" because, without AMCs, "[r]egional groundwater levels would be lowered and managed at levels to facilitate physical recharge capacity for the ASR system."

c. Regarding Little Arkansas River Diversions: "Additional river flow events can be put to beneficial use, river water directly replaces groundwater that would have been utilized from the City's [wellfield]", instead of water being "lost downstream during periods when the ASR system lacks physical recharge capacity."

d. Regarding Cheney Reservoir: "Increased use during full periods, optimized use of water resources matching the daily capacity and seasonal conditions of all available resources," instead of "water that could have been used by the City [during full conditions] bypasses the reservoir as production remains focused on the Equus Beds Wellfield." (City Ex. 1, p.3-11.)

301. McCormick's expert report does not address the Proposal's potential to cause impairment, impacts to water quality, safe yield or how the Proposal would impact the public interest. (McCormick, Tr. pp.1184-1185.)

302. Clement did not analyze the Proposal's potential impacts on water quality, safe yield, or whether the Proposal is in the public interest. (Clement, Tr. pp.1003, 1004, 1006.)

303. 303. DeAngelis testified that he has no opinion on whether the City's Proposal will impair individual wells. (DeAngelis, Tr. p. 488.)

304. Pajor testified that in the case of a one percent drought in which the City pumped water so as to cause the water level to decline to the new proposed lower levels, there could be an adverse impact to other wells. (Pajor, Tr. p. 308.)(See Finding of Fact No.143.)

305. The Proposal does not contain a table or compilation alleging public benefits of lowering minimum index levels, similar to Table 3-1 for AMCs. (City Exh. 1.)

306. A DWR draft "Example Proposed F&O amending terms & conditions of an existing ASR Phase II permit", dated June 1, 2018, lists among its draft conditions the City's obligation to remediate ASR-caused water quality deterioration or adverse impact from drawdown by the City's ASR wells that may impact domestic wells within 660 feet of a new or existing ASR well. (DWR Ex. 1; GMD Ex. 33.)

307. Neither the Proposal nor the DWR draft (described above) contain any provision for the protection of wells other than domestic (irrigation, municipal, etc.) that may be harmed as to quality or productivity by City operations under the Proposal. (See Letourneau, Tr. p.1803-1831.)

308. Boese testified that he performed a safe yield analysis on all 30 of the existing ASR Phase II permits for purposes of this hearing process. (Boese, Tr. p.2210.) Boese concluded that

none of them meets meet safe yield; some of them exceed safe yield substantially; if ASR quantities were factored in, the areas would be "even more grossly over-appropriated"; and he would not recommend them for approval. (Boese, Tr. p.2222-2223; GMD Ex 59; See Finding of Fact No.103.)

309. The area is over-appropriated; Boese testified about the ASR Phase II condition that, if recharge credits cannot be withdrawn if the static water level in the index well is below the 1993 levels, the public interest in not diverting Equus Beds groundwater will be protected. (Boese Tr. pp.2261-2262.) He testified that he interprets this (ASR Phase I and II) permit condition as implying that below the 1993 levels, the water below the 1993 levels is Equus Beds groundwater, not recharge credits, and would, therefore, already be dedicated to other users. (*Id*.)

310. Pope testified that the area is fully appropriated if not over-appropriated, so new permits would not be allowed except for minor exceptions. (Pope, Tr. p.2727.) Pope testified that he is concerned that, because AMCs would allow the pumping of groundwater that was not water the City physically put into the Aquifer, the pumping of AMCs would pump water that other water right holders are entitled to pump, which could adversely affect other water right holders in the area. (Pope, Tr. p.2727.)

311. Boese identified the bifurcation of regulations related to impairment; one addresses the procedure DWR follows in cases of "[d]istribution of water between users when a prior right is being impaired" (K.A.R. 5-4-1) and the other addresses "[d]istribution of water between users when a prior right is being impaired due to a regional lowering of the water table" (K.A.R. 5-4-1a.) (Boese, Tr. p.3047.)

312. Boese testified that, if the City were to withdraw their annual maximum quantity of credits each year until the 120,000 acre-feet total was reached, without physically injecting water into the Aquifer, the Aquifer would experience substantial decline, there could be a negative impact on water quality (because the increase in hydraulic gradient would cause salinity movement from the Burrton and Arkansas River areas), there could be impact to shallower wells (domestic or irrigation), there could be impact to minimum desirable streamflow, and possibly cause impairment to other wells. (Boese, Tr. p.2268-2269.)

DD. Water Quality

313. Boese testified in relation to the USGS Report, "Preliminary Simulation of Chloride Transport in the Equus Beds Aquifer and Simulated Effects of Well Pumping and Artificial Recharge on Groundwater Flow and Chloride Transport near the City of Wichita, Kansas, 1990 through 2008," (USGS SIR No. 2016-5165) to which he contributed, and described the modeled impacts to chloride movement of six different possible pumping scenarios. (Boese, Tr. pp.2178, 2183-2184.) He testified that, according to the study, the scenario with the most pumping (double the City's pumping plus existing irrigation) increased the movement of chloride from the Burrton saltwater plume and the Arkansas River saltwater contamination into the Wichita well field area. (Boese, Tr. p.2184.) Boese testified that this high level of pumping resulted in lowering the water table, which increased the movement of chloride from both locations, and that, if the City were allowed to pump below the 1993 levels, that activity would increase the hydraulic gradient, which, in turn, would increase the rate of chloride movement. (Boese, Tr. p.2184; See Finding of Fact No. 141.)

314. Boese testified that, in his expert opinion, the City's proposal to lower the minimum index levels could have the impact of accelerating the movement of the chloride plume, which would create a public interest concern. (Boese, Tr. pp.2185-2186.)

315. Boese testified that any reduction in the water level will change the hydraulic gradient, that the change could be large or small depending on the change in hydraulic gradient, and that, conversely, increases in the water level reduce the hydraulic gradient. (Boese. Tr. pp.2353, 2355.)

316. Romero testified that he used the USGS model, adapted it with a transport model to look at the chloride migration, and found that most of the chloride migration occurs near the Arkansas River and near the Burrton plume; he characterized this work as preliminary and recommended that it be continued. (Romero, Tr. p. 2550.) Romero testified that quantification beyond what he did, and what USGS did, has not been done in relation to this Proposal. (Romero, Tr. p.2551.)

317. Romero testified that, as the City wells pump more water or lower water levels, that tends to induce chloride migration from the area of the Arkansas River and the Burrton chloride plume. (Romero, Tr. p.2558.)

318. Romero testified that lowering the minimum index levels has the potential to degrade water quality. (Romero, Tr. pp.2559-2560.)

319. Romero testified that he did not see the potential degradation of water quality caused by lowering the minimum index levels addressed in the Proposal. (Romero, Tr. p.2561.)

320. Romero testified that withdrawing groundwater (including ASR credits or AMCs) would have the effect of degrading water quality. (Romero, Tr. p.2561.)

321. The potential degradation of water quality caused by withdrawing AMC or ASR credits is not addressed in the Proposal. (Romero, Tr. p.2561; City Ex. 1.)

322. Romero testified that withdrawing AMCs has the potential to affect minimum desirable streamflow. (Romero, Tr. p.2561.)

323. The potential effect on minimum desirable streamflow caused by withdrawing AMCs is not addressed in the Proposal. (Romero, Tr. p.2561; City Ex. 1.)

324. Austin testified that a rise in groundwater elevations in the basin storage area would lessen the hydraulic gradient and, therefore, slow the movement of the chloride; accordingly, his expert report states that pumping the Aquifer to levels below historic levels would accelerate chloride movement toward the pumping source. (Austin, Tr. p.3150; Interv. Exh. 2, p.4.)

325. Burns and McDonnell did not model chloride migration as it would be impacted by the lowering to the new minimum index level and withdrawing aquifer maintenance credits during the time of an extreme drought. (McCormick, Tr. p.3537.)

326. DeAngelis testified that he has no opinion with respect to water quality and how it relates to the City's model. (*Id*.)

327. Henry had no opinion as to whether the Proposal would protect domestic well owners beyond 660 feet from a City Phase II well. (Henry, Tr. p.605.)

328. McCormick testified that he did no modeling, MODFLOW or otherwise, to determine the impact of the City's current Proposal on water quality. (McCormick, Tr. p.1109.)

329. McCormick testified that he did no work to understand the movement of the Burrton chloride plume if 120,000 acre-feet of AMCs were withdrawn from the aquifer. (McCormick, Tr. p.1217.)

330. McCormick testified that he did no work to understand the future chloride movement from the Arkansas River if water was drawn down to the minimum index level. (McCormick, Tr. p.1218.)

331. McCormick testified in reference to, and included in his supplemental expert report, the USGS report entitled, "Preliminary Simulation of Chloride Transport in the Equus Beds Aquifer and Simulated Effects of Well Pumping and Artificial Recharge on Groundwater Flow and Chloride Transport neat the City of Wichita, Kansas, 1990 through 2008", (USGS SIR 2016-5165). (McCormick, Tr. p. 3515; City Ex. 29.) This report contains the following conclusion: "Additionally, the results of modeling these scenarios indicate that eastward movement of the Burrton plume could be slowed by the additional artificial recharge at the Phase I sites and that decreasing pumping along the Arkansas River or increasing water levels could retard the movement of chloride and may prevent further encroachment into the southern part of the well field area." (McCormick, Tr. p.3515; City Ex. 29.) McCormick testified that this report is not referring only to Phase I sites. (McCormick, Tr. p.3516.) He also stated that this report pre-dates the City's Proposal and does not address the concept of AMCs. (McCormick, Tr. p.3514, 3516.)

332. Letourneau testified that DWR did not perform any modeling to determine whether the City's proposal would impact water quality. (Letourneau, Tr. p.1380.)

333. The ASR Phase I and Phase II approval orders required compliance with regulatory requirements of the Kansas Department of Health and Environment (KDHE). (GMD Exhs. 26, 28.) Letourneau testified that he was not aware if inquiry had been made to KDHE regarding the Proposal, but they could be asked about it. (Letourneau, Tr. pp.1997-1998.)

334. In an interrogatory, the City was asked, "What steps did the City take to assess, evaluate and/or measure the potential impact pumping or otherwise withdrawing the 120,000 AF (sic) in AMCs would have on the migration of the Burrton Chloride Plume and/or chloride intrusion from the Arkansas River?" In its objection to the question based on the City's proposal of

120,000 acre-feet as a cap on recharge withdrawals, rather than a proposal to withdraw a net 120,000 acre-feet from the Aquifer, the City stated, "neither such a withdrawal nor the impact on chloride migration was modeled as part of the City's proposal because such an event is not contemplated by the City's proposal." (GMD Ex. 18, p.12.)

EE. Minimum Desirable Streamflow

335. Austin testified that streamflow is made up of two components: runoff, which is comprised of precipitation or excess water that runs off the land surface and enters the stream, and base flow, which is comprised of groundwater discharge that enters the stream. (Austin, Tr. p.3102.)

336. Minimum desirable streamflow (MDS) refers to statutorily-defined and protected specific water levels in designated streams and rivers, reflecting the protection of water rights (existing at the time the MDS law took effect) authorizing the use of water from that given stream or river. (K.S.A. 82a-703a, -703b, -703c; Austin, Tr. p.3104.)

337. Letourneau testified that MDS applies to permits and water rights whose priority dates are junior to (more recent than) 1984, which includes the ASR Phase I and II permits. (Letourneau, Tr. p.1681.) He explained that there are statutory MDS target levels for river basins throughout Kansas, and if the flows drop below those levels, DWR issues administration orders for post-1984 surface water rights and permits to cease pumping until the streamflow comes back, perhaps for two weeks. (Letourneau, Tr. p.1756.)

338. Letourneau testified that DWR did not consider how MDS would be protected through the City's Proposal, but that DWR does not conduct that analysis when evaluating any applications or permits; rather, DWR approves applications and, if MDS is not met at a given

gage location, DWR administers the related water rights as if the gage was a water right with a 1984 priority. (Letourneau, Tr. pp.1681-1682.)

339. Letourneau testified that DWR has primarily administered MDS in the context of surface water rights, that the area of the Proposal is not one of the two areas in which DWR has (or is planning to) administer groundwater rights for MDS. (Letourneau, Tr. p.1680.) He stated that DWR does not have sufficient data regarding the Equus Beds and Little Arkansas River to administer MDS as to groundwater rights and permits, but DWR can administer surface water rights in those areas. *(Id*. p.1758.)

340. Letourneau testified that groundwater use can impact MDS. (Letourneau, Tr. p.1754.)

341. DeAngelis testified that he has no opinion on impacts to streamflow based on the City's model. (*Id*.)

342. The Proposal does not demonstrate that the City considered whether the proposed modifications would impact minimum desirable streamflow or performed any modeling that addressed impacts to minimum desirable streamflow. (Austin, Tr. p.3119-3120; pp.3189-3190.)

343. Austin's expert report includes a table representing his calculations of the percentages of achievement of MDS at the Little Arkansas River gage at Valley Center, Kansas, for given time periods: for 2009 through 2018, MDS was achieved 83.80% of the time; for 2011 through 2012, MDS was achieved 63.4% of the time. (Interv. Ex. 3; Austin, Tr. p.3198.)

344. Austin testified that lowering the City's minimum index levels to below historically low levels would have a greater impact on base flow and, if base flow is affected enough, MDS would be hard to achieve at the lower level. (Austin, Tr. p.3189.)

345. Austin testified that, based on Romero's estimated reduced streamflow that would be seen with the City pumping below the current minimum index levels, it would be reasonable to expect that MDS would be met half of the time or less. (Austin, Tr. p.3198.)

346. Boese testified that, based on his own analysis and data, when aquifer levels drop, it impacts the MDS in both the Big Arkansas River and the Little Arkansas River; he also testified that if the City withdraws recharge credits so as to drive the water levels below those seen in 1993, there would "absolutely" be the potential to negatively affect MDS. (Boese, Tr. p.2188.)

347. Boese testified that, in considering new applications for permits to use water for beneficial use, the GMD2 safe yield and spacing regulations have built-in calculations that take MDS into account and therefore, MDS is a factor in GMD2's process of reviewing new applications. (Boese, Tr. p.2913.) He further testified that, because ASR applications are exempt from safe yield regulations, MDS is not already accounted for in this way here. (*Id.*) Boese testified that he believes an MDS analysis should be done for the Proposal. (Boese, Tr. pp.2914-2915.)

348. Austin testified that the City's model does not address how withdrawing AMCs later would impact MDS. (Austin, Tr. p.3190.)

349. Romero testified that there is no model reporting in the City's Proposal as to the Proposal's hydrologic impacts to rivers or wells, either as to lowering the minimum index levels or adoption of AMCs. (Romero, Tr. pp.2467-2470, 2475-2476.)

350. Romero modeled the potential impacts caused by the Proposal; he stated that he used an additional analysis package (Multi-Node Well) in combination with the Proposal's MODFLOW modeling to look at impacts to rivers and wells in the area; reflective of ASR credit pumping data shown in Proposal Table 2-5, Romero was able to isolate the impacts of pumping ASR

recharge credits on both rivers as related to minimum desirable streamflow and also the impacts to water levels as related to individual wells. (Romero, Tr. pp.2481-2482, 2586, 2639; GMD Ex. 68, Fig. 1.) Romero stated that the City's one percent drought scenario, as shown in Table 2-5, is diverting almost 40,000 acre-feet of its native water rights every year during the eight-year drought, while Romero's analysis includes the full diversion of 40,000 acre-feet of native rights every year during the eight year period. (Romero, Tr. p.2492.)

351. Romero testified that lowering the minimum index levels has the potential to affect minimum desirable streamflow. (Romero, Tr. p.2560.)

352. Romero testified that he did not see the potential effect on minimum desirable streamflow caused by lowering the minimum index levels addressed in the Proposal. (Romero, Tr. p.2561.)

353. Romero testified that his water budget analysis indicated that, if the City pumped 50,000 acre-feet of recharge credits over an eight-year period (as reported in the Proposal's Table 2-5 and assuming the same amount of native water right pumping as shown in Table 2-5), there would be a resulting depletion in river levels of approximately 30,100 acre-feet. (Romero, Tr. pp.2486-2487; GMD Ex. 68, Fig.1.) Romero testified that, under the same conditions, if the City were to pump 120,000 acre-feet of recharge credits over the modeled eight-year drought period, the resulting river depletion would be greater. (Romero, Tr. p.2489; GMD Ex. 68, Fig.1.)

354. Romero testified that his water budget analysis indicated that, if the City pumped its target of 50,000 acre-feet of recharge credits over an eight-year period with pumping of its native water rights as reported in the Proposal's Table 2-5, there would be a resulting depletion in aquifer levels of approximately 18,700 acre-feet. (Romero, Tr. p.2492; GMD Ex. 68, Fig.1.)

355. Romero testified that his water budget analysis indicated that, if the City pumps its full 40,000 acre-feet of native rights every year during the modeled eight-year drought, there would

be a resulting depletion in river levels of 146,300 acre-feet and a depletion in aquifer levels of 155,400 acre-feet. (Romero, Tr. p.2493; GMD Ex. 68, Fig. 2.)

356. Romero testified that his water budget analysis indicated that, if the City diverts its native water rights of 40,000 acre-feet each year during the modeled drought condition, most of the water above the current minimum index level will have been removed to satisfy those native water rights. (Romero, Tr. p.2497; GMD Exh. 68, Fig 3.) About 14,900 acre-feet of water above the current minimum index levels would be left to withdraw as recharge credits. If this remaining water (14,900 acre-feet) is pumped as recharge credits, after 40,000 acre-feet of native rights has been pumped each year for eight years, river levels will then be depleted by 10,200 acre-feet and aquifer levels will be depleted by 5200 acre-feet. (Romero, Tr. p.2498.)

357. Romero testified that his water budget analysis indicated that, if the City diverts its 40,000 acre-feet of native rights each year over the eight year period, and is allowed to lower its index levels as proposed, it will have access to 79,500 acre-feet more than current index levels allow. (Romero, Tr. p.2497; GMD Exh. 68, Fig.4.) Romero testified that in this situation, river levels will be depleted by 43,800 acre-feet and aquifer levels will be depleted by 33,100 acre-feet. (Romero, Tr. p.2498.)

358. Romero testified that his water budget analysis showed, in comparing the resulting depletion impacts between current minimum index levels and the proposed lower index levels, the depletion to river levels would be four to five times greater and the depletion to aquifer levels would be at least six times greater with the lower minimum index levels. (Romero, Tr. pp.2500-2501.)

359. Romero testified that his analysis showed pumping down to the lower minimum index levels for the modeled eight years would cause the Arkansas and Little Arkansas Rivers to lose

approximately ten cubic feet per second (cfs) combined. (Romero, Tr. pp.2508-2509; GMD Exh. 68, Fig. 4.) He testified that, applying half of that loss (five cfs) to the Little Arkansas River, and adding it to the loss seen during the drought of 2011-2012, pumping to the lower minimum levels during drought would result in more days when MDS would be exceeded, approximately one month's worth during each two-year period. (Romero, Tr. p.2510, 2514, 2517; GMD Ex. 68, Fig. 5.)

360. Romero testified that stream depletion from the impact of well pumping continues even after the wells are turned off, because well pumping creates a cone of depression that drops the water levels; after the well is turned off, the water level will be filled in by flow from the river (water levels in the aquifer rise, but at the expense of flow from the river). (Romero, Tr. pp.2553, 2643-2644.) Romero testified that he did not quantify how long post-drought depletion would occur after the City were to resume normal pumping operations following its modeled eight-year one percent drought. (Romero, Tr. p.2643.)

361. Romero analyzed the potential impact to aquifer levels resulting from the City pumping groundwater to the proposed lower levels. (Romero, Tr. pp.2529-2532; GMD Ex. 68, pp.7-8 of 16.)

362. Romero testified that, if the minimum index levels are lowered as proposed, 35 wells could potentially lose their water column; of those 35 wells, 29 would lose their water column from the City pumping its 40,000 acre-feet of native rights and the other six wells would lose their water column if the City were to pump down to the new lower index levels. (Romero, Tr. p.2532.) Romero testified that these results were limited to the wells included in records dating back to 1975, and that his analysis did not include wells drilled in the area prior to 1975; the actual number of affected wells could be higher. (Romero, Tr. pp.2533-2534.)

363. Romero testified that his analysis showed that, among the wells that would lose their water column due to the City's pumping (as described above), some are more than 660 feet from City wells, and therefore 660 feet is not an adequate distance for establishing protections for existing wells in the event of impact or impairment from City pumping. (Romero, Tr. p.2545; GMD Ex. 68, Fig. 7.) Romero testified that his study did not include wells drilled prior to 1975. (Romero, Tr. p.2546.)

FF. DWR Concerns/Unresolved Aspects

364. In its pre-hearing brief submitted March 18, 2019, DWR recommended that at least the following permit conditions be imposed in the event of approval of the City's Proposal:

a. conditions that impose a maximum recharge credit (whether physical recharge credits, or AMCs) accumulation amount of 120,000 acre-feet;

b. conditions that adequately ensure that other native rights in the area are protected from any impairment that may result, such as conditions that require Wichita to use pumping rotation and timing if conflicts occur, and that adequately protect current domestic use in the well field;

c. conditions that adequately address the sequence of Wichita's priority pumping, i.e., pumping recharge credits vs. native water rights;

d. conditions that limit the usage of accumulated recharge credits to Wichita's overall authorized quantity; and

e. such other conditions that DWR or the Presiding Officer may deem appropriate to impose because of the information presented or received in the proceedings of this matter. (See also Letourneau, Tr. pp.1280-1282.)

365. Letourneau testified that DWR was still taking in information through these proceedings and was willing to submit revised recommendations if necessary at the end of these proceedings. (Letourneau, Tr. p.1284.)

366. Letourneau testified that DWR has not yet fully vetted with the City how they are going to manage the recharge basin if AMCs are available. He suggested that if AMCs are available, the Proposal is to spread the AMCs across the entire well field and then apply the five percent, three percent and one percent loss, but if the City puts all of its water into the basin storage area, it loses over 50% of that water to the river. (Letourneau, Tr. p.1512-1513.) The City has not provided enough analysis on that point for DWR to make a recommendation on it. (*Id.*)

367. Letourneau testified that DWR would review the loss error which McCormick described. (Letourneau, Tr. p.1461.)

368. Letourneau testified that each time an error is discovered, it is cause for concern and DWR would definitely want to review it. (Letourneau, Tr. pp.1426-1427, 1458, 1461, 1462, 1466, 1467, 1471.)

369. Letourneau testified that it has not yet been determined whether, if the Proposal is approved, the City could only withdraw AMCs in a time of drought. (Letourneau, Tr. p.1515.)

370. Letourneau testified that, regarding the errors or discrepancies in the City's modeling reports, DWR is willing to review those errors to see how they may have impacted the model's outputs. (Letourneau, Tr. p.1530.)

371. Letourneau testified that he believes there should be a correlation between the modeled results and the contingency identified in the Proposal's lower minimum index levels. (Letourneau, Tr. p.1470.)

372. Letourneau testified that the discrepancies of over 100 feet between practical saturated thickness as reported on driller's lithologic logs and the Proposal's modeled saturated thickness values gives him cause for concern and about which he would seek DWR modelers to study whether the modeled saturated thicknesses are accurate for all 38 index cells. (Letourneau, pp.1560, 1575, 1586.)

373. Letourneau testified that, based on the significant discrepancies between practical saturated thicknesses of four index cells as revealed by driller's logs compared to modeled results shown in Figures 10 and 11 of the Proposal, the proposed drop of minimum index levels by an amount of 9 feet to 23 feet gives him cause for concern. (Letourneau, Tr. pp.1588-1589.) He testified that a drop of 23 feet in index cell 1, where the practical saturated thickness is 30 feet could cause a significant effect. (*Id.)*

374. Letourneau testified that the additional data presented regarding the practical saturated thicknesses of the four index cells could change his previous opinion that dropping the index levels would not be significant. (Letourneau, Tr. p.1590.)

375. Letourneau testified that it would give him cause for concern with the impacts of lowering the minimum index level if the actual measured data for all 38 index cells was vastly different from the modeled results. (Letourneau, Tr. p.1590**.)**

376. Letourneau testified that, with respect to lowering the minimum index levels and based on the well log data, he wants to review the proposal further before saying whether lowering the minimum index levels is in the public interest. (Letourneau, Tr. p.1604.)

377. Letourneau testified that, based on his real world experience, after the drought of 2011 through 2012, it took the Aquifer about six to seven years to recover, and that it would be

reasonable to consider how recovery from an eight-year drought may compare to the six-to-seven year recovery from a two-year drought. (Letourneau, Tr. p.1796.)

378. Letourneau testified that protections for other types of water users (other than domestic well owners within spacing requirements) who may be adversely affected by the Proposal could be considered. (Letourneau, Tr. p.1830.)

379. Regarding the City's proposed 120,000 acre-foot cap on recharge credits, and the possibility of other municipalities that might implement an ASR project in the Equus Beds well field, Letourneau testified, "that's always in the back of our mind."

380. Letourneau testified that he was not aware if inquiry had been made to KDHE regarding the Proposal, but they could be asked about it. (Letourneau, Tr. pp.1997-1998.)

381. Letourneau testified that each time an error is discovered, it is cause for concern and DWR would definitely want to review it. (Letourneau, Tr. pp.1426-1427, 1458, 1461, 1462, 1466, 1467, 1471.)

GG. Intervenors' Testimony/Basore

382. The record indicates that each of the eleven Intervenors has a significant interest in the outcome of this matter, either by virtue of ownership in a well or wells (irrigation, domestic, stockwatering) in or near the City's well field, or existing water permit(s) or water right(s) in or near the City's well field, and/or a business dependent on the continued viability of wells in or near the City's wellfield. The DWR permits, certificates and other orders of the Chief Engineer documenting the permits and water rights have been administratively noticed. (Tr. p.11.)

383. The Intervenors are: Richard Basore, Josh Carmichael, Judy Carmichael, Bill Carp, Carol Denno, Steve Jacob, Terry Jacob, Michael J. McGinn, Bradley Ott, Tracy Pribenow, and David Wendling.

384. Richard Basore, one of the Intervenors, testified that he has four wells that rely on the Equus Beds Aquifer. (Basore, Tr. p.3233) He stated that he has four water permits that encompass three wells and operate five pivots. (*Id*.) One well is a domestic well at his house. (Basore, Tr. p.3235.)

385. Basore testified that he has no alternative source of water, "if my water under my land gets so salty I can't use it, I'm lost." (Basore, Tr. p.3237, 3257.)

386. Basore testified that all of his water rights predate the City's Proposal. (Basore, Tr. p.3301.)

387. Basore described his extensive experience working for, and with, a variety of water-related agencies and entities, including DWR, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, Kansas Department of Wildlife and Parks, and fifteen years working for the Kansas Department of Health and Environment. (Basore, Tr. pp.3215-3232, 3292-3299.)

388. Basore testified that he hopes he has enough authorized quantity to be adequate during an eight-year drought, but he has not had the experience of an eight or ten-year drought. (Basore, Tr. pp.3240-3241.) He testified that, in approximately 1980, there was a period of 30 days during which the temperatures exceeded 100 degrees which caused him to run his one pivot 24 hours, seven days a week on 130 acres of corn, resulting in about half the yield he would have hoped for. (Basore, Tr. p.3242.)

389. Basore testified that he typically pumps a reasonable amount, which is not always the full authorized quantity, and with some crops he might not pump at all. (Basore, Tr. pp.3244-3245.) He testified, "it's not efficient to water when you don't need it, it makes no sense, there's a cost

to it; you've got a big investment in it and you want it to last as long as you can." (Basore, p.3245.)

390. Basore testified that he gets no future credit for water he leaves in the Aquifer. (Basore, Tr. p.3245.)

391. Basore testified that he pays for the well and his farm tenant pays for the pump, motor and pivot. (Basore, Tr. 3246.) He estimated that his three wells represent a $75,000 investment plus the domestic well at his house is 250 feet deep and a five-inch well costs $50 to $100 a foot. (Basore, Tr. p.3247.)

392. Basore testified that his main reason for being an intervenor in this matter is because of the potential for the City's Proposal to increase salt intrusion into the water on which he relies. (Basore, Tr. p.3248.)

393. Basore testified that he is concerned about potential vertical expansion of the City's basin storage area which would include lowering the minimum index levels. (Basore, Tr. 3248-3249.) He stated that he is concerned about this expansion potentially causing saltwater intrusion from the Big Arkansas River into the Equus Beds and affecting his irrigation and domestic wells; he testified that his decades of experience with windmills showed that the wells closest to the river were the saltiest and the wells farther away were less so. (Basore, Tr., p.3248.) He further testified that his irrigation wells are close to the river, putting him on the "front line of the movement of the salt front". (Basore, Tr. p.3250.)

394. Basore testified that he is concerned about the potential impact of chloride intrusion in his area if the AMC concept is approved (Basore, Tr. pp.3297.) He testified that he is concerned about the potential for the City to withdraw AMCs, potentially up to 120,000 acre-feet total over eight years of drought, because in an eight-year drought everyone (including the City, irrigators,

industrial users and other municipalities) would be pumping their full water rights, which include the native water rights plus recharge credits each year, and there isn't proof of what the cumulative effect would be or what it would mean for his property, his water rights and his ability to use water. (Basore, Tr. pp.3273-3274.) Basore testified that he believes it would be legitimate for the City to withdraw recharge credits up to 120,000 acre-feet over time, as long as the City had actually injected the amount of water into the aquifer. (Basore, Tr. p.3273.)

395. Basore testified that, in the mid-1980's, the water he was pumping to grow soybeans changed from usable to unusable in the span of five or six years, and that his crop advisor analyzed the resulting crop damage and determined it to be "salt burn." (Basore, Tr. pp.3248-3249.) Basore testified that he had to change his crops to more salt-tolerant varieties and eventually had to put in a new well. (Basore, Tr. p.3249.)

396. Basore testified that his ultimate worry is that the salinity would get so high that the water would be unusable for irrigation, returning the property values to dryland values, which would mean significant economic harm in two ways: (1) a loss of one-third to one-half of the property value and diminished value in the water right and (2) the loss of future income from being unable to grow irrigated crops. (Basore, Tr. pp.3251, 3315.)

397. Basore testified that, if lowering the index levels and withdrawing AMCs is shown to take water away from other Intervenors besides himself, everyone in the area would be negatively impacted in increased power costs to pump at deeper levels, reduced yields, loss of income to the local co-op association that runs the local grain elevator, reduced income for the sellers of fertilizers, seeds, herbicides and fuel, and loss of income to the companies that provide that fuel. (Basore, Tr. p.3316.)

398. Basore testified that his wells are in Index Cells No. 32 and No. 35 and, according to Romero's analysis, his wells in Index Cell No. 35 are in the area of direct impact from salt intrusion as modeled under Romero's scenarios, and that there is already chloride in the water under his wells. (Basore, Tr. pp.3254-3255; GMD Exh. 68, Fig. 8.)

399. Basore testified that, in the event that the City's operations under the Proposal may cause a negative impact to his wells, he stated that the proposed remedies were only after-the-fact and therefore not satisfying because replacing a well can take significant time away from irrigation during the growing season; he also stated that the proposed remedy of drilling a well deeper is not helpful because his irrigation and domestic wells are already as deep as they can be. (Basore, Tr. pp.3308-3309.)

HH. Intervenors' Testimony/Carmichael

400. Josh Carmichael, one of the Intervenors, testified that he lives on the southern edge of Index Cell No. 32, and that he has lived within 500 feet of that area of the Equus Beds for 38 years. (Carmichael, Tr. p.3324, Int. Exh. 1.) He testified that he has a domestic well there, which is his only source of water. (Carmichael, Tr. p.3324.) He further testified that his well is not within 660 feet of any of the City's wells. (Carmichael, Tr. p.3325.)

401. Carmichael testified that his domestic well is in Index Cell No. 32 and, according to Romero's analysis, his well is at risk from chloride movement. (Carmichael, Tr. pp.3335-3336; GMD Exh. 68, Fig. 8.)

402. Carmichael testified that, if his well could no longer access quality water, it would be "life-altering," that he would have to have water hauled in, have rural water or "up and leave." (Carmichael, Tr. p.3325.)

403. Carmichael testified that the impact of losing his domestic well and access to water for his house would cause his property value to become substantially less, with a difference in the hundreds of thousands of dollars. (Carmichael, Tr. pp.3366-3367.)

404. Carmichael testified that he runs a center pivot irrigation business that helps people to be more efficient with their water use, including implementing low-pressure sprinklers, variable rate irrigation strategies, soil moisture probes and water meter monitoring. (Carmichael, Tr. pp.3326-3327.)

405. Carmichael testified that he does not drill wells, but has quite a bit of experience working with wells; he stated that the expense of drilling a well can be $100 per foot, not including the pumping equipment; he stated that starting a new project could cost around $80,000 to $100,000. (Carmichael, Tr. pp.3329-3330.)

406. Carmichael testified that it can take three or four months to get a well drilled due to the backlog drilling companies are experiencing, and that the delay would increase "drastically" during a drought. (Carmichael, Tr. p.3329.)

407. Carmichael testified that in his business, he has looked for solutions to saltwater contamination in irrigation equipment and found them to be "terribly expensive" and "there's no proof that they work yet." (Carmichael, Tr. p.3371.) Carmichael testified that equipment adaptations can be made to guard against damage from salinity and that these upgrades can cost between $30,000 and $60,000. (Carmichael, Tr. p.3362.)

408. Carmichael testified that he is concerned about the City's request to lower the minimum index levels because DWR, GMD2 and the City previously agreed on the 1993 levels, one of the lowest reached in the aquifer, and that the Proposal does not explain what has changed to make lower levels acceptable now. (Carmichael, Tr. pp.3333-3334.) He also testified that, if the

Proposal is approved, he is concerned the City may make another request to lower the minimum levels again. (Carmichael, Tr. p.3338.)

409. Carmichael testified that everyone who has a well in the basin storage area should be given protections and remedies, whether or not their well is 660 feet from a City well, due to high water levels, chloride migration or lack of water; he stated that the burden of proof for such impacts should not be on the affected well owner; he further stated he is concerned that it could take a lengthy period of time to prove such impacts and to also implement a remedy. (Carmichael, Tr. p.3340.)

410. Carmichael testified that, unlike the City's AMCs concept, he does not have the opportunity to bank his water rights for future use and that his customers would "absolutely" want to bank their water rights if given the opportunity. (Carmichael, Tr. pp.3341-3342.)

411. Carmichael testified that he is "alarmed that [the City is] trying to switch to all Equus Beds water to create a hole so that they can recharge and not use Cheney"; he states that activity would not be good stewardship of the water. (Carmichael, Tr. p.3339.)

412. Carmichael testified that he decided to intervene in this matter because he felt there were a lot of unanswered questions with the Proposal, and after listening to all the testimony, he now has more unanswered questions. (Carmichael, Tr. p.3338.)

II. Intervenors' Testimony/Carp

413. Bill Carp, one of the Intervenors, testified that he is a crop producer of corn, soybeans, and irrigated wheat, and has been for 40 years. (Carp, Tr. p.3378.)

414. Carp testified that he owns four permitted wells, one leased well that he relies on for irrigation, and one rental property with a domestic well on which it relies. (Carp, Tr. p.3378.) Of these wells, only one is in the basin storage area, and the others are two miles south of the

basin storage area. (Carp, Tr. pp.3378-3379.) Carp testified that his one well in the basin storage area is in Index Cell No. 31. (Water Right, File No.32,678; Carp, Tr. p.3379, Int. Ex. 1.)

415. Carp testified, regarding his well in the basin storage area, that he does not have a back-up plan if the Equus Beds water becomes contaminated or unavailable. (Carp, Tr. p.3379.)

416. Carp testified that he invests in conserving water by using long drop sprinklers and newer nozzles, which reduce evaporation. (Carp, Tr p.3381.) He stated that any conservation he does is based on a return on his investment. (Carp. Tr., p.3393.)

417. Carp testified that he gets no future credit for water that he has saved with his conservation efforts. (Carp, tr. p.3382.) He further stated that if he uses less than his authorized quantity in a given year, the amount he did not use is "gone" and he is not allowed to store it. (Carp. Tr. p.3387.)

418. Carp testified that the impact of the 2011-2012 drought on his operations led him to pump more than his authorized quantity and incur penalties, and he still came up short. (Carp, Tr. p.3400.)

419. Carp testified that, if he lost access to water, he would lose the investment he made in irrigation equipment, including installation and removal costs plus depreciation, and that the resale value would be limited and perhaps nothing if the equipment has been pumping in a salty area. (Carp. Tr. pp.3404-3405.)

420. Carp testified that if he lost the water right on his land, the loss in property value would be approximately half a million dollars. (File No. 32,678; Carp, Tr. p.3447.) He also stated that, if he lost his water right, he would also lose his livelihood, which depends on the ability to irrigate crops. (Carp, Tr. p.3449.)

421. Carp testified that he is concerned about lowering the minimum index levels because the City, DWR and GMD2 had all agreed that 1993 levels were as low as they should go, and he hadn't seen, read or heard anything to make him believe going lower would be safe for the Aquifer. (Carp, Tr. p.3411.) He also testified that he is concerned because the area has not experienced pumping below the 1993 levels; he characterized it as "paramount" to model whether the Aquifer can recover from any of the proposed pumping scenarios. (Carp, Tr. pp.3412-3413.)

422. Carp testified that one of his concerns about AMCs is that approval of this Proposal would set a precedent for the entire state. (Carp, Tr. p.3417.)

423. Carp testified, "if this goes wrong, then it's serious for everybody. . . if they're wrong on this one, it's expensive to everybody. It's not Wichita's bill, it's everybody's bill." (Carp, Tr. p.3425.)

II. DISCUSSION AND CONCLUSIONS

A. Motion to Dismiss

As stated earlier in this recommended order, GMD2 filed a Motion to Dismiss on March 11, 2019. The Intervenors filed a Motion in Support of GMD2's motion on the same day. The City and DWR both filed responses on March 18, 2019, seeking denial of the Motion to Dismiss. On May 3, 2019, GMD2 filed its Reply and Clarifications to Various Responses of DWR and the City to the District's Motions. Counsel for all four parties presented oral argument on this motion, and the other pending motions, at a hearing held on May 28, 2019. At oral argument the parties generally addressed the Motion for Summary Judgment and the Motion to Dismiss somewhat simultaneously due to overlap in GMD2's arguments for those two motions. In the July 24, 2019 Prehearing Order, the Motion for Summary Judgment was denied because the

motion had not adequately established uncontroverted facts material to the case. This standard did not apply to the Motion to Dismiss; consequently, the Motion to Dismiss was taken under advisement until after the evidentiary hearing.

The Motion to Dismiss primarily alleges the Proposal is legally impermissible because (1) the Proposal has not been submitted according to mandatory statutory or regulatory procedures, (2) the Chief Engineer generally lacks jurisdiction to modify the City's permits, (3) the Proposal violates the prior appropriation doctrine, (4) the Proposal constitutes an uncompensated taking of private property for public purposes, and (5) the City lacks standing to advance the Proposal.

1. Has the Proposal been submitted in compliance with mandatory statutory or regulatory procedures?

GMD2 and the Intervenors assert that the Proposal should be dismissed outright for failure to follow statutory procedures, or, in a related argument, because no statutory procedure authorizes the kinds of modifications the Proposal seeks. The resolution hinges fundamentally on whether the Proposal was required to be submitted according to statutory procedures for filing applications for new appropriations or for filing applications to change an aspect of an existing water right. (K.S.A. 82a-711, K.S.A. 82a-708b). The City did not file either of these kinds of applications to request the water right modifications it seeks.

The Kansas Water Appropriation Act allows applications to be filed to change only three of the essential components of an existing water right: changes in authorized point of diversion, authorized place of use, or authorized use made of water (type of use). K.S.A. 82a-708b. David Pope, Chief Engineer from 1983 to 2007, and Tim Boese, Manager of GMD2 since 2007, both testified that, based on their extensive experience applying the laws and regulations, these three

changes are the only fundamental changes that can be made to an existing water right under the KWAA, and the statutory application procedure is the only way to obtain approval for any of these three changes.

According to Pope, Boese and Lane Letourneau, Program Manager for DWR's Water Appropriations Program, certain exceptions exist in which minor or administerial changes to water rights or permits can be made by the Chief Engineer without an application under K.S.A. 82a-708b. Boese testified that these exceptions include administrative corrections of the legal description of an authorized place of use or point of diversion [K.A.R. 5-5-(b)], approval of conservation plans [K.S.A. 82-733(f); K.A.R. 5-3-5l], reduction of an existing water right [K.A.R. 5-7-5], exemptions from the requirements of a flowmeter [K.A.R. 5-1-7(c)(5)(F)], division of a water right [K.S.A. 82a-742], distribution of water between users when a prior right is being impaired [K.A.R. 5-4-1(e)], and enrollment in a certain kind of water rights conservation program [K.A.R. 5-7-4b]. None of these types of changes allow expansion of a water right (quantity or rate) or changing the local source of supply.

The changes to the ASR Phase II permits requested by the Proposal (lowering of the minimum index level and adoption of AMCs) are not changes in points of diversion, place of use or use made of water, as contemplated by K.S.A. 82a-708b. Pope, Boese and Letourneau testified accordingly. Therefore, a change application would not be the appropriate mechanism for the City to use here.

The question then turns to whether the City's desired changes to their water right permits require new applications under K.S.A. 82a-711. As the record and testimony corroborate, certain fundamental attributes of a water right, other than the three components listed under K.S.A. 82a-708b, cannot be changed: the date of priority, maximum annual quantity, maximum rate of

diversion, authorized source of supply. To obtain the Chief Engineer's authorization for differences in those attributes, the underlying water right may not be officially changed; a new appropriation would need to be approved, requiring the filing of an application for a new appropriation of water ("new application"). As Pope testified, a water right's maximum rate ad quantity cannot be expanded once the water right has been created.

Some discussion of K.A.R. 5-5-3 during testimony took place as to whether this regulation may allow the Chief Engineer to increase the maximum authorized annual quantity of an approved permit or a perfected water right. It does not. This regulation states, "the extent of consumptive use shall not be increased substantially after a vested right has been determined or the time allowed in which to perfect the water right has expired, including any authorized extension of time to perfect the water right." Counsel mistakenly offered this regulation as support for the proposition that the maximum authorized quantity of a water right could be increased, as long as it was accomplished during the perfection period. Some clarification is in order.

The prior appropriation doctrine, adopted by Kansas in 1945 with the passage of the Kansas Water Appropriation Act, has as its core principle that water rights receive priority in times of shortage by a "first in time is first in right principle." K.S.A. 82a-706; *Clawson v. Kansas Dept. of Agriculture*, 49 Kan. App.2d 789, 797, 315 P.3d 896 (2013); *F. Arthur Stone & Sons v. Gibson*, 230 Kan. 224, 630 P.2d 1164 (1981). The date and time at which an application is filed is of the utmost importance. When an application is filed to seek approval for a new appropriation, DWR stamps it with the date and time of its filing; this date and time irrevocably sets its place in the priority timeline. K.S.A. 82a-707. If the application is approved, the approval (permit) dictates the pertinent conditions and limitations; the permit also sets deadlines

for developing the authorized use into a full water right by actual use as authorized, a process called perfection. The permit will state the maximum annual authorized quantity of water that may be used, and the maximum rate at which diversion may take place. These two attributes are never approved for more than the amounts requested in the application, due to the prior appropriation doctrine. "Upon perfection, the quantity of the water rights perfected and the rate of diversion shall not exceed the amount set forth in the permit." *Cochran v. State Dept. of Agriculture*, 49 Kan. App.2d 789, 803, 315 P.2d 896 (2013). The quantity and rate are the paramount attributes of any water right; they are locked in at the time an application is filed, because, to allow these to expand after others have filed a new application in the interim, would violate the "first in time is first in right" doctrine. It is important to note that a permit may be approved for less than requested, and a full water right may be perfected for less than the maximum annual quantity of water authorized in the permit. *Cochran*, 49 Kan.App.2 at 803. Reductions in the (requested or authorized) rate or quantity do not violate the prior appropriation doctrine; only increases do.

The language in K.A.R. 5-5-3 (stating that consumptive use shall not be increased substantially after the time allowed in which to perfect the water right has expired) does not mean the authorized maximum annual quantity can be increased beyond that which was requested in the application, or beyond that which was approved by the permit. Consumptive use (use which permanently removes water from the source of supply), if it occurs, is necessarily a subset of the authorized annual quantity established in the permit. The regulation does not allow for an increase in maximum authorized annual quantity beyond that which was approved by the permit. To do so would violate the prior appropriation doctrine. Therefore, K.A.R. 5-5-3

does not support an argument or implication that the Chief Engineer may increase the maximum annual quantity authorized by a permit.

There are two controlling questions as to whether the City is required to pursue AMCs and/or lower minimum index levels through new applications. The first question is whether the City is seeking approval to use more water than is authorized under the existing permits. The record and testimony indicate that this is the case, or at least that approval of the lower minimum index levels and/or AMCs would provide the possibility for the City to increase its water use beyond the limits of its current permits.

The City's Strategic Plan indicated that a one percent drought would result in the need for "a combination of new water supply and long term conservation." (City Ex. 9, p.29.) Pajor testified that the City now has sufficient water under its native water rights (in Cheney Reservoir and the Equus Beds) in all but extreme drought conditions. Pajor also testified that the only purpose for which the City still needs to recover ASR credits is to meet demand during extreme drought events to avoid employing stage three and four restrictions of its Drought Response Plan. The Strategic Plan identified the need for an additional 10 million gallons per day (mgd) to meet demands during the extreme drought.

Scott Macey, Water Resources Engineer for the City, testified that he put together the demand projections that were placed on the Equus Beds portion of the Proposal as a result of his work in MODSIM simulations; he implemented future demand as adjusted for planned conservation, which resulted in a future projected demand of 81,690 acre-feet in 2060.

The Proposal expressly requests approval of the lower minimum index levels for potential future ASR infrastructure and that the AMC concept, if approved, would apply to future bank storage wells in addition to surface water diversion from the Little Arkansas River.

Letourneau testified that if the City constructs new bank storage wells, those new wells would increase the City's capacity to capture overflow water from the Little Arkansas River.

Under the AMC concept, the City would be able to earn more credits than they currently can earn under their ASR permits. Indeed, this is the purpose for seeking AMC approval. The City describes being unable to earn physical recharge credits due to the permit condition that allows injection of surface water only when the water level is ten feet or more below the land surface elevation. Because the recovery of the aquifer has brought water levels high enough that the City cannot inject source water at times, the City is unable, at those times, to earn physical recharge credits to meet its goal. The inability to earn and accumulate the desired quantity of physical credits led the City to seek a new way to earn recharge credits (AMCs) which would result in more credits than are possible with ASR credits. The rationale for earning more credits necessarily means more pumping of groundwater than the ASR permits currently allow.

The AMC concept creates a two-for-one situation in which the City would earn additional recharge credits (AMCs) for leaving previously-injected water in the aquifer; this previous injection would have already earned the City recharge credits (ASR) by virtue of the water having been stored in the aquifer (after diversion from the Little Arkansas River and treated). Thus, under the AMC concept, the water in storage would result in the City having two recharge credits for each unit of water: the initial ASR credit and the subsequent AMC credit. As a result, the City would ultimately be able to withdraw two physical water (credit) units of water for each physical water unit stored in the aquifer. In this way, the City would be allowed to withdraw more water from the aquifer than currently authorized.

The AMC concept would also allow a "two-for-one" in the sense that there would be two beneficial uses occurring from the same water at the same time, in which water is directly used in

the City for municipal use and simultaneously earns a recharge credit for future artificial recharge use. Boese and Letourneau both testified to this. Letourneau further stated that, in his 28 years of looking at applications and permits and applying statutes and regulations to them, he has never seen approval of two types of uses for the same quantity of water at the same time; he testified that it cannot be done. *(Id.*)

As with AMCs, the lower index levels are a mechanism by which the City could pump more groundwater than is currently authorized. The permits currently prohibit the withdrawal of physical recharge credits (even though the credits are earned by physical injection of source water into the aquifer) when the static water level in the given index cell is below the 1993 level. A problem can arise in times of drought when usage is high and water levels drop below the 1993 levels; in that situation, the City would be prevented from withdrawing ASR credits it has earned during a time it may need them most. The Proposal seeks to alleviate this problem by lowering the index levels at which the City can pump recharge credits. If the minimum index levels are lowered, the City could continue pumping beyond the limit is currently has, allowing it to access water deeper into the aquifer and, therefore, pump more water than its permits currently allow.

According to Romero, his modeling and analysis showed that lowering the minimum index levels would effectively be a new diversion of groundwater with associated impacts to nearby rivers and neighboring wells. He stated that, if the City were to pump its full 40,000 acre-feet of native water rights each year during the modeled one percent drought in combination with ASR credits, and the City were allowed to pump down to the proposed lower index levels, the additional amount of recharge water that could be pumped (as compared to current index levels) would be 79,500 acre-feet.

It is clear that the Proposal seeks to provide water the City has determined it will need for its residents and customers in times of severe and extended drought. This is a legitimate and laudable goal. However, the laws of Kansas governing the appropriation of water do not allow the authorized quantity of any permit to be expanded beyond the maximum authorized annual quantity. The need for water does not override the criteria of K.S.A. 82a-711. Indeed, the prior appropriation doctrine ignores need altogether for allocating water during times of shortage.

In addition, an aquifer storage and recovery system has, at its heart, the recovery of an aquifer. When the aquifer has recovered, the ASR system has succeeded, at least from the standpoint of restoring the aquifer. The restrictions imposed on pumping relative to upper and lower water levels are reasonable and necessary for protecting other users of the aquifer; they protect others from harm due to water levels that are too close to the surface, or from harm due to water levels that are so low as to jeopardize others' ability to exercise their senior water rights or so low as to threaten chloride contamination. (See ahead.) As Letourneau testified, neither the ASR Phase I or Phase II orders guaranteed the City a specified amount of credits or that the City would have enough credits to meet its needs. The physical limitations preventing the City from earning or accessing credits, depending on actual hydrological circumstances, are part and parcel of the approved ASR project; it is reasonable to conclude that the drafters of the ASR permits contemplated that these limitations could come to pass, and would be necessary if the described circumstances arose. All water rights in Kansas have limitations. As stated above, the limitations on maximum authorized quantity are immutable.

Argument has been raised that the ASR permits would retain their current authorized quantity limitations (either 500 acre-feet or 1000 acre-feet annually, depending on the permit), and so the Proposal poses no risk of exceeding the authorized annual quantity. It is true that the

Proposal does not expressly request an increase in the annual authorized quantity in acre-feet increments. However, the fact that the City is presenting this Proposal for the purpose of increasing their water supply during an extreme drought undermines the claim that the new operations would not threaten to exceed the authorized quantity. As the record demonstrates, approval of AMCs and/or approval of lower index levels, would allow for more groundwater to be withdrawn than currently authorized. Approval of modified conditions that are requested for the purpose of increasing the City's water supply (under any circumstances) would be inconsistent with maintaining the current quantity limitations, and therefore, unreasonable, especially when at least one of those conditions was imposed to protect the public interest.

The Proposal, both the AMC and lower index levels, would allow the City to potentially withdraw more groundwater from the Equus Beds than the current permits allow. The law is clear. For these changes to be requested, and possibly approved, new applications would need to be filed pursuant to K.S.A. 82a-711.

The second controlling question as to whether the City is required to pursue their requested changes through new applications is whether the Proposal would result in the use of a different source of supply than the current permits authorize.

Under the ASR Phase II permits, the authorized source of supply for municipal use 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." (Water Right, File No. 46,714, *et al.*) The permits' perfection conditions further specify 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." (*Id*.) Thus, the authorized source of supply is the source water injected into and stored in the aquifer.

Under the AMC concept, the source of water for direct municipal use (without storage) is the Little Arkansas River. This source is clearly different than groundwater recharge credits accumulated by injection and storage of actual water in the aquifer ("water recharged"), as authorized by the permits.

Lowering the minimum index levels would also allow diversion of a different source of supply than specified in the permits. As stated above, the permits allow withdrawal of recharge credits (water injected into and stored in the basin storage area). The current permit conditions (and associated regulations) define the basin storage area by its lower and upper levels. According to the record, water existing below the bottom of the lower index level is Equus Beds water, existing outside the basin storage area. As such, it is part of the water supply upon which the other water right holders in this over-appropriated area depend. If the City is allowed to access water below its basin storage area (or viewed another way, if the City is allowed to expand its basin storage area), it would be accessing a new source of supply beyond that approved by the permits. This result is corroborated by Romero's modeling and analysis.

Because the Proposal, both as to AMCs and the lower index levels, would result in diversion of a different source of supply than currently authorized, these changes cannot be approved outside the statutory application process; the changes would need to be requested through a new application pursuant to K.S.A. 82a-711.

2. Does the Chief Engineer lack jurisdiction to modify the City's permits?

The District argues that the *Clawson* case categorically prohibits the Chief Engineer from modifying permit conditions after a permit has been issued. *Clawson v. State, Dept. of*

Agriculture, Div. of Water Resources, 49 Kan. App.2d 789, 315 P.3d 896 (2013). In *Clawson*, the court invalidated the Chief Engineer's use of conditions in approved permits that would allow unilateral after-the-fact reductions in approved rates and quantities. In that case, the Chief Engineer initially dismissed Clawson's applications for new appropriations, finding that they would impair existing water rights. *Clawson*, 49 Kan. App.2d at 793. Eventually, the agency secretary ordered the Chief Engineer to approve the applications. *Clawson*, 49 Kan. App.2d at 794. In approving the permits, the Chief Engineer included a condition in which he retained jurisdiction "to make reasonable reductions in the approved rate of diversion and quantity authorized to be perfected, and such changes in other terms, conditions and limitations set forth in this approval as may be deemed to be in the public interest." *Id*.

In resolving the ultimate issue, the *Clawson* court looked to whether the Chief Engineer had the statutory authority, express or implied, to retain jurisdiction to reduce the approved rate and quantity after approval of a permit. In so doing, the court analyzed the permitting and perfection process of the KWAA. The court found that the actions of the permit holder (actual water use) determine the amount to which a water right is perfected, and that the Chief Engineer's role in documenting that amount was ministerial in nature and did not constitute continuing active consideration of the permit application. Therefore, the court declared the Chief Engineer lacked the authority to retain jurisdiction to make quantity and/or rate reductions in the already-approved permits.

The *Clawson* court acknowledged that the finding in *Wheatland Electric Cooperative v. Polansky*, 46 Kan. App.2d 746, 265 P.3d 1194 (2011)(*rev. denied* May 20, 2013.) "reaffirms the chief engineer's statutory authority under K.S.A. 82a-712 to impose such terms, conditions and limitations as he or she shall deem necessary for the protection of the public interest when

determining whether an application is appropriate." *Clawson*, 49 Kan. App.2d at 805. Under the *Clawson* holding, this authority did not extend to the Chief Engineer's unilateral reductions of authorized quantity after issuance of the *Clawson* permits. The court supported its finding, in part, on the basis that the Chief Engineer would have evaluated the effect on the public interest at the time the applications were evaluated, prior to approval.

The City's Proposal is not necessarily controlled by *Clawson*. The situations are factually distinguishable. The *Clawson* court based its analysis, throughout the opinion, on the Chief Engineer's retention of jurisdiction to unilaterally reduce the approved rate and quantity against the wishes of the permit holder. However, the question at hand is whether the Chief Engineer can make changes requested by the permit holder, that would benefit the permit holder and possibly harm the public interest. The City is not facing a situation in which the Chief Engineer has unilaterally limited the City's permits against its wishes. In light of this distinction, the *Wheatland* case seems more on point, in which the permit holder is seeking modifications for its benefit.

The KWAA grants the Chief Engineer broad discretion in the execution of his or her statutory duties to manage and conserve the state's water resources and protect the public interest. This discretion is expressed in the statutes of general authority, as well as the statutes governing applications to appropriate water for beneficial use. "The chief engineer shall enforce and administer the laws of this state pertaining to the beneficial use of water and shall control, conserve, regulate, allot and aid in the distribution of the water resources of the state for the benefits and beneficial uses of all of its inhabitants in accordance with the rights of priority of appropriation." K.S.A. 82a-706. "The chief engineer may approve an application for a smaller amount of water than requested and he or she may approve an application upon such terms,

conditions, and limitations as he or she shall deem necessary for the protection of the public interest." K.S.A. 82a-712. Moreover, the KWAA declares that the Act shall be construed liberally to effectuate its purposes and "the enumeration of specific powers in this act shall not operate to restrict the meaning of any general grant of power contained in this act or to exclude other powers comprehended in such general grant." K.S.A. 82a-721. This broad authority, coupled with a liberal construction, seems inconsistent with the view that the Chief Engineer is prohibited from imposing and implementing permits conditions to protect the public interest. To the contrary, the KWAA supports the notion that the Chief Engineer is empowered to retain jurisdiction to make changes in an approved permit for the protection of the public interest.

It is also notable that, unlike the *Clawson* case, this situation does not involve a prior evaluation of the impact of the Proposal on the public interest. *Clawson* relies in part on that factor having already been considered; here, the potential impacts on the public interest from the significant changes in the operations of the ASR project are still being evaluated as part of this hearing process.

Therefore, it appears that the KWAA does sufficiently grant the Chief Engineer the authority to retain jurisdiction to modify permit conditions in order to protect the public interest. However, that authority does not extend to reducing, over the objection of the permit holder, the permit holder's ability to perfect a water right up to the maximum rate of diversion and maximum annual quantity approved in the permit; this exception, the foundation for *Clawson*, does not apply here.

3. Does the Proposal violate the prior appropriation doctrine?

The district asserts that the Proposal would violate the prior appropriation doctrine because when the City would pump below the established minimum index levels based on

accumulated AMCs, it would be able to withdraw more water than currently authorized, and that such additional withdrawals would infringe on senior water rights. This argument indicates that water rights pre-dating the approval of the Proposal, as well as approval of the ASR Phase II project, would be the affected senior rights. As noted above, the Proposal would allow the pumping of more groundwater than the permits allow. Accordingly, the additional water withdrawn would be a more recent approval than any permits that may have been approved in the area since the ASR Phase II permits were approved. Those other permits would be senior to the "new" use of water approved under the Proposal, but the "new" use would be backdated to the ASR Phase II permit dates. Because the area is over-appropriated, without enough water to satisfy all senior water rights already, this outcome would violate the prior appropriation doctrine.

4. Does the Proposal constitute an uncompensated taking of private property for public purposes?

GMD2 and the Intervenors assert that the Proposal, if approved, would violate the "takings" clause of the federal and state constitutions. The district alleges approval of the Proposal would result in a taking of existing water rights in that AMCs and lower minimum index levels would allow the City to withdraw Equus Beds water that is already allocated to other existing water rights. The Intervenors contend the Proposal would result in an unconstitutional taking of existing water rights because it would result in the degradation of water quality beyond a reasonable economic limit.

The "takings" clause of the Fifth Amendment to the U.S. Constitution forbids the taking of private property for public use without just compensation. U.S. Const. Amends. V, XIV. The Kansas Court of Appeals has held that water rights are property that can be taken, for purposes of

a claim that property has been taken without just compensation. *Wheatland Electric Cooperative, Inc., v. Polansky*, 46 Kan. App.2d 746, 265 P.3d 1194 (2011)(*rev. denied* May 20, 2013). Kansas water rights are not rights to ownership of the water; rather they are rights to the use of the water if available. K.S.A. 82a-707; K.S.A. 82a-701(g). *Wheatland* involved a water right owner's challenge to DWR's actions in the context of its own application pursuant to K.S.A 82a-708b to change aspects of its water right(s). The *Wheatland* court indicated that a water right owner may file an inverse-condemnation action to determine if a taking has occurred resulting from action by DWR, and that such a claim would depend on case-specific facts relative to the alleged economic harm caused in relation to the protection of the public interest. 46 Kan. App.2d at 756. Some of those specific facts may involve how the regulation has decreased the property's value, restricted the owner's access to the property, or interfered with the owner's invested expectations. *Id.*

The *Wheatland* court emphasized a number of key principles. The "takings" clause does not prohibit the state from taking private property for public use; it prohibits that action from being done without just compensation. 46 Kan. App.2d at 755. In addition, "[w]hen a property owner believes that his or her property has been taken without just compensation and the government hasn't initiated a formal eminent domain proceeding, the owner may file an inverse-condemnation suit for the district court to determine whether a taking has occurred and, if so, what compensation is due." 46 Kan. App.2d at 755-756.

As in *Wheatland*, the current claim is not presented within the context of an inverse condemnation action, but is asserted as another ground for relief against DWR. Unlike *Wheatland*, in which the plaintiff sought to overturn DWR's decision, in the current case GMD2 and the Intervenors seek to prevent DWR from making an unfavorable decision.

The *Wheatland* court rejected the claim of a "taking" (for which compensation was due) because there was no evidence of the alleged economic harm caused by DWR's decision. In this case, the expert testimony provides evidence that, if approved and executed, the City's Proposal would cause unreasonable negative impacts to some water right owners in the area. The Intervenors testified as to their invested expectations and their estimations of the individual economic harm they would each face if these unreasonable impacts to their senior water rights would occur due to the approval and execution of the Proposal.

However, the posture of the current case requires an additional inquiry: whether the agency's regulatory decision may be determined ahead of time by a preventative "takings" analysis. Kansas caselaw provides no clear precedent on this point. As defined by Professor John Peck, the claim here is in the nature of an inverse condemnation action. Peck draws a distinction in the arena of groundwater management between a "taking" of property involving the government actually acquiring title to property and "the more difficult question" of inverse condemnation in which the government affects property in a negative way through regulation, but does not actually acquire title. Peck, J., "Property Rights in Groundwater – Some Lessons from the Kansas Experience," 12 Kan. J.L. & Pub. Pol'y 493, 502 (2002-2003). Professor David Owen also discusses inverse condemnation in the context of challenges to governmental restrictions on a particular landowner's groundwater use. Owen, D., "Taking Groundwater," 91 Washington Univ. L.R. 253 (2013). Peck and Owen review existing precedent and the competing interests of water right holders' property rights and public policy in favor of reasonable water resource management. Both authors cite the fact-specific nature of the various cases; Owen cites to three cases that involve claims of takings based on government decisions that would allegedly lead to degradation of groundwater quality. Owen, D. at 280. Although

none of these cases resulted in a finding that a "taking" or inverse condemnation had occurred, none involved an analysis applicable to the current matter. Rather, these rulings relied on specific state statutory procedures and/or the failure of the complaining parties to establish ripeness under those procedures. In short, neither author provides clear guidance on whether, or how, groundwater users have applied a "takings" claim in the administrative setting to prevent an unwanted regulatory decision prior to its being made.

Moreover, since it appears the request for a "taking" analysis in this case is essentially an inverse condemnation claim, it would seem necessary to also determine the amount of just compensation due, a determination that is beyond the scope of this proceeding.

Without clear judicial precedent or scholarly guidance for using a proactive "takings" analysis to dismiss the Proposal at this stage and in the context of administrative proceedings, the undersigned presiding officer declines to do so.

5. Does the City have standing to advance the Proposal?

The District asserts that the City lacks standing to submit its Proposal. This assertion is rejected. The cases cited by GMD2 in support of its contention are not persuasive in the context of this case. Two cases involve challenges to actions taken by a governmental agency and hinge on the interpretation of the standing provision within the Kansas Judicial Review Act (KJRA)(K.S.A. 77-601, *et seq*.) *Moorhouse v. City of Wichita*, 259 Kan. 570, 913 P.2d 172 (1996)(Employee challenged employment action to reassign her position); *Bd. of County Comm'rs v. Bremby*, 286 Kan. 745, 189 P.2d 494 (2008)(Entities and individuals challenged a landfill permit issued by state agency). The other case is an appeal of a granting of summary judgment in a civil contract dispute. *Varney Business Servs. v. Pottroff*, 275 Kan. 20, 59 P.3d 1003 (2002).

The common factual denominator in these cases is that an action has taken place and an entity wishes to challenge it. As standing is described in the *Moorhouse* case, "The party must have personally suffered some injury and there must be a causal connection between the injury and the challenged conduct. (Citation omitted.)" *Moorhouse v. City of Wichita,* 259 Kan. at 574. The case at hand is distinguishable because it does not involve a challenge to an agency action; there has not yet been an agency action. *See Cochran v. State, Dept. of Agr., Div. of Water Resources*, 291 Kan. 898, 249 P.3d 434 (2011). Moreover, the City is the party requesting relief, not a party objecting to said request.

The District further argues that the City lacks standing to submit its Proposal because it has not followed legal procedures in doing so, thereby depriving the Chief Engineer of jurisdiction to alter the ASR Phase II permits. The question, more accurately, is not whether the City may make its request, but whether the Chief Engineer has the statutory authority to consider it. This issue was raised and resolved under subsection (1), above.

6. Motion to Dismiss Conclusion

In light of the facts demonstrated by substantial competent evidence in the record, applicable law, and the rationale provided above regarding legally-required procedures, the undersigned presiding officer concludes that the Proposal should be dismissed, without consideration on the merits, for failure to comply with statutory prerequisites of the Kansas Water Appropriation Act, K.S.A. 82a-701, *et seq*.

B. Further Discussion and Conclusions

K.A.R. 5-14-3a(s) requires the presiding officer to provide the Chief Engineer with written recommendations containing a statement of the recommended decision, facts and conclusions of law, after the record of the hearing is closed. Accordingly, the discussion and

conclusions above relied on testimony presented and exhibits admitted throughout the hearing process. In the event that the Chief Engineer declines to adopt the recommendations herein that this Proposal should be dismissed for failure to adhere to prerequisite statutory requirements, the undersigned presiding officer, in compliance with K.A.R. 5-14-3a(s), offers the following discussion and conclusions on whether, based on the record as a whole, the Proposal otherwise meets the statutory and regulatory criteria for approval that govern these proceedings.

1. Lower Minimum Index Levels/Consistency with Permit Conditions re MOU

The ASR Phase II permits each contain the condition that the approval of the given permit is subject to the terms, conditions, and limitations of the Memorandum of Understanding (MOU) between the Equus Beds Groundwater Management District No. 2 and the City of Wichita, Kansas, dated December 3, 2008.

This MOU contained the following issue and commitment: Issue 6 asked how the City will protect domestic water wells within 660 feet of a project recharge and recovery well from adverse drawdown impacts that may result from operation of the well. The corresponding commitment stated [in pertinent part]: "Because the Project recharge and recovery wells can only be pumped if water levels in the aquifer are higher than the historic low level, no impairment is expected." (GMD Ex. 27.) The MOU also included the agreement between the City and GMD2 that, as to water permit applications filed by the City which, in all other respects comply with GMD2 regulations and for which the proposed wells were to be used for aquifer recharge as defined by regulation and withdrawal of water for an authorized use, GMD2 agreed to recommend that the Chief Engineer waive applicable well spacing requirements. The City would need to submit to GMD2 a petition for such a waiver; said petition would be granted by GMD2 upon a finding that the conditions set out above [in the MOU] did exist and that the

granting of the waiver would not unreasonably impair the public interest. Boese testified that the "conditions set out above" as referenced in the MOU included the wells into which water would be injected for artificial recharge and then withdrawn at a later time.

As part of the ASR Phase II application process, the City sent letters to owners of domestic wells less than 660 feet from proposed ASR recharge/recovery wells, seeking the owners' consent to waive the well spacing regulations that would otherwise prevent approval of those wells. These letters provided assurances to the recipients, including the statement, "Withdrawals will not be permitted if water levels are below the 1993 base line established by the ASR permit." The letter further stated, "the City has also entered into a Memorandum of Understanding with GMD2 that more rigorously protects the interests of domestic well owners." (GMD Ex. 57.)

The record establishes that the City requested a waiver of the well spacing regulations, which the ASR Phase II applications would not meet, in exchange for the assurance that "ASR water rights may be utilized only when water levels exceed the level observed in 1993." (GMD Ex. 53.) Boese testified that he recommended to the GMD2 board of directors that they recommend the requested waiver of regulatory well spacing requirements in reliance on the City's commitment that recovery of ASR credits would not take place if the minimum index levels dropped below the 1993 levels. Accordingly, the GMD2 board of directors recommended to the Chief Engineer that the regulatory well spacing requirements be waived for the ASR Phase II project. The waiver occurred; the permits were approved.

The regulatory well spacing requirements were created, at least in part, to protect existing wells from unreasonable negative impacts (such as impairment), as a result of the drilling and operation of wells junior to existing wells. In exchange for, and in reliance on, the City's

assurances that pumping of the proposed recharge/recovery wells would not occur if water levels fell below the 1993 levels, owners of potentially affected domestic wells surrendered this regulatory protection. Likewise, GMD2, in reliance on the terms of the MOU in which the City committed to not pumping the recharge/recovery wells if water levels dropped below the 1993 levels, recommended that the Chief Engineer waive the regulatory well spacing protections. The permits themselves expressly incorporated this commitment within the permit conditions.

Under the Proposal, the conditions under which the GMD2 recommendation and individual consent agreements were obtained would no longer apply. In order for lower minimum index levels to be considered, the Proposal would need to be subject to new requests by the City for a GMD2 waiver recommendation and for new consent agreements from potentially affected well owners. In its current form, the Proposal's request to lower the minimum index levels below the 1993 levels would violate an express condition of the ASR Phase II permits (and the MOU which it incorporates), as well as the consent agreements reached with the individual well owners. For these reasons, the request to lower the minimum index levels must be denied.

2. Passive Recharge/Consistency with Permit Conditions and Regulation

The ASR Phase I and Phase II approvals both expressly forbid passive recharge credits. While the phrase is not defined in statute or regulation, the descriptions accompanying the phrase in the Phase I order and the adoption of that related content in the Phase II order provide a clear explanation. The Phase I order refers to passive recharge credits as "credits for not pumping City wells in the basin storage area". It further states, "passive recharge credits should not be allowed because they are not 'artificial recharge' as defined in K.A.R. 5-1-1, because no source water is being artificially recharged to create those credits" and "passive recharge credits shall

not be allowed." The Phase II approval repeats, "passive recharge credits shall not be allowed," noting that the Phase II applications shall be subject to the pertinent conditions of Phase I.

David Pope, former Chief Engineer who promulgated the regulations authorizing ASR projects in Kansas and who approved the City's Phase I project, defined a passive recharge credit as credits for water left in storage that the City could have otherwise pumped. He stated that during the review of the Phase I applications, the concept of passive recharge credits was carefully considered and ultimately it was determined that passive recharge credits would not be consistent with the law because no physical recharge of the aquifer would occur. He stated that the key concept in identifying passive recharge was whether or not physical recharge would occur. In other words, the matter hinges on whether AMC credits would be earned, not for physical recharge, but for groundwater that was not pumped, but could have been pumped. In Pope's opinion, AMC credits amount to passive recharge credits and should not be approved.

Tim Boese, Manager of GMD2 who has been extensively involved in the development of the City's ASR project, also opined that AMCs, as described in the Proposal, are passive recharge credits for the same reasons Pope identified and should not be approved. He stated that the same definition of passive recharge credits used in the ASR Phase I approval applies equally to the ASR Phase II approval.

Joe Pajor, Director of Public Work for the City of Wichita, testified that the basis of an Aquifer Maintenance Credit is water that the City left there in a prior period, that under the AMC concept, no source water would be put into the aquifer and no physical recharge would occur.

The record and the Proposal clearly indicate that AMCs would be created based on water that was left in the basin storage area, water that the City could pump, but would not. This fact unavoidably establishes AMCs as passive recharge credits.

Paul McCormick, Professional Engineer with Burns and McDonnell, asserted that AMCs do not constitute passive recharge credits because the City's planned treatment of the surface water from the Little Arkansas River and its use through the City's infrastructure defeats the claim of AMCs being passive. This position reflects a misunderstanding of the aspect of passivity in passive recharge credits. In this context, the term "passive" does not mean that surface water is not diverted or that no infrastructure is involved. Rather, the passivity refers to there being no physical injection of source water into the aquifer, as opposed to actual recharge of the aquifer. AMCs would be generated for leaving groundwater in the aquifer, rather than injecting source water into the aquifer. The absence of injecting source water is the passive aspect here. Another way to put it is that credits based on inactivity (leaving groundwater in the aquifer that could have been pumped) are, by definition, credits for passive behavior.

An essential corollary to the question of whether AMCs constitute passive recharge credits is whether the ASR statutes and/or regulations require the physical injection and storage of source water in the aquifer. ASR regulations and the ASR Phase II approval conditions resolve this question in the affirmative.

Interpreting the language of the regulations can be guided by the rules of statutory construction. The fundamental rule of statutory construction is to give the language the effect intended by the legislature. *Hawley v. Kansas Dept. of Agriculture*, 281 Kan. 603, 132 P.2d 870 (2006). The principles of statutory construction may be used to determine that intent, but only if the language is ambiguous. (*Id*. at 608.) If the provision "is clear from its plain language, then that language is to be applied as expressed." (*Id*.) The regulation defining "aquifer storage and recovery system" states, "'Aquifer storage and recovery system' means the physical infrastructure that meets the following conditions: (1) Is constructed and operated for artificial

recharge, *storage, and* recovery of source water; and (2) consists of apparatus for diversion, treatment, recharge, *storage,* extraction, *and* distribution." (Emphasis added.) K.A.R. 5-7-1(f). Likewise, "[A]quifer storage" means "the *act of storing* water in an aquifer by artificial recharge for *subsequent* diversion and beneficial use." (Emphasis added.) K.A.R. 5-1-1(e). "Recharge credit" means the quantity of *water that is stored* in the basin storage area and that is available for *subsequent* appropriation for beneficial use. . ." (Emphasis added.) K.A.R. 5-1-1(mmm). The requirement of subsequent diversion or appropriation necessarily means water would need to have been physically stored in the aquifer.

A requirement of "source water" used for artificial recharge is that it 'will not degrade the ambient groundwater quality in the basin storage area." K.A.R. 5-1-1(yyy). This regulation requires storage of water in order to make sense. There would be no need to require protection for groundwater quality if water is not physically stored in the aquifer.

Stating the obvious, the title of an aquifer storage and recovery system lists two vital components: aquifer storage and aquifer recovery. Storage is not an optional aspect of an ASR project.

No less than sixteen regulatory provisions include storage as part of an aquifer storage and recovery system. [K.A.R. 5-1-1(e), (f), (g), (uu), (mmm), (yyy), (oooo); K.A.R. 5-12-1; K.A.R. 5-12-2; K.A.R. 5-22-1(c), (f), (l), (m), (y), (ee), (mm)]. These regulations all appear earlier in this recommended order. Of particular note are the regulations addressing permitting authorization and application requirements for ASR permits. The regulation establishing a permitting system for ASR projects speaks exclusively to storing, "An operator *may store water* in an aquifer storage and recovery system under a permit to appropriate water for artificial recharge if the water appropriated is source water." K.A.R. 5-12-1(a). There is no regulatory

provision speaking to permits to appropriate water for artificial recharge that do not require storage of source water. Thus, the only water appropriation permits allowed under the KWAA for artificial recharge require the storage of source water. It is not legally possible to acquire a permit for water use as artificial recharge if that project does not involve storage of water in the aquifer.

In addition, each application for a permit to appropriate water for artificial recharge "shall describe the horizontal and vertical extent of the basin storage area in which the *source water will be stored*." (Emphasis added.)[K.A.R. 5-12-1(b)]. This regulation clearly makes it a requirement under artificial recharge permits, the kind of permits that authorize ASR Phase I and II, that, if source water is diverted under the permit, that water must be stored.

These regulations are all unambiguous; storage of source water for future withdrawal is an essential component of an aquifer storage and recovery system.

Assuming, for the sake of argument, that the regulations' numerous references to storage are ambiguous, the principles of statutory construction would lead to the same conclusion. In construing unclear statutes, one should avoid unreasonable results and make different provisions consistent, harmonious and sensible. (*Hawley*, 281 Kan. At 609.) For the ASR regulations to make sense in reference to each other, storage must be assumed to be an essential feature of an ASR system. All regulatory references assume storage of source water for withdrawal at a later time. This assumption reflects the very purpose of an ASR system: to allow storage of water in the aquifer (water diverted from a different source) to facilitate recovery of the aquifer, and to allow the use of that stored water at a later time. In this way, the water storer has additional water to use later when needed, the aquifer recovers in the meantime, and no additional native groundwater is pumped from the aquifer in the process. Without the storage component, no

aquifer recovery occurs by virtue of the ASR project. (To the contrary, under the AMC concept, more native groundwater would be accessible to the City, defeating the fundamental "aquifer recovery" component of an ASR project.) In short, the storage of water is what enables the aquifer recovery.

The ASR permit conditions express the same requirement of a storage component. The ASR Phase II approval order describes the Phase II project as "surface water will be diverted from the Little Arkansas River by means of a surface water intake [per 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." (Emphasis added.) (GMD Ex. 28.) This approval also requires each ASR well to be equipped with water flow meters "to separately and accurately record the total quantity of water injected into and diverted by each well." (*Id*.) The approved Phase II permits authorizing the withdrawal of groundwater recharge credits for municipal use state, "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. . ." (Emphasis added.) (File No. 46,714, *et al*.) These Phase II permits also mandate that the perfection of those permits (the process by which they become full water rights) shall be "by the actual application of water to the proposed beneficial use" (artificial recharge and municipal use). (*Id*.)

The USGS model itself assumes actual physical recharge of water into the aquifer as an essential component of the ASR Project. USGS Scientific Investigation Report (SIR) 2013-5042, which details the USGS groundwater model simulating the effects of artificial recharge and storage volume changes in the Equus Beds near Wichita (1935-2008), and which formed the basis for the City's groundwater model, states the following, "The *purpose* of the *Equus* (sic)

Beds ASR Project is *to store and later recover* groundwater and to form a hydraulic barrier to a known chloride-brine plume near Burrton, Kans." (Emphasis added.) (City Ex. 1, Att. E. p.8.) The report further states, "Recharge credits indicate the *volume of water Wichita has recharged to the aquifer*, the movement of recharged water between index cells, and the amount of water Wichita can remove at a later date from index cells that contain recharged water." (Emphasis added.) (*Id*.)

As reflected in the USGS report, the regulations, the Phase I and II permits and testimony at the hearing, the very purpose of an ASR system requires actual physical injection of water into the aquifer, to store for subsequent use at a later time. The fact that an area is over-appropriated or in decline creates the need for a project that will allow *recovery* of the aquifer through *storage* in the aquifer, an ASR project. This strategy does not allow for additional groundwater to be taken beyond the amount already authorized by existing permits and water rights. By acquiring water from a separate source (in this case, "source water" from the Little Arkansas River) and storing it in the aquifer for later use, there is a net zero impact on the groundwater supply. In an ASR project, one is allowed to withdraw water from the aquifer later only because one had previously put additional actual water into the aquifer. If physical injection and storage of water does not occur, recharge of the aquifer does not occur (it is not "artificial recharge"). As the Proposal states, recharge under the AMC concept would be "theoretical." (City Ex. 1, p.4-1.)

In summary, AMCs as described in the Proposal, would constitute passive recharge credits, which are prohibited by regulation and ASR Phase II permit conditions. In addition, physical injection and storage of actual source water in the aquifer is required for any ASR project pursuant to existing regulations and ASR Phase II permit conditions; AMCs would not

meet this requirement. For these reasons, the Proposal's request for the adoption of Aquifer Maintenance Credits must be denied.

3. City Burden to Demonstrate Satisfaction of Statutory Criteria of 82a-708b and 82a-711

In order to obtain approval of its Proposal, the City bears the burden of demonstrating, by a preponderance of the evidence, that its requested modifications will neither impair a use under an existing water right nor prejudicially and unreasonably affect the public interest. (K.S.A. 82a-708b; K.S.A. 82-711; K.A.R. 5-14-3a; Prehearing Order, May 1, 2019; Order to Modify Hearing and Schedule, September 27, 2018; Pre-Hearing Conference Order, July 23, 2018.)

The Kansas Water Appropriation Act details considerations that must be addressed to resolve each of these criteria.

a. Prejudicially and Unreasonably Affect the Public Interest, K.S.A. 82a-711(b)

K.S.A. 82a-711(b) states, "In ascertaining whether a proposed use will prejudicially and unreasonably affect the public interest, the chief engineer shall take into consideration:

(1) Established minimum desirable streamflow requirements;

(2) the area, safe yield and recharge rate of the appropriate water supply;

(3) the priority of existing claims of all persons to use the water of the appropriate water supply;

(4) the amount of each claim to use water from the appropriate water supply;

(5) all other matters pertaining to such question."

Each of these factors will be addressed in turn, to determine if the City has met its burden of proof, by a preponderance of the evidence.

i. Minimum Desirable Streamflow

The Kansas Water Appropriation Act declares that, when there is a legislatively-designated minimum desirable streamflow (MDS) for any watercourse in this state, the Chief Engineer "shall withhold from appropriation that amount of water deemed necessary to establish and maintain" the MDS for that watercourse. K.S.A. 82a-703a. The KWAA further states that it shall be an express condition of each and every appropriation right (except domestic use) that was applied for after April 12, 1984, that such right shall be subject to any MDS requirements identified and established on or before July 1, 1990, for the water supply pertinent to that appropriation right. K.S.A. 82a-703b(a).

According to Letourneau, MDS applies to permits and water rights whose priority dates are junior to (more recent than) 1984, which includes the ASR Phase I and II permits. He explained that, if there are statutory MDS target levels for river basins throughout Kansas, and if the flows drop below those levels, DWR issues administration orders for post-1984 surface water rights and permits to cease pumping until the streamflow comes back. Letourneau further explained that DWR has primarily administered MDS in the context of surface water rights, that the area of the Proposal is not in one of the two areas in which DWR has (or is planning to) administer groundwater rights for MDS. He stated that DWR does not have sufficient data regarding the Equus Beds and the Little Arkansas River to administer MDS as to groundwater rights and permits, but DWR has sufficient data to administer MDS in those areas as to surface water.

Letourneau stated that DWR did not consider how MDS would be protected through the City's Proposal, but that DWR does not conduct that analysis when evaluating any applications for new appropriations; rather, if DWR approves applications based on other criteria, and MDS

is not met at a given surface water gage location, DWR administers the related water rights as if the gage was a water right with a 1984 (MDS) priority. Accordingly, the ASR Phase II permits (for the surface water intake and for the recharge/recovery wells) contain a condition that makes the right to appropriate water subject to any MDS requirements established pursuant to K.S.A. 82-703c for the source of supply to which the water right applies. The KWAA contains an MDS designation (20 cubic feet per second) applicable to the Little Arkansas River at Valley Center, Kansas. K.S.A. 82a-703c.

Boese testified that the GMD2 process for evaluating new applications for water appropriation permits considers MDS, in that the GMD2 safe yield and well spacing regulations have built-in calculations that take MDS into account. However, because the ASR Phase II applications were exempt from safe yield regulations and the well spacing regulations were waived, MDS was not taken into account as part of the ASR Phase II approval process. (The safe yield exemption applied because physical water would be injected into, and stored in, the aquifer; well spacing regulations were waived in exchange for imposition of the 1993 minimum index levels.)

Therefore, in keeping with the standard practices of DWR and GMD2, an evaluation of the Proposal's impact on MDS was not part of DWR's or GMD2's processing of the ASR Phase II applications. This fact, although relevant, does not resolve the issue of whether the City has sufficiently demonstrated that the Proposal's changes to those permits will not adversely impact MDS, per K.S.A. 82a-711(b)(1). The initial ASR Phase II applications were eligible for an exemption of safe yield and a waiver of well spacing regulations based on circumstances that the City now seeks to change (physical injection and storage of source water and 1993-based

minimum index levels). Therefore, the previous exemption and waiver, and associated extenuation of MDS considerations, do not apply to the Proposal.

It is important to distinguish between the MDS condition of the ASR Phase II permits and the aspect of the surface water permit limiting diversion to only times of high flow. The ASR Phase II permit for the surface water intake on the Little Arkansas River states that the diversion of natural flows shall not take place unless there is water available to satisfy all demands by senior water rights and permits. (File No. 46,627) This permit also states that the surface water intake may only be operated when flows in the Little Arkansas River at the U.S. Geological Survey stream gage No. 07144200 located west of Valley Center, Kansas, exceed baseflow and, in order to ensure protection of senior water rights, shall not cause the streamflow at said gage to fall below 30 cubic feet per second (cfs). (*Id.*) The MDS issue raised in the context of this case is not whether the surface intake diversions, in and of themselves, will exceed MDS. Rather, the issue is whether the City has sufficiently demonstrated that operations under the Proposal (the concept of AMCs and/or lowering of the minimum index levels) will not adversely impact MDS.

The Proposal does not include modeling or analysis of the potential impacts to MDS of adoption of AMCs or lowering of the minimum index levels. Luca DeAngelis, Professional Engineer and Professional Geologist with Burns and McDonnell, who provided peer review assisting with the City's model calibration and other modeling issues, testified that he had no opinion on impacts to streamflow based on the City's model.

Evidence offered by other parties in the form of expert reports and testimony indicates concern regarding the Proposal's potential impacts to MDS. This evidence included modeling and analysis of the impacts in relation to the interaction between groundwater and streamflow.

Austin testified that streamflow is made up of two components: runoff, which is comprised of precipitation or excess water that runs off the land surface, and enters the stream, and base flow, which is comprised of groundwater discharge that enters the stream. Boese testified that, based on his own analysis and data, when aquifer levels drop, it impacts MDS in both the Arkansas River and the Little Arkansas River.

Romero modeled the potential impacts to rivers and wells in the area caused by AMCs and lowering of the water table; he used an additional analysis package in combination with the Proposal's MODFLOW modeling. He testified that, according to his modeling, lowering of the minimum index levels has the potential to affect MDS. His expert report states, "[D]uring times of drought, when MDS flow is generally of concern, the Proposal seeks to recover credit water from below the current minimum index level, which will cause a new depletion to the river system that impacts MDS flow." (GMD Ex. 68, p.7 of 16.) He testified that he did not see the potential effect on MDS caused by lowering the minimum index levels addressed in the Proposal.

Romero identified numerous specific results of his water budget analysis as applied under different scenarios. For example, he found that if the City pumped 50,000 acre-feet of recharge credits over an eight-year period (as reported in the Proposal's Table 2-5), there would be a resulting depletion in river levels of approximately 30,100 acre-feet. Under the same scenario, there would be a resulting aquifer depletion of approximately 18,700 acre-feet. Romero's water budget analysis showed, in comparing the resulting depletion impacts between current minimum index levels and the proposed lower index levels, the depletion to river levels would be four to five times greater and the depletion to aquifer levels would be at least six times greater with the lower minimum index levels. He further testified that pumping down to the proposed lower

minimum index levels for the modeled eight years, and applying that to losses seen in the drought of 2011-2012, pumping to the lower levels during drought would result in more days when MDS would be exceeded, approximately one month's worth during each two-year period. He further explained that stream depletion from the impact of well pumping continues even after the wells are turned off, due to the cone of depression (a cavity around the well) created by the pumping, which will then be filled in by flow from the river.

Austin analyzed the percentages of achievement of MDS at the Little Arkansas River gage at Valley Center, Kansas for given time periods: MDS was achieved 83.8% of the time from 2009 through 2018, and 63.4% of the time from 2011 through 2012. He testified that lowering the minimum index levels would have a greater impact on base flow and, if base flow was affected enough, MDS would be hard to achieve at the lower levels. Austin did not see anything in the Proposal demonstrating that the City considered whether the proposed modifications would impact MDS or performed any modeling that addressed impacts to MDS.

The record indicates that the City did not address potential impacts to MDS caused by either of the changes sought by the Proposal. Moreover, expert testimony and reporting in the record provide substantial credible evidence that the Proposal has the potential to adversely and unreasonably affect MDS. Therefore, the City has not met its burden to demonstrate that the Proposal will not adversely affect minimum desirable streamflow per K.S.A. 82a-711(b)(1).

ii. The Area, Safe Yield and Recharge Rate of the Appropriate Water Supply

The City bears the burden to demonstrate that the Proposal will not prejudicially and unreasonably affect the public interest, considering the area, safe yield and recharge rate of the appropriate water supply. K.S.A. 82a-711(b)(2).

The Equus Beds wellfield is over-appropriated, meaning there are more approved water use permits and water rights in the area than can be satisfied with the existing groundwater supply. The Equus Beds central well field area is closed to new appropriations (new applications are not being approved, with a few small use exceptions) due to the extent to which the area exceeds safe yield. The area has been closed since GMD2's safe yield regulation (K.A.R.5-22-7) went into effect, requiring new applications, change applications, and term permit applications to meet safe yield calculations as defined in the regulation. "Safe yield" is defined as "the long-term sustainable yield of the source of supply, including hydraulically connected surface water or groundwater." K.A.R. 5-1-1(vvv). The regulatory formula for calculating safe yield includes the aquifer recharge value. K.A.R. 5-22-7(2)(5).

The regulations list certain exemptions from safe yield, including applications for aquifer storage and recovery wells. K.A.R. 5-22-7(b)(7). The rationale for this exemption is that water pumped from ASR recharge/recovery wells is not additional water from the aquifer; rather, it is water that originated elsewhere (in this case, in the Little Arkansas River) and was physically induced into the aquifer. The exemption recognizes that the process of acquiring water from a different source and physically adding it to the aquifer, and removing it later, has a net zero impact on the amount of natural groundwater in the aquifer. As such, ASR activity does not impact safe yield.

Boese testified that he performed a safe yield analysis on all 30 of the existing ASR Phase II permits for purposes of this hearing. None of them met safe yield. In fact, some exceeded safe yield substantially. Therefore, if the exemption (based on adding new water into the aquifer) did not apply, the applications would violate K.A.R. 5-22-7. This analysis was done for the purpose of illustrating the impact of the AMC concept. Because AMCs would generate

credits allowing additional aquifer withdrawals without adding water to the aquifer, safe yield would be negatively impacted. The rationale for the exemption from safe yield would not apply. The AMC concept would convert a net-zero impact on the aquifer to a potentially substantial negative impact on the aquifer.

The City presented no analysis as to the Proposal's potential impact on safe yield. McCormick testified that his expert report does not address the Proposal's impacts to safe yield or how the Proposal would impact the public interest. Clement testified that he did not analyze the Proposal's impacts on safe yield or whether the Proposal is in the public interest.

The record indicates that the City did not address potential impacts to the area, safe yield or recharge rate caused by either of the changes sought by the Proposal. Moreover, expert testimony and reporting provides substantial credible evidence that the Proposal has the potential to adversely and unreasonably affect safe yield. Therefore, the City has not met its burden to demonstrate that the Proposal will not adversely affect the area, safe yield, or the recharge rate per K.S.A. 82a-711(b)(2).

iii. The Priority of Existing Claims of All Persons to Use the Water of the Appropriate Water Supply and the Amount of Each Claim to Use Water from the Appropriate Water Supply

The City bears the burden to demonstrate that the Proposal will not prejudicially and unreasonably affect the public interest, considering the priority of existing claims of all persons to use the water of the appropriate water supply and the amount of each claim to use water from the appropriate water supply, per K.S.A. 82a-711(b)(3),(4). The record shows unequivocally that the area is over-appropriated and that water rights and/or permits senior to the ASR Phase II project, and to the Proposal, exist in the area. This record includes the testimony and water right

and/or permit files of the Intervenors, although the fact of over-appropriation applies to the Equus Beds Aquifer, and not just the water rights and/or permits of the Intervenors. These facts being well-established, the question of whether the City demonstrated consideration of the potential impacts to prior water rights and/or permits and to the authorized amounts of those water rights and/or permits is addressed herein under the other sections discussing the public interest requirements of K.S.A. 82a-711.

iv. All Other Matters Pertaining to Such Question

K.A.R. 5-3-9 speaks to this provision, and the considerations it lists are otherwise addressed herein. K.A.R. 5-3-9 states,"(a) In accordance with K.S.A. 82a-711(b)(5), as amended, in ascertaining whether a proposed use will prejudicially and unreasonably affect the public interest, the chief engineer shall also take into consideration the quantity, rate and availability of water necessary to: (1) satisfy senior domestic water rights from the stream; (2) protect senior water rights from being impaired by the unreasonable concentration of naturally occurring contaminants; and (3) over the long term reasonably recharge the alluvium or other aquifers hydraulically connected to the stream. (b) Unless otherwise provided by regulation, it shall be considered to be in the public interest that only the safe yield of any source of water supply, including hydraulically connected sources of water supply, shall be appropriated." As discussed in other sections herein, the City has not met its burden to demonstrate that its Proposal will not impair senior domestic water rights, harm senior water rights by water quality contamination, diminish recharge of the alluvium or and connected aquifers, or violate safe yield of the aquifer.

b. Impair a Use Under an Existing Water Right, K.S.A. 82a-711(c)

Pursuant to K.S.A. 82a-711, the City bears the burden of proving, by a preponderance of the evidence, that its Proposal will not impair a use under an existing water right. That statute sets out three elements that must be addressed. "With regard to whether a proposed use will impair a use under an existing water right, impairment shall include the unreasonable raising or lowering of the static water level or the unreasonable increase or decrease of the streamflow or the unreasonable deterioration of the water quality at the water user's point of diversion beyond a reasonable economic limit." K.S.A. 82a-711(c).

Some arguments presented about impairment in this case seem to confuse the Kansas Water Appropriation Act's two analyses of impairment: one is conducted by DWR (including regulations and recommendations from a groundwater management district if the proposed use would occur in a GMD) in evaluating whether to approve an application in the first instance. At this initial stage, the applicant bears the burden of demonstrating, among other criteria, that its proposed use will not "impair[s] a use under an existing water right." K.S.A. 82a-711. The second kind of impairment analysis occurs after an application is approved, triggered by a complaint from a prior water right holder. K.S.A. 82a-706a; K.A.R. 5-4-1; K.A.R. 5-4-1a. The former analysis provides a public interest protection and acknowledgement of the status of senior water rights as part of the permitting process. The latter analysis provides senior water rights a mechanism for enforcement of the bedrock prior appropriation doctrine. An initial showing of "no impairment" during the application process is not a guarantee that impairment will never occur. Likewise, the fact that the statutory scheme allows for after-approval mitigation does not alleviate, or substitute for, an applicant's burden to satisfactorily demonstrate, during the evaluation process, that impairment is not likely to occur. Indeed, if we only hold the City's

proposal to the standard that an impaired prior right holder can seek redress after the fact, we will have rewritten K.S.A. 82a-711 to remove an applicant's duty to show no impairment as part of the application process, and DWR's duty to evaluate said showing. [K.S.A. 82a-711(b) "specifically requires the chief engineer to consider senior water rights and the public interest *prior* to granting a water right." (Emphasis in original). *Clawson v. State, Dept. of Agriculture, Div. of Water Resources*, 49 Kan. App.2d 789, 806, 315 P.3d 896 (2013).]

The record shows that no firm definition of impairment exists in statute or regulation. The Kansas Court of Appeals has construed the term "impair" in the context of K.S.A. 82a-717a (the process by which a senior water right holder can claim impairment by a junior user and seek enforcement of that senior right by the Chief Engineer). *Garetson Bros. v. American Warrior, Inc.*, 51 Kan. App.2d 370, 347 P.3d 687 (2015)(*rev. denied* 2016). The court found the term unambiguous and held, "the legislature intended that the holder of a senior water right may seek injunctive relief to protect against a diversion of water by a holder of a junior water right when that diversion diminishes, weakens, or injures the prior right." (*Id*. at 389.) The court declined to add the "beyond a reasonable economic limit" language found in K.S.A. 82a-711(c), because that phrase is absent from K.S.A. 82a-717a. The court further stated, "Had the legislature desired to give the word 'impair' a special definition, it could have done so either by adding the definition to the text of K.S.A. 82a-717a or including it in the definition section of the KWAA." (*Id*.) The Kansas Court of Appeals declined to modify these rulings in the subsequent case of *Garetson Bros. v. American Warrior, Inc.*, 56 Kan. App.2d 623, 435 P.3d 1153 (2019).

Pursuant to the *Garetson* case, the term "impair" is unambiguous and is taken to mean "diminish, weaken or injure a prior right." Therefore, this view is applied here. It is noted that the *Garetson* court declined to define "beyond a reasonable economic limit," as that phrase is

used in K.S.A. 82a-711(c), so we are without the court's guidance as to whether that phrase applies only to the third prong of the impairment provision (water quality degradation) or all three provisions that precede it. However, that issue need not be resolved because the City's Proposal contains no analysis as to what "beyond a reasonable economic limit" might mean as applied to potential impairment that its Proposal could cause relative to static water level, streamflow or water quality. The record does contain testimony from some of the Intervenors as to the significant economic harm the Proposal could potentially cause to them; this testimony is reviewed elsewhere in these recommendations.

According to the record, the City did not analyze or evaluate the Proposal's potential public interest impacts. McCormick testified that his expert report does not address the Proposal's potential to cause impairment, impacts to water quality, safe yield or how the Proposal would impact the public interest. Clement testified that he did not analyze the Proposal's potential impacts on water quality, safe yield, or whether the Proposal is in the public interest. DeAngelis testified that he has no opinion on whether the City's Proposal will impair individual wells.

i. Unreasonable Raising or Lowering of the Static Water Level

Under this provision, the City must show that its Proposal will not impair a use under an existing right due to the unreasonable raising or lowering of the static water level. K.S.A. 82a-711(c). In accordance with *Garetson*, the City must show that existing rights will not be diminished, weakened or injured by either direct interference or by regional raising or lowering of the water table.

The Proposal asserts the AMC concept would be beneficial in that it would keep the aquifer fuller because, without AMCs, "[r]egional groundwater levels would be lowered and

managed at levels to facilitate physical recharge capacity for the ASR system." (City Exh. 1, Table 3-1.) The ASR Phase II permits do not allow the City to inject source water into the aquifer when the static water level is ten feet or more below the land surface elevation. In other words, when the aquifer has recovered to the point of being within ten feet of the land surface, no more water may be injected (as long as that condition persists), with no associated ASR credits being earned while that restriction exists. Under current ASR conditions, the City can only earn ASR credits for future groundwater pumping by injecting water into the aquifer. Expert witnesses for the City explained that the City desires a way to earn recharge credits even when the aquifer is too full for physical injection. Accordingly, the AMC concept is designed to allow the City to earn credits for future pumping without injecting source water into the aquifer; the AMCs would be earned based on leaving previously-injected source water in the aquifer. Without AMCs, the City's experts explained, the City will pump groundwater from the Equus Beds for the purpose of making space (lowering the water level) so that physical ASR credits can be earned by injecting source water into the space created. Under this strategy, the City would pump groundwater more frequently than it would otherwise to continue to create space for earning more ASR credits.

The City characterizes this management approach of pumping groundwater to make space for credits as something it is being forced to do, and will be forced to do, without approval of the AMCs. This characterization is not supported by the record. The evidence shows that this approach would a voluntary choice by the City and lawful under the City's ASR permits. Moreover, the evidence shows that this approach would likely create negative impacts, including increasing the risk to water quality. Expert testimony for all parties, including expert testimony presented by the City, corroborated the fact that a fuller aquifer helps prevent migration of

chloride contamination (see accompanying discussion section on water quality). Because of the detrimental effects likely to result from the City choosing to pump groundwater in order to make space for earning recharge credits, Boese and Pope both opined that such a decision would constitute poor stewardship of the resource, although it would not violate the City's permits.

It should be noted that testimony on behalf of the City often characterized the creation of AMCs as taking place during times when the aquifer is too full for physical recharge. However, the Proposal does not contain nor suggest that condition. Under the Proposal in its current form, the City could divert Little Arkansas River water directly to the City for municipal use, thereby earning an AMC for future groundwater pumping, even when the aquifer is capable of receiving physical source water. Thus, under the Proposal, the City could conceivably earn ASR (physical) and AMC (non-physical) credits simultaneously.

For these reasons, the City's rationale for why its AMC concept would benefit the public interest is unpersuasive.

A. Static Water Level/Regional Impact

Romero testified that there is no model reporting in the City's Proposal as to the Proposal's hydrologic impacts to rivers or wells, either as to lowering the minimum index levels or the adoption of AMCs.

Romero modeled the potential impacts to rivers and wells in the area caused by the Proposal. (His results will be included here and in the following section on impacts to streamflow.) Using an additional package applied to the Proposal's MODFLOW modeling, reflective of ASR credit pumping data shown in Proposal Table 2-5, Romero was able to isolate the impacts of pumping ASR recharge credits on both rivers (Arkansas and Little Arkansas) as related to minimum desirable streamflow and also the impacts to water levels as related to

individual wells. Romero's analysis assumed the full diversion of 40,000 acre-feet of native rights every year during the eight-year period, as compared to the City's one percent drought simulation, which assumed diversion of 40,000 acre-feet every year except years one (34,202 acre-feet), seven (39,308 acre-feet) and eight (39,491 acre-feet).

Romero's water budget analysis indicated that, if the City pumped 50,000 acre-feet of recharge credits over an eight-year period (as reported in the Proposal's Table 2-5), there would be a resulting depletion in aquifer levels of approximately 18,700 acre-feet.

Romero's water budget analysis also indicated that, if the City pumps its full 40,000 acre-feet of native rights every year during the modeled eight-year drought, there would be a resulting depletion in river levels of 146,300 acre-feet and a depletion in aquifer levels of 155,400 acre-feet.

Romero's water budget analysis indicated that, if the City diverts its native water rights of 40,000 acre-feet each year during the modeled drought condition, most of the water above the current minimum index level will have been removed to satisfy those native water rights. About 14,900 acre-feet of water above the current minimum index levels would be left to withdraw as recharge credits. If this remaining water (14,900 acre-feet) is pumped as recharge credits, after 40,000 acre-feet of native rights has been pumped each year for eight years, river levels will then be depleted by 10,200 acre-feet and aquifer levels will be depleted by 5200 acre-feet.

Romero's water budget analysis also demonstrated that, if the City diverts its 40,000 acre-feet of native rights each year over the eight-year period and is allowed to lower its index levels as proposed, it will have access to 79,500 acre-feet more water than current index levels allow. Romero testified that in this situation, river levels will be depleted by 43,800 acre-feet and aquifer levels will be depleted by 33,100 acre-feet.

In comparing the resulting depletion impacts between current minimum index levels and the proposed lower index levels, Romero's modeling showed the depletion to river levels would be four to five times greater and the depletion to aquifer levels would be at least six times greater with the lower minimum index levels.

In support of the Proposal, the assertion is made that the Proposal's modeling shows the aquifer would remain approximately 80% full even in the worst case scenario, as reflected in Table 2-9 of the Proposal. Substantial credible evidence, including evidence of practical saturated thickness information, undermines the reliability of this claim.

According to Table 2-9 in the Proposal, the groundwater model indicated how full the Aquifer would be each year in an eight-year drought, as a percentage compared to predevelopment conditions, based on saturated thickness. Clement testified that the model did not take into account any practical saturated thickness (PST) information. Evidence shows that saturated thickness is basically the saturated portion of an aquifer, between and among geologic layers, between the upper layer and bedrock. PST differs from saturated thickness in that PST accounts for geologic layers, such as clay, that do not readily yield water. Thus, PST is a more accurate description of the availability and accessibility of water. Romero testified that the Proposal's conclusion that the aquifer would remain approximately 80% full after the one percent drought did not contemplate the data of lithologic layers (clay, silt, sand) in the USGS report on which the model was based.

According to Clement, no one at Burns and McDonnell nor the City analyzed the PST for individual index cell monitoring or any specific wells. This becomes important in light of the Proposal's representations on average aquifer conditions by index cell at the end of the eight-

year simulated drought, and average aquifer conditions by index cell at the proposed lower index levels, as seen in Figure 10 and 11, respectively.

The Proposal did not provide any modeling data as to how the aquifer would recover from proposed pumping as shown in Tables 2-3 and 2-5.

Comparisons between the modeled saturated thickness values seen in the Proposal and PST values derived from actual well log information reveal significantly lower PST values than saturated thickness values, indicating a more severe impact on the aquifer. Letourneau testified as to the well log data and acknowledged these discrepancies.

B. Impact on individual wells

Regarding the lower minimum index levels, the Proposal does not contain a table of purported benefits, in the manner of Table 3-1's listing of benefits for AMCs. The content in the Proposal that addresses whether there would be a raising or lowering of the static water level is only in the context of the modeled results relative to the City pumping to the lower minimum index levels, rather than an analysis of how pumping to the lower minimum index levels would impact existing water rights.

Romero testified that, if the minimum index levels are lowered as proposed, 35 wells could potentially lose their water column; of those 35 wells, 29 would lose their water column from the City pumping its 40,000 acre-feet of native rights and the other six wells would lose their water column if the City were to pump down to the new lower index levels. Romero testified that these results were limited to the wells included in records dating back to 1975, and that his analysis did not include wells drilled in the area prior to 1975; the actual number of affected wells could be higher. In addition, some of the wells that would lose their water column due to the City's pumping (as described above), are more than 660 feet from City wells, and

therefore 660 feet is not an adequate distance for establishing protections for existing wells in the event of impact or impairment from City pumping.

Experts for GMD2 and the Intervenors raised concerns regarding the suitability of the Proposal's model for evaluating the Proposal's impacts to individual wells. The Proposal's model is based on the USGS groundwater flow model detailed in USGS SIR Report No. 2013-5042. The USGS report contains a number of limitations, including the following: "To correctly interpret model results, the following limitations of the model should be considered . . . The groundwater-flow model was discretized using a grid with cells measuring 400 ft by 400 ft. Model results were evaluated on a relatively large scale and cannot be used for detailed analyses such as simulating water-level drawdown near a single well. A grid with smaller cells would be needed for such detailed analysis." (City Ex. 1, Att. E., p.72.) DeAngelis testified that the USGS model is a regional scale model and that he was aware of no analysis done by the City or any of its consultants to ensure that the calibration error was acceptable at individual wells. He stated that the model results in the USGS model cannot be used to determine what will happen to the water levels in individual pumping wells, including domestic wells. Masih Akhbari, Ph.D. and Professional Engineer, testified that, although the model was a good tool to make decisions on the total volume of water that can be extracted from the basin in a year, the model lacks the capacity for specifying water levels at the locations of specific wells. Austin echoed this opinion.

Akhbari testified that it is possible to calibrate the model to identify the impact of the City's proposed use at specific well locations, using more observed data and more technical work on calibrating the model. McCormick corroborated this testimony, stating that there are numerous tools that can be used with the USGS model to interpolate specific water levels.

However, these techniques were not used. McCormick testified that Burns and McDonnell did not attempt to evaluate individual drawdown impacts on surrounding wells within the model.

In comparing results based on observed data versus the model's simulated data, Akhbari found that, on average, there was about 30% of error at the location of each index level, with some errors as high as 68%. He concluded that the Proposal's model "cannot be used to set groundwater elevations at individual wells." (Akhbari, Tr. p.390.)

The record indicates that, if the Proposal were to be approved, the City may be agreeable to conditions on its ASR permits that would offer some redress to well owners impacted by the Proposal. (DWR Ex. 1.) One of the DWR-suggested conditions stated that, if a pre-existing domestic well located within 660 feet of a new or existing ASR well is adversely impacted by drawdown from such ASR well, the City will re-drill or take other appropriate affirmative action to restore the productivity of such domestic well to the same rate and quality as existed before. Substantial evidence casts doubt on the efficacy of this kind of assurance. Romero's modeling indicates that up to 35 wells could lose their water column as a result of the Proposal; that there may be more than 35 wells impacted, because his analysis only included wells existing as of 1975; that of the 35 impacted wells, some were farther than 660 feet from an ASR well; and not all of the potentially impacted wells are domestic. In addition, testimony indicated that re-drilling may not solve the problem if the impacted well has lost its water column due to a declining static water level. Moreover, the suggested condition does not clarify who would bear the expense of proving the fact of impact, the causation of the impact, what the acceptable standard of proof would be, or who would enforce the remedy in the event of a disagreement between the owner of the impacted well and the City. This suggested condition does not

constitute a sufficient substitute for a showing in advance that the Proposal will not impair existing rights.

For all of these reasons, the City has not met its burden to demonstrate that its Proposal will not cause impairment of a use under an existing water right by the unreasonable raising or lowering of the static water level per K.S.A. 82a-711(c). To the contrary, substantial credible evidence in the record indicates a likelihood of this outcome.

ii. Unreasonable Increase or Decrease of the Streamflow

This issue overlaps with the Minimum Desirable Streamflow discussion above, due to the interactive relationship between the aquifer and hydraulically connected streamflow. Austin explained that if groundwater levels increase, it means more water will be discharged into the stream and, conversely, if a drought occurs and aquifer pumping occurs at deeper levels than historically reached, there would be less flow from the aquifer into the stream, which would affect surface water users reliant on streamflow.

As stated above in the MDS discussion, Romero modeled the potential impacts to rivers and wells in the area caused by the Proposal, using an additional analysis package in combination with the Proposal's modeling.

He was able to isolate the impacts of pumping ASR recharge credits on both rivers (Arkansas and Little Arkansas) as related to minimum desirable streamflow. Romero found potential impacts to streamflow (and aquifer levels) from use of the AMC concept and from lowering of the minimum index levels as proposed. **(**Romero stated that the City's one percent drought scenario, as shown in Table 2-5, is diverting almost 40,000 acre-feet of its native water rights every year during the eight-year drought, while Romero's analysis includes the full diversion of 40,000 acre-feet of native rights every year during the eight year period.)

Romero's water budget analysis indicated that, if the City pumped 50,000 acre-feet of recharge credits over an eight-year period (as reported in the Proposal's Table 2-5), there would be a resulting depletion in river levels of approximately 30,100 acre-feet. Romero testified that, under the same conditions, if the City were to pump 120,000 acre-feet of recharge credits over the modeled eight-year drought period, the resulting river depletion would be greater.

Romero's water budget analysis also indicated that, if the City diverts its 40,000 acre-feet of native rights each year during the eight-year drought and is allowed to withdraw recharge credits to the proposed new lower minimum index levels during the drought condition, it will have access to 79,500 acre-feet more than current index levels allow. Romero testified that in this situation, river levels will be depleted by 43,800 acre-feet and aquifer levels will be depleted by 33,100 acre-feet.

Romero testified that his water budget analysis showed, in comparing the resulting depletion impacts between current minimum index levels and the proposed lower index levels, the depletion to river levels would be four to five times greater and the depletion to aquifer levels would be at least six times greater with the lower minimum index levels.

Romero testified that stream depletion from the impact of well pumping continues even after the wells are turned off, because well pumping creates a cone of depression that drops the water levels; after the well is turned off, the water level will be filled in by flow from the river (water levels in the aquifer rise, but at the expense of flow from the river).

For all of these reasons, the City has not met its burden to demonstrate that its Proposal will not impair a use under an existing water right by the unreasonable increase or decrease of the streamflow per K.S.A. 82a-711(c). To the contrary, substantial credible evidence in the record indicates a likelihood of this outcome.

iii. Unreasonable Deterioration of the Water Quality at the Water User's Point of Diversion Beyond a Reasonable Economic Limit

The City bears the burden to demonstrate that its Proposal will not harm the public interest by resulting in an unreasonable deterioration of the water quality at the water user's point of diversion beyond a reasonable economic limit. K.S.A. 82a-711(c).

There is an existing water quality concern in the area of the Wichita wellfield: movement of chloride contamination into the area from the Burrton chloride plume and from the Arkansas River. The record shows that a primary purpose of the ASR Phase I project was to slow the movement of chloride into the area by raising aquifer levels, thereby creating a hydraulic barrier against the chloride contamination. A 2013 letter from the City to Chief Engineer Barfield acknowledged, "A primary purpose of the [Phase I] ASR Project was to begin formation of a freshwater barrier to the salt water contamination moving towards the wellfield from the Burrton area. [The 1993 minimum index level permit conditions] 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." (City Exh. 19.)

As acknowledged in the City's 2013 letter, the condition prohibiting recharge credit withdrawal when water levels dropped below the 1993 levels was expressly included as a protection of the public interest. The ASR Phase I approval, incorporated into the Phase II approval, states that if recharge credits cannot be withdrawn if the static water level in the index

well is below the lowest level for that well (the 1993 level), the public interest in not diverting Equus Beds groundwater will be protected.

Experts on all sides of this case testified that keeping water levels higher helps to protect water quality by increasing the hydraulic barrier against chloride contamination. McCormick testified in reference to, and included in his supplemental expert report, USGS SIR No. 2016-5165, "Preliminary Simulation of Chloride Transport in the Equus Beds Aquifer and Simulated Effects of Well Pumping and Artificial Recharge on Groundwater Flow and Chloride Transport near the City of Wichita, Kansas, 1990 through 2008." This USGS report contains the following conclusion: "Additionally, the results of modeling these scenarios indicate that eastward movement of the Burrton plume could be slowed by the additional artificial recharge at the Phase I sites and that decreasing pumping along the Arkansas River or increasing water levels could retard the movement of chloride and may prevent further encroachment into the southern part of the well field area." (City Ex. 29.) McCormick testified that this report is not referring only to Phase I sites.

Don Henry, Assistant Director of Public Works and Utilities for the City, also testified to the increased protection from chloride contamination with a higher water level: "The higher the water level is, the more effective the barrier." (Henry, Tr. 579.)

Boese testified in relation to the same USGS report referenced by McCormick (to which Boese contributed), USGS SIR No. 2016-5165. Citing that report, Boese stated that, if the City were allowed to pump below the 1993 levels, that activity would increase the hydraulic gradient which, in turn, would increase the rate of chloride movement into the area. Austin's testimony corroborated this statement from Boese.

Romero testified that, as the City wells pump more water or lower the water levels, that activity tends to induce chloride migration from the Arkansas River and the Burrton chloride plume. He also stated that withdrawing groundwater from the aquifer (whether ASR credits or AMCs) would have the effect of degrading water quality in the area. Romero did not see that the Proposal had addressed potential degradation of water quality caused by lowering the minimum index levels or withdrawing ASR credits or AMCs.

Although experts testifying on behalf of the City supported the fact that higher aquifer levels would act as a barrier to chloride contamination, they did so in the context of advocating for AMCs, in that it would threaten water quality for the City to draw down the aquifer to create space for injection of water to earn ASR credits. Regardless of the purpose for which the aquifer would be drawn down, or the purpose for which this testimony was given, the associated threat to water quality from drawing down the aquifer remains the same.

Regarding whether the Proposal involved any modeling or analysis of the potential water quality impacts caused by AMCs or lowered minimum index levels, the City did not perform either. McCormick testified that Burns and McDonnell did not model chloride migration as it would be impacted by lowering to the new minimum index level and withdrawing AMCs during the time of extreme drought. He stated that he did no modeling to determine the impact of the Proposal on water quality. DeAngelis testified that he had no opinion with respect to water quality and how it relates to the City's model. The record shows that the City stated it did not model the impact on chloride migration from the Burrton Plume or the Arkansas River because such an event was not contemplated by the City.

The testimony of Intervenors reveals that chloride contamination caused by the City's proposed changes is a paramount concern. Richard Basore stated that his ultimate worry is that

the salinity in the water would get so high that the water would be unusable for irrigation, returning the land to dryland value, which would mean a loss of one-third to one-half of his land's property value and the loss of future income from the inability to grow irrigated crops. Josh Carmichael testified that if the water in his domestic well (his only source of water) became contaminated, he would have to haul water or move away, and that his property value would be substantially less without a domestic well that provided safe water. Carmichael runs a center pivot irrigation equipment business; he described possible solutions to saltwater contamination in irrigation equipment as "terribly expensive" and "there's no proof that they work yet." (Carmichael, Tr. p.3362.) Bill Carp testified that he has property with irrigation wells and a domestic well and that he has no backup plan if his water becomes contaminated or unavailable.

As mentioned above, the record indicates if the Proposal were to be approved, the City may be agreeable to conditions on its ASR permits that would offer some redress to well owners impacted by the Proposal. (DWR Exh. 1.) One of the DWR-suggested conditions stated that, if the water quality in an existing domestic well within 660 feet of an existing or new ASR 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. Substantial credible evidence outweighs the kind of protection this assurance may actually provide to an impacted water user. The condition only speaks to domestic wells, and offers no remedy to irrigators or other water users. Testimony of Basore, Carmichael and Carp establishes the economic devastation to an irrigator, as well as a domestic user, if his or her water were to

become too contaminated as a result of the Proposal. The City provided no evidence that only domestic wells might be impacted, or that only domestic wells within 660 feet of an ASR well might be impacted. In addition, the promise of an alternate water supply may not make up for the loss in property value described by Carmichael if chloride contamination renders his domestic well unusable. Moreover, the suggested condition does not clarify who would bear the expense of proving the initial quality of the water, the change in water quality, the causation of the deteriorated quality, what the acceptable standard of proof would be, or who would enforce the remedy in the event of a disagreement between the owner of the impacted well and the City. This suggested condition does not constitute a sufficient substitute for a showing in advance that the Proposal will not impair existing rights due to deterioration of water quality.

For all of these reasons, the record shows that the City has not met its burden to demonstrate, by a preponderance of the evidence, that its Proposal will not cause unreasonable deterioration of the water quality as set forth in K.S.A. 82a-711(c). To the contrary, substantial credible evidence in the record indicates a likelihood of this outcome.

c. Summary regarding K.S.A. 82a-711

As detailed above, the Proposal does not contain adequate analysis, or in most instances, any analysis, to demonstrate the requisite criteria listed under K.S.A. 82a-711, to prove the Proposal will not harm the public interest and will not impair an existing right to the use of water. Although it is not the obligation of any other party to affirmatively prove the Proposal will cause such harms, the record contains substantial credible evidence indicating, at best, that a number of these potential impacts needs further study, and, at worst, that these potential impacts are likely to occur as a result of the Proposal. Therefore, the Proposal cannot be approved and must be denied.

4. Additional considerations

In meeting the obligation to provide a comprehensive set of recommendations to the Chief Engineer, additional issues and aspects raised by the parties during the course of this hearing will also be included here.

A. "Functional Equivalent"

The notion has been raised that AMCs are the "functional equivalent" of the physical recharge credits authorized by the ASR Phase II permits, and therefore are eligible for approval. This notion is rejected. As noted earlier in this recommended order, "Administrative agencies are creatures of statute and their power is dependent upon authorizing statutes, therefore any exercise of authority claimed by the agency must come from within the statutes. There is no general or common law power that can be exercised by an administrative agency. *Pork Motel, Corp. v. Kansas Dept. of Health & Environment,* 234 Kan. 374, 378, 673 P.2d 1126 (1983)." *American Trust Administrators, Inc. v. Kansas Insurance Dept.*, 273 Kan. 694, 698, 44 P.3d 1253 (2002). There is no statutory provision authorizing the adoption of a "functional equivalent." Accordingly, the regulations contain no such provision. Pope and Letourneau both testified that DWR has not ever attempted to apply the concept of a "functional equivalent" in any other water right context. Boese testified that, in his role reviewing water right applications and permits for GMD2, he has not used the concept of "functional equivalent" in relationship to any water permit applications: "Either it meets the regulations or it does not." (Boese, Tr. pp. 2249-2250.) As explained earlier, the AMC concept does not meet the pertinent regulations. The notion that AMCs can be approved as a "functional equivalent" of physical recharge credits is rejected. Moreover, assuming for the sake of argument that functional equivalence is authorized by the KWAA, the fact that AMCs would award credits for future pumping without

any accompanying storage of source water proves that AMCs are not a functional equivalent of ASR credits.

B. Accounting Methodology

The Proposal's MODFLOW model is also used for ASR accounting purposes. Pursuant to the ASR Phase II approvals, the City must provide an extensive accounting of numerous aspects of the operations. The Proposal outlines a modified accounting methodology to account for AMCs, because there is no physical recharge that occurs with AMCs as there is with ASR storage and credits: "there would be no observed water level changes to compare the AMC results against, since the location of the AMC recharge would be theoretical." (City Ex. 1, p.4-1.)

The Proposal's accounting methodology relies on an outcome of the City's modeling which states that 95% of the water recharged would be retained as recharge credits. This 95% retention rate forms the basis for the Proposal's assignment of an initial theoretical recharge loss rate of five percent, with a graduated annual theoretical loss rate across the basin of five percent, three percent and one percent, respectively across the basin storage area.

McCormick, in reviewing an excerpt from the 2016 ASR accounting report, corrected the values shown in the Proposal; he testified that the ASR credit retention rate for 2006 to 2016 was actually approximately 64%, and that the ASR credit retention rate for the period 2006 to 2015 was actually 73%. Austin's testimony corroborated McCormick in this regard; Austin found the Proposal's accounting methodology used lower loss percentages for injected recharge water than were derived from previous years' ASR model-based accounting.

In depicting the losses (leakage) that figure into the retention rate, the Proposal indicates that a greater amount of loss occurs with ASR credits as compared to the losses assigned to

AMCs. (City Ex. 1, Fig.16.) With physical recharge credits, the loss values increase as the aquifer becomes fuller. The Proposal does not apply these increasing loss values to AMCs; instead, the Proposal applies its designated loss percentages (five, three and one percent) without adjustment for the impact of aquifer fullness. The record does not support this deviation from the use of actual aquifer conditions in devising the theoretical accounting methodology for AMCs.

Assuming for the sake of argument that AMCs would be approvable under existing regulations, statutes and permit conditions, the Proposal's accounting methodology is not sufficiently grounded in existing data relative to actual aquifer conditions.

C. Other Concerns Regarding Modeling

A number of concerns regarding the Proposal's modeling were identified during testimony and in expert reports. Some of those concerns relate to errors in the Proposal's content that the City characterizes as typos, while some relate to substantive sufficiency.

The following errors were identified during testimony and acknowledged by the experts involved in creating the Proposal:

(i) Table 2-5 lists the percent of conservation pool 12-month simulated average at the beginning of the year for Cheney Reservoir as 110%, when it should have been 100%.

(ii) Table 2-5 lists the City's ASR credit pumping as 15,552 acre-feet, when it should have been 16,579 acre-feet.

(iii) Table 2-3 lists the same error (as Table 2-5) for Cheney Reservoir percent of conservation pool 12-month simulated average as 110%, rather than 100% .

(iv) Table 2-10 indicates the contingency added to the lower index level for Well IW01C as 20 feet, when it should have been 23.42 feet.

(v) Table 2-10 indicates the contingency added to the lower index level for Well IW02C as 20.52 feet, when it should have been 10 feet.

(vi) The Proposal and McCormick's testimony stated that between 80% and 85% of the water injected into the basin storage area during the time the ASR project had been in operation 2006 through 2016 has been retained in the basin storage area. (City Exh.1, p.4-2.) But upon referencing the ASR accounting report information, McCormick corrected his statement to indicate that the retention rate for that period (for purposes of ASR credits for 2006 through 2016) was actually 63% to 64%. He further testified that for the period 2006 through 2015, the retention rate was approximately 73%, not the 85% stated in the Proposal.

The evidence revealed some discrepancies in the Proposal's model's use of contingencies in assigning the new lower index levels. For nearly all 38 index wells, a contingency of 10 feet was added, to lower the requested level beyond the modeled elevation. As stated above, Table 2-10 contained errors in stating the contingencies added to two specific index well elevations. Boese opined that use of a ten-foot contingency was excessive, particularly regarding Well No. IW05C, for which the difference between the current and proposed elevations was only one foot.

Romero testified that, in most models he has worked with, the contingency was established in a "plus or minus" format, rather than one-directional, and would be on the order of plus or minus approximately 20%. Romero found no scientific justification for the contingencies used in the Proposal.

There was confusing testimony regarding clarification of the values shown in Table 2-5 of the Proposal. That table indicates the amount of water use would increase from year three to year four of the severe drought, despite the imposition of conservation measures under Stage 2 of the City's Drought Response Plan. In responding to this point, the City's expert (Clement) focused on 1930's hydrologic data, despite the fact that his previous testimony indicated no such data existed, which caused the City to use observed data from the years 2011 and 2012 in repeated fashion.

The Proposal's model uses 1998 aquifer levels as the starting point for the eight-year drought simulation, as seen in Table 2-9. Concern was raised that this starting point may not yield a reliable depiction of the impact on the aquifer. This concern is reasonable, in light of McCormick's testimony. McCormick stated that any level could be chosen for the starting point of the next drought because one never knows when a drought may occur. He further stated that the changes in an aquifer caused by an eight-year drought would be directly related to the chosen starting level. He explained that the 1998 level was chosen as the starting point here due to considerations of potential injection and retention rates beneficial to the City. The selection of a starting point was not based on an attempt to represent average aquifer conditions, nor were alternate scenarios simulated in the Proposal.

Additional concerns apply to Table 2-9 in the Proposal, due to unclear explanations as to the source of water use data used in the table. Clement, the City's expert who created the table,

stated that the model inputs used to generate the values in Table 2-9 used conditions from 2011 for stress period one, then conditions from 2012 for stress period two, and then repeated these yearly values in an alternating manner for the next six stress periods, accounting for water use by all users, not just the City. However, he made inconsistent statements as to individual components of the water use values. Clement testified that Table 2-9 shows the modeled effects if the City were to pump the "theoretical number the City believes that they would have to take out based on a projection through 2060" (as shown in Table 2-5), not the City's use in 2011 and 2012. (Clement, Tr. p.725-726.) Clement also stated the following: in addition to the City's use, the model adds an estimated impact of water usage by industrial and irrigation users based on what their use was in 2011 and 2012; conversely, he stated that the model did not apply actual reported irrigation use for 2011 and 2021, but that net irrigation values were applied instead. He stated that the model took into account municipal use from Halstead, Newton and others, but that the model did not take into account domestic use or other use that had not been reported to the Division of Water Resources. These contradictory statements raise serious concerns. All of these errors, discrepancies and inconsistencies undermine the credibility of the model, and, by extension, the Proposal.

D. Alternative Drought Strategies for the City

The District and Intervenors assert the existence of alternative drought response strategies available to the City, and that these strategies support a denial of this Proposal. This assertion raises issues beyond the scope of this hearing. As stated above, the questions to be resolved here are whether the City has met its burden to demonstrate that the Proposal will neither impair a use under an existing water right nor prejudicially and unreasonably affect the public interest. This

Presiding Officer is not authorized to make recommendations as to whether there are other approaches the City should pursue.

E. Multi-year Flex Accounts (MYFAs)

The District and Intervenors assert the City has not pursued enrollment in multi-year flex accounts, a statutory option offered by DWR to provide water right owners flexibility in the use of water rights and permits. K.S.A. 82a-736. This assertion raises issues beyond the scope of this hearing. As stated above, the questions to be resolved here are whether the City has met its burden to demonstrate that the Proposal will neither impair a use under an existing water right nor prejudicially and unreasonably affect the public interest. This Presiding Officer is not authorized to make recommendations as to whether there are other approaches the City should pursue.

F. Primacy of Chief Engineer as compared to GMD

The District argues in its post-hearing brief that the City failed to follow proper administrative channels in that it should have submitted its Proposal to GMD2 prior to submitting it to the Chief Engineer. In support, the District argues that aquifer management, which includes ASR projects, is the purview of GMD2, rather than the Chief Engineer. This argument is rejected.

The Kansas Water Appropriation Act confers broad and comprehensive authority over water appropriation, including permitting, exclusively on the Chief Engineer. K.S.A. 82a-706; K.S.A. 82a-701, *et seq*. Under the KWAA, only the Chief Engineer has authority to issue permits to appropriate water and to approve of certain changes to water rights. K.S.A. 82a-705, 82a-711, 82a-708b. The Groundwater Management District Act expressly creates an advisory role for GMDs as related to the authority of the Chief Engineer. K.S.A. 82a-1020, *et seq*. GMDs may make recommendations to the Chief Engineer regarding regulations and other

matters of water management. K.S.A. 82a-1028. The GMD's management program is subject to Chief Engineer approval. K.S.A. 82a-1029. This relationship between the GMD and the Chief Engineer does not, however, diminish the importance of GMD2's role. As testimony from Boese and Letourneau indicated, the recommendations of GMD2 are integral in the Chief Engineer's evaluation of applications for new permits or changes to water rights, and the Chief Engineer seldom acts contrary to those recommendations. Nonetheless, the authority to modify permit conditions lies exclusively with the Chief Engineer. Therefore, for purposes of which entity is the appropriate one for receiving a request to change permit conditions, that entity is the Chief Engineer.

RECOMMENDED ORDER

Based on the foregoing findings and conclusions, the City of Wichita's "ASR Permit Modification Proposal, Revised Index Levels and Aquifer Maintenance Credits," regarding its ASR Phase II project, should be dismissed for failure to comply with the requirements of Kansas law, primarily the Kansas Water Appropriation Act, K.S.A. 82a-701, *et seq*., and related regulations. In the alternative, the Proposal should be denied because the City failed to meet its burden to demonstrate, by a preponderance of the evidence, that its Proposal will neither impair an existing water right nor prejudicially and unreasonably affect the public interest.

NOTICE OF RIGHT TO FILE COMMENTS REGARDING THE RECOMMENDATIONS OF THE PRESIDING OFFICER

The parties have fifteen **(15)** days after service of these "Recommendations on the City of Wichita's Proposed Modification of the Aquifer Storage and Recovery Project Phase II Water Appropriation Permits" to file written comments for the Chief Engineer's consideration. K.A.R. 5-14-3a(s). The Chief Engineer shall issue the Initial Order in this matter after reviewing any

timely submitted comments. Only written comments may be submitted. Any such comments must be filed with the Chief Engineer by submitting them to Ronda Hutton by email at ronda.hutton@ks.gov, or by postal mail to Ronda Hutton, Division of Water Resources, Kansas Department of Agriculture, 1320 Research Park Drive, Manhattan, Kansas 66502. A copy of the comments also must be simultaneously filed with all other parties, as listed in the Certificate of Service (below). The Chief Engineer will issue an Initial Order based on the proceedings had in this matter, including any timely filed written comments responding to the above-captioned recommendations.

These "Recommendations on the City of Wichita's Proposed Modification of the Aquifer Storage and Recovery Project Phase II Water Appropriation Permits" are now issued this 14th day of January 2022.

Constance C. Owen
Presiding Officer

CERTIFICATE OF SERVICE

On this 14th day of January 2022, I hereby certify that the original of the foregoing "Recommendations on the City of Wichita's Proposed Modification of the Aquifer Storage and Recovery Project Phase II Water Appropriation Permits" was sent by electronic mail to the following:

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Constance C. Owen
Presiding Officer