BEFORE THE OFFICE OF ADMINISTRATIVE HEARINGS
STATE OF KANSAS

IN THE MATTER OF	**)**	
THE APPLICATION OF THE CITIES OF	**)**	
HAYS, KANSAS AND RUSSELL, KANSAS	**)**	
FOR APPROVAL TO TRANSFER WATER	**)**	**OAH NO. 23AG0003 AG**
FROM EDWARDS COUNTY, KANSAS	**)**	
PURSUANT TO THE KANSAS WATER	**)**	
TRANSFER ACT.	**)**	
	)	

Pursuant to K.S.A. Chapter 77

THE CITIES' PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

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FINDINGS OF FACT

I. The Cities' First Amended Water Transfer Application.

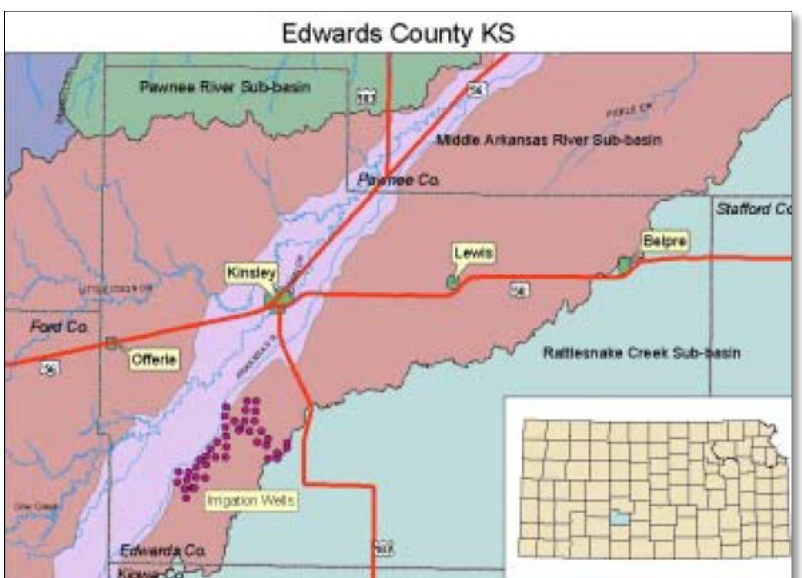
1. The Cities of Hays and Russell jointly own the following water appropriation rights (the "R9 Water Rights") appurtenant to the R9 Ranch in Edwards County designated as DWR File Nos.: 21,729-D1; 21,729-D2; 21,730; 21,731; 21,732-D1; 21,732-D2; 21,733; 21,734; 21,841; 21,842; 22,325; 22,326; 22,327; 22,329; 22,330; 22,331; 22,332; 22,333; 22,334; 22,335; 22,338; 22,339; 22,340; 22,341; 22,342; 22,343; 22,345; 22,346;

27,760; 29,816; 30,083; and 30,084. (Ex. 1-2 at Cities 0000108, ¶ 3; Cities 0000109, ¶¶ 17 and 18.)

2. The R9 Water Rights are located in a contiguous parcel of land previously used for irrigated agriculture known as the R9 Ranch, which sits along the south side of the Arkansas River in Edwards County, approximately 5 miles southwest of Kinsley. (Ex. 1-1; Ex. 300; Ex. 918 at Cities 0024532; Ex. 821 at Cities 0021831; Figure. 1.)

3. The R9 Ranch is approximately 77 miles from Hays and approximately that far from Russell; i.e., more than 35 miles from the Cities. (Dougherty Test., Tr. Vol. 1 at 81:8–82:8; Ex. 2687; Ex. 918 at Cities 0024565 (68 miles of anticipated transmission line to Schoenchen).)

Figure 1



(Ex. 2207 at Cities 0078342.)

4. The purchase agreement for the R9 Ranch was signed by the sellers in August of 1994. (Ex.1286 at Cities 0067874-75.) Hays leased the R9 Ranch back to the sellers to continue utilizing the property as irrigated farmland. (Ex. 1290.) The deed was filed of record in early 1995. (Ex. 830.)

5. When purchased, the R9 Water Rights were existing perfected water rights, purchased on the open market in an arm's length transaction. (Dougherty Test., Tr. Vol. 1 at 102:25–103:2.)

6. In August of 1995, Hays sold an undivided 18% interest in the R9 Ranch to Russell. (Ex. 831.)

7. The Cities purchased the Ranch intending to convert existing irrigation water rights to municipal water supply because their existing sources are unreliable and do not meet their long-term needs, or their current needs during droughts. (Dougherty Test., Tr. Vol. 1 at 94:17–989:13; 101:20–102:22; Quinday Test., Tr. Vol. 2 at 480:17–484:5; 511:19–513:7; 536:21–537:8; Letourneau Test., Tr. Vol. 4 at 906:10–24; Ex. 1-37 at Cities 0002460.)

8. The R9 Ranch overlies the "Great Bend Prairie aquifer," which (in contrast to the "Ogallala Aquifer" farther to the west in Kansas) regularly receives recharge from precipitation. (Dougherty Test., Tr. Vol. 1 at 86:19–87:20. *See also* Ex. 2659.)

9. The Ranch covers approximately 6,900 acres (Ex. 1-1; Ex. 918 at Cities 0024532; *See also generally* Ex. 830) and is located within the Big Bend Groundwater

Management District No. 5 ("GMD5"), which is closed to new permits to appropriate water. (K.A.R. 5-25-4; Ex. 1-2 at Cities 0000112, ¶ 44.).

10. The R-9 Water Rights authorize irrigation from 54 separate wells across 43 tracts with partial or complete center pivot irrigation systems, and a total annual appropriation of 7,647 acre-feet. (Ex. 1 at Cities 0000005; Ex. 1-1 (aerial image showing location of irrigation wells); Ex. 2827 at Cities 0103693; Ex. 2631 at Cities 0098162; Ex. 2824 at Cities 0103565; Ex. 1743 at Cities 0072092.)

11. None of the R9 Ranch property has been used as irrigated farmland since 2017. (Ex. 2824 at Cities 0103565 (Dr. Harmoney Report); Ex. 1741 (aerial photo showing years each of the R9 Ranch circles were taken out of production).)

12. As discussed in more detail in Section VII.F, between 2007 and 2017, the irrigated circles were removed from crop production, the center-pivot structures were removed, and the circles were seeded back to a mixture of predominantly native grasses. (Ex. 2824 at Cities 0103565; Ex. 1741 (aerial photo showing years each of the R9 Ranch circles were taken out of production).)

13. All but two of the irrigation wells on the R9 Ranch have been plugged and abandoned. (Dougherty Test. Tr. Vol. 1 at 214:20–215:1; Clement Test., Tr. Vol. 3, 724:6–25; Ex. 2397 (R9 Ranch 2018 Well Abandonment Report).)

14. The two remaining wells were relatively new, are not being used for irrigation, but have been capped. (Clement, Tr. Vol. 3, 724:6–25.)

15. As a regulatory precondition to initiating the water transfer proceeding, on June 26, 2015, the Cities filed applications to contingently change the R9 Water Rights from irrigation use on the Ranch to municipal use in the Cities (the "Change Applications"). (Ex. 1-2 at Cities 0000112, ¶¶ 47–48 (Master Order); Ex 3-2 (the June 25, 2015 cover letter transmitting the Change Applications) Citations to the original and amended Change Applications are provided in Appendix C.)

16. The original Change Applications sought the Chief Engineer's contingent approval to convert 7,625 acre-feet of water per calendar year from irrigation to municipal use. The Change Applications included several conditions that needed to be met. (Ex. 3-2 at Cities 0008496–97; Ex. 1-2 at Cities 0000113, ¶ 50.)

17. After extensive discussion between the Cities and the Chief Engineer, the Cities agreed to reduce the total quantity from 7,625.7 acre-feet of water per calendar year to 6,756.8 acre-feet of water per calendar year for municipal use on the terms and conditions contained in the Master Order contingently approving the Change Applications. (Ex. 1-2 at Cities 0000113, ¶ 51.)

18. The reduction from 7,647 acre-feet in irrigation water rights to 6,756.8 acre-feet per year was based on the Chief Engineer's application of DWR's consumptive use regulation, K.A.R. 5-5-9 (1994 version). (Ex. 1-2 at Cities 0000119–22, ¶¶ 76–91. The text of the 1994 version is attached to the Master Order as Appendix C. Ex. 1-2 at Cities 0000165–66.)

19. GMD5 evaluated the Chief Engineer's consumptive use calculation and agreed that DWR's calculations were "accurate to determine the regulatory consumptive use for [the Cities'] change applications. KDA-DWR staff invested substantial effort to be as accurate as possible and follow existing processes for the determination of 6756.8 [acre-feet] cumulative." (Ex. 266 at Cities 0020383–84.)

20. The Cities further agreed to the Chief Engineer's imposition of a Ten-Year Rolling Aggregate Limitation ("TYRA Limitation") of 48,000 acre-feet of water that can be diverted from the combined R9 Water Rights for municipal use during any rolling 10-year period, or an average of 4,800 acre-feet per calendar year. In other words, the quantity diverted during a calendar year from all of the R9 Water Rights combined, plus the total of the quantities diverted from all of the R9 Water Rights combined during each of the 9 previous calendar years, may not exceed 48,000 acre-feet of water. (Ex. 1-2 at Cities 0000108, ¶ 13; Cities 0000110, ¶ 24; Cities 0000123, ¶ 96; Cities 0000136–39, ¶¶ 159–70; Cities 0000148, ¶¶ 225–30.)

21. The TYRA Limitation is imposed by the Master Order and incorporated into each of the Change Approvals. (Ex. 1-2 at Cities 0000110, ¶ 24; 0000121–22, ¶¶ 87–89; 122–139, ¶¶ 92–170; 148–49 ¶¶ 224–230.)

22. By agreeing to the 4,800 acre-feet per year TYRA Limitation, the Cities voluntarily agreed to reduce the quantity available under the R9 Water Rights by 37% compared to the quantity available for irrigation use; and by nearly 29% from the 6,756.8

acre-feet per year to which the Cities would be entitled under DWR's consumptive-use regulations. ((4,800 ÷ 7,647) -1 = -37%; (4,800 ÷ 6,756.8) -1 = -29%.)

23. On March 27, 2019, the former Chief Engineer, David Barfield, issued a Master Order and 32 Approvals changing the R9 Water Rights from irrigation to municipal use, changing the places of use to the Cities of Hays and Russell as well as the R9 Ranch, and changing the points of diversion from multiple irrigation wells to 14 municipal wells. (Ex. 1-2 at Cities 0000148, 152, and 172.)

24. The changes are contingent on a final, non-appealable order approving a transfer of water pursuant to the Kansas Water Transfer Act, K.S.A. 82a-1501, *et seq.* (Ex. 1-2 at Cities 0000154.)

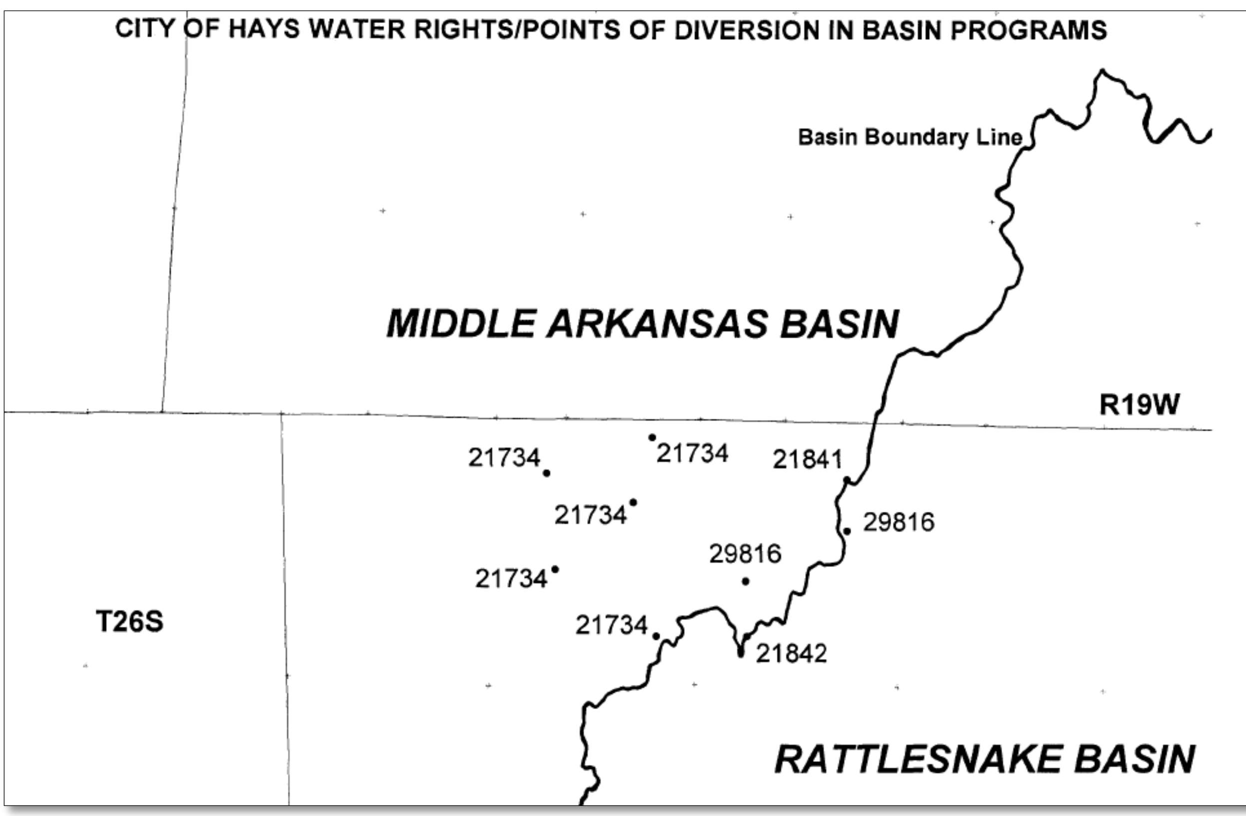
25. The changes are also contingent on written notice to DWR that the City of Hays has entered into a written contract to drill one or more of the 14 proposed municipal wells (excluding test drilling). (Ex. 1-2 at Cities 0000154.)

26. Most of the R9 Ranch is in the Middle Arkansas River Basin with a small area extending into the upper reaches of the Rattlesnake Creek Sub-Basin. (Ex. 2827 at Cities 0103697.)

27. Mr. Wenstrom testified that Municipal Well E is "classed by the State of Kansas as being in the Rattlesnake [drainage basin], not in the Arkansas River [drainage basin]." (Wenstrom Test. Tr. Vol. 8 at 1394:17–1395:9; 1407: 19-23.)

28. Mr. Wenstrom was mistaken. In an Order issued on April 23, 1996, DWR corrected previous statements about the location of four wells authorized by DWR File 21,734 stating that "more accurate information has recently been received from the United States … Geological Survey and the United States … Natural Resources Conservation Service which indicates that the authorized points of diversion … are actually located within the Arkansas River drainage basin." (Ex. 956 at Cities 0037569–70.)

29. In fact, only original irrigation wells 9A and 11A were in the Rattlesnake Creek drainage basin. (Ex. 978 at Cities 0047349–50, 0047338–39; Ex. 958 Cities 0038547.)



(Ex. 978 at Cities 0047339.)

30. Well 9A, one of the two wells authorized by File 29,816, was located 4,056 feet north and 1,320 feet west of the southeast Corner of Section 4-T26S-R19W, and was plugged on February 21, 2018.. (Ex. 978 at Cities 0047349–50; Ex. 2397 at Cities 0082143.) Well 11A, authorized by File 21,842, was located 1,301 feet north and 3,910 feet west of the southeast corner of Section 4-T26S-R19W, and was plugged on February 21, 2018. (Ex. 958 at Cities 0038605; Ex. 2397 at Cities 0082147.)On May 16, 2019, the Cities of Hays and Russell filed the First Amended Application to Transfer Water from Edwards County, Kansas to the Cities of Hays and Russell, Kansas. (Ex. 1 at Cities 0000054–55.)

31. Consistent with the terms, conditions, and limitations of the Master Order, Hays and Russell requested an order authorizing transfer of up to 6,756.8 acre-feet of water per year from the R9 Water Rights to Hays and Russell for municipal use. (Ex. 1 at Cities 0000005–06 and Cities 0000007–10.)

32. The maximum annual quantities to be transferred from each of the R9 Water Rights are set out in the Master Order, Appendix B, Table 1. (Ex. 1-2 at Cities 0000160–64.)

33. The Cities have requested approval to transfer the full 6,756.8 acre-feet of water each year without further limitations including without the TYRA Limitation (Ex. 1 at Cities 0000011) because the Master Order allows the Chief Engineer to increase the TYRA Limitation if the Cities produce a groundwater model supported by data and/or methods demonstrated to be comparable or superior to the methods used in the model

approved by the Chief Engineer in the Master Order that provides a larger estimated yield. (Ex. 1-1 at Cities 0000149, ¶ 229.)

34. Before deciding whether to approve a requested increase in the TYRA Limitation, the Chief Engineer must hold a public hearing or hearings to determine if the City has demonstrated that the requirements in the Master Order have been met to the Chief Engineer's reasonable satisfaction. (Ex. 1-1 at Cities 0000149, ¶ 230.)

35. On June 30, 2022, District Court Judge, Bruce Gatterman, issued a Memorandum Decision and Order upholding the Master Order with minor modifications of the hearing requirement imposed in Master Order, ¶ 230. (Ex. 2462 at Cities 0091622–1703.)

36. Judge Gatterman amended the Master Order to require publication of notice and requiring that water right holders in the area be given the right to appear, be heard, present evidence of direct impairment, or to challenge to any new groundwater model or modeling analysis, including presentation of relevant expert evidence in opposition to a proposed modification of the TYRA Limitation and the effect of sustainable yield upon the surrounding area and water right holders. (Ex. 2462 at Cities 0091700–01.)

37. Because the Master Order, as amended by Judge Gatterman, ensures that all interested parties will have full due process rights if the Cities request an increase in

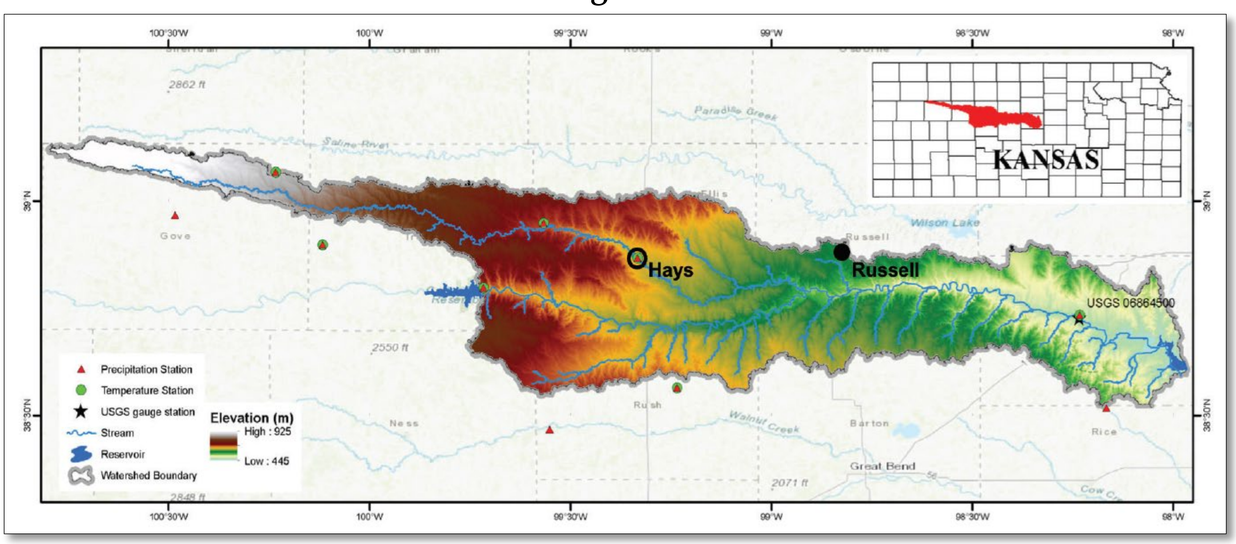
the TYRA Limitation, there is no need to include it in any order approving the water transfer.

II. The Cities are in desperate need of a redundant, drought-resistant water supply that will enable their growth into the future.

A. Both Cities have wellfields that draw water from the Smoky Hill River alluvium.

38. The Cities' principal existing water supplies depend on surface water flow in the Smoky Hill River and Big Creek, both of which are located within the broader Smoky Hill Watershed, which is depicted in Figure 2.

Figure 2



(Ex. 2822 at Cities 0103417.)

39. The Smoky Hill River originates in eastern Colorado and flows through southern portions of Trego, Ellis, and Russell Counties. It joins the Saline and Solomon Rivers east of Salina and then flows on to Junction City where it joins with the Republican River to form the Kansas River. (*See* Figure 2; Ex. 1-162 at Cities 0007375.)

40. The Smoky Hill River alluvium is a narrow paleochannel eroded into the bedrock surface, but water can be pumped from the sands adjacent to and under the river. (Ex. 935 at Cities 0026063, ¶107; Ex. 2660.)

41. When there is flow, the Smoky Hill River replenishes these sands as water is withdrawn. (Ex. 1-162, Cities 0007375.)

42. Exhibits 2658 and 2660 are maps showing the Cities' locations with respect to alluvial aquifers in dark orange and illustrating that neither Hays nor Russell is on or near alluvial sources except for the Smoky Hill River and Big Creek alluviums, neither of which are drought-resistant water sources as discussed below.

43. The Cities are also in an area of relatively low annual precipitation in which upstream contribution to the stream is required for flowing water to be sustained in both the Smoky Hill River and Big Creek, in particular compared to the eastern half of Kansas, which receives much more rainfall. (Ex. 1665; Dougherty Test., Tr. Vol. 1 at 198:4–11; 79:8–80:22.)

44. During times of low precipitation, the streamflow in the Smoky Hill River and Big Creek at or near the Cities' wellfields or Russell's surface-water intake runs dry or is so low as to be insufficient to replenish the associated alluvial aquifers, and there is often zero flow in one or both rivers, causing rapid depletion of groundwater. (Ex. 2680. *See also* Exs. 846, 849, 850, 851, 852, 855, 863, 866, 867, 868, 871, 872, 873, 876, 877, 881, 885, 886, 887, 890, 891, 892, 895, 896, 900, 2255, 2268, 2269, 2270, 2277, 2278 2279, 2289, 2290,

2291, 2307, 2316, 2327, 2335, 2354, 2369, 2379, 2382, 2383, 2387, 2390, 2391, 2392, 2409, 2412, 2413, 2414, 2419, 2421, 2422, and 2423. *See also* Dougherty Test., Tr. Vol. 1 at 85:20–86:7.)

45. Due to the scarce precipitation in the area and the impoundment of water in Cedar Bluff Reservoir, the Cities rely on rainfall in the 25 mile-stretch on the Smoky Hill between the reservoir and Hays' Schoenchen wellfield to replenish their water rights in the Smoky. There is only periodic flow in the Smoky Hill River. (Dougherty Test., Tr. Vol. 1 at 85:9–86:7.)

46. When there is adequate rainfall, the Smoky Hill River and Big Creek are productive water sources; however, they are both prone to rapid drying and depletion—the Smoky Hill River dries up faster (and recovers faster) than Big Creek, which dries up slower (and recovers slower). (Dougherty Test., Tr. Vol. 1 at 97:7–23.)

47. For example, during the drought of 2011–2013, flow in the Smoky Hill River near the Cities' wellfields ceased entirely and the riverbed completely dried out, as shown in photographs of the riverbed in Exhibits 800–803. (Quinday Test., Tr. Vol. 2 at 476:18–480:9; Ex. 2679 (drought plot); Ex. 2680.)

48. The 2011–2013 drought "showed that the Smoky Hill wellfield is not a viable and sustainable source during times of prolonged drought" because Hays and its residents "saw our water levels declining in the aquifer, the streamflow dried up—and then the water levels rapidly declined ...." (Dougherty Test., Tr. Vol. 1 at 141:8–15.)

49. Similarly, "the flow actually stopped in Big Creek ... and we started seeing some fairly rapid declines in Big Creek" during the 2011–2013 drought. (Dougherty Test., Tr. Vol. 1 at 144:17–25.)

50. Exhibit 2680 is a U.S. Geological Survey graph showing the times between January 1990 and mid-2023 in which the daily flow in the Smoky Hill River and Big Creek at the Cities' wellfields and Russell's surface-water intake was below 1 cubic foot per second (in gray) and zero cubic feet per second (in red). The number of times the riverbed ran completely dry, particularly at Russell's wellfield near Pfeifer, but also at Hays' wellfield near Schoenchen, demonstrates the vulnerability of the river as a viable source. (Ex. 2680 at Cities 0103350; 0103354.)

51. Cedar Bluff Reservoir is approximately 25 miles upstream from Hays' Smoky Hill Wellfield and "effectively truncates any flow upstream from the dam, and because there are not regular scheduled releases from Cedar Bluff Reservoir, most of the water that's impounded behind the reservoir evaporates or stays within the reservoir. So it's effectively cut off the flow 25 miles upstream from our wellfield." (Dougherty Test., Tr. Vol. 1 at 85:12–19.)

52. Figure 3 in Exhibit 255 (Cities 0017106) shows the status of Hays' Smoky Hill Wellfield during the 2011–2013 drought and indicates that, without two emergency releases from the Cedar Bluff Reservoir, the City's water supply would have dropped

into emergency status—even with 7 inches of rain in between releases. (Dougherty Test., Tr. Vol. 1 at 153:4–154:24.)

53. Exhibit 2657 is a map showing the Cities' locations with respect to the High Plains Aquifer in light orange illustrating that neither Hays nor Russell overlie that groundwater resource. (*See also* Dougherty Test., Tr. Vol. 1 at 81:8–82:24.)

54. The Cities understand that the existence of a legal right to divert a quantity of water does not guarantee that sufficient water will be available from the source of supply when it is needed. (Ex. 810 at Cities 0021245; Ex. 1883 at Cities 0074252; Quinday Test., Tr. Vol. 3 at 587:14–20 and 600:5–24.)

B. Hays' existing water rights.

55. The City of Hays is the sole municipal water supplier for all residents within its city limits. (Dougherty Test., Tr. Vol. 1 at 131:15–16.)

56. The City owns the vested water right designated as DWR File No. EL-02 and water appropriation rights designated as DWR File Nos. 1,248, 5,757, 18,857, 18,858, 33,296, 33,548, 33,548, 36,519, 36,520, 36,804, 40,367, 40,368, 40,702, 40,703, 40,704, 40,705, 40,706, and 40,707. (Table 1 below and Appendix A.)

57. Hays' existing water sources include water rights in the Smoky Hill River alluvium south of Hays near Schoenchen, Kansas, in the Big Creek alluvium in Hays, and a small quantity from wells in the Dakota formation southwest of Hays. (Ex. 1-4 at Cities 0000386.)

58. Exhibit 2661 is a map showing the locations of wells in Hays' Big Creek Wellfield (blue), its Smoky Hill Wellfield (yellow), and its Dakota Wellfield (green). Exhibit 255 shows zoomed-in views of Hays' in-City Big Creek Wellfield at Cities 0017104 and the Smoky Hill River Wellfield at Cities 0017105 (Dougherty Test., Tr. Vol. 1 at 109:8–110:7 (Big Creek)) and Cities 113:13–22 and 145:8–14 (Smoky Hill River).)

59. The permitted quantities of Hays' water rights are set out in Table 1. The detailed characteristics of each water right, with citations to the record, are provided in Appendix A.

Table 1							
DWR File No.	Well Number	Permitted Quantities In Acre-Feet	Limitations on Quantities	Limitations on Quantities	Smoky Hill River IGUCA Limitations	Net Quantities	Permitted Quantities
Big Creek Wells (Some permits limited to 3,675 acre-feet when combined with other water rights.)							
EL 002	C-17	1,021.57	1,227.55	1,624.34		1,624.34	4,677.94
EL 002	C-21						
EL 002	C-24						
EL 002	C-27						
EL 002	C-28A						
EL 002	C-31						
EL 002	C-29	102.99					
EL 002	C-30	102.99					
EL 002	C-20	0.00					
18,857	C-19	10.74	68.97				
18,858		10.74					
36,519		34.42					
36,520		9.20					
36,804		3.81					
40,367	C-33	104.53	194.824				
40,368	C-32	170.54					
33,548	YE-1	61.00	133.00				
33,548	YE-2	72.00					
Smoky Hill Wells							
1,248 / 5,757	S-8	2,500.00	2500.00	2,800.00	2,285.83	2,285.83	
1,248 / 5,757	S-10	2,500.00					
1,248 / 5,757	S-11	2,500.00					
1,248 / 5,757	S-13	2,500.00					
1,248 / 5,757	S-14	2,500.00					
1,248 / 5,757	S-16	2,500.00					
1,248 / 5,757	S-18	2,500.00					
1,248 / 5,757	S-21	2,500.00					
1,248 / 5,757	S-19	2,500.00	968.00				
1,248 / 5,757	S-20	2,500.00					
33,296	S-22	155.20	300.00				
33,296	S-23	176.96					
Dakota Wells. (Limited to 4,097.27 acre-feet per year when combined with other water rights.)							
40,702	D-6	120.00	767.77	767.77		767.77	
40,703	D-3	123.98					
40,704	D-5	128.98					
40,705	D-4	125.82					
40,706	D-1	118.00					
40,707	D-2	150.99					

1. Hays' Smoky Hill Wellfield.

60. Hays' Smoky Hill River Wellfield is composed of 12 shallow wells that draw water from the Smoky Hill River alluvial aquifer near Schoenchen, Kansas. (Ex. 2828 at Cities 0103761; Ex. 2661 (in yellow); Dougherty Test., Tr. Vol. 1 at 84:13–23.)

61. Water appropriation rights designated as DWR File Nos. 1,248, 5,757, and 33,296 permit the diversion of up to 2,800 acre-feet of water for municipal use in the City of Hays and its immediate vicinity.[1] (Exs. 935, 938, and 981.)

62. Beginning in 1985, the Lower Smoky Hill Intensive Groundwater Use Control Area ("IGUCA") restricted municipal water rights to 90 percent of the maximum quantity used during 1981, 1982, or 1983. (Exs. 2440 at Cities 0082529; 2828 at Cities 0103744:14–15 (Direct Testimony of Paul A. McCormick).)

63. The IGUCA reduced the quantity that can be diverted from the Smoky Hill Well Field from 2,800 acre-feet to 2,285.8 acre-feet per year. (Ex. 935 at Cities 0026052, ¶ 51.)

64. As discussed in Appendix D, the City of Hays expanded its Smoky Hill River Wellfield in 2009. (Dougherty Test., Tr. Vol. 1 at 138:18–19.)

2. Hays' Big Creek Wellfield inside the City.

65. Hays' Big Creek Wellfield is composed of wells drawing water from the Big Creek alluvium. The wells are authorized by vested water right designated as File No.

[1] "Immediate vicinity" is defined at K.A.R. 5-1-1(mm).

EL 002, and water appropriation right File Nos. 18,857, 18,858, 36,519, 36,520, 36,804, 33,548, 40,367, and 40,368. (Ex. 3-2 at Cities 0008525.)

66. The Big Creek Wellfield provides Hays, on paper, with a total quantity of water available for municipal use of 1,429.46 acre-feet of water per year. (Ex. 2828 at Cities 0103744:13–14 (Direct Testimony of Paul A. McCormick).)

3. Hays' Dakota Wellfield southwest of the City.

67. The Dakota Wellfield is composed of six wells located southwest of the City in Sections 18 and 20, Township 14 south, Range 18 west, Ellis County, Kansas, and Sections 13 and 14, Township 14 south, Range 19 west, Ellis County, Kansas. (Exs. 2661 (green dots), 1-112, 1-113, 1-114, 1-115, 1-116, and 1-117; (Dougherty Test., Tr. Vol. 1 at 119:16–120:12.)

68. The Dakota wells were drilled as a result of the 1991 drought, which was "life changing in many ways for the City of Hays." (Dougherty Test., Tr. Vol. 1 at 126:21–127:10. *See also id.* at 123:20–21.)

69. Paragraph 23 of each of the Permits states that wells must be constructed so that the source of supply will be restricted to withdrawal of water from the Lower Cretaceous (Dakota) Formation. Each well must be equipped with an adequate seal between the Dakota Formation and all overlying water-bearing strata to prevent any movement of water between formations. (Exs. 1-112, 1-113, 1-114, 1-115, 1-116, and 1-117.)

70. Recharge from infiltrating precipitation is on the order of 0.1% or less of lateral flow in the confined Dakota aquifer in much of western Kansas. (*Id*. at Cities 0005393.)

71. Regionally, groundwater flow in the Dakota aquifer is from recharge areas in southeastern Colorado. (Ex. 1-120 at Cities 0005504.)

72. The Dakota formation in the area of Hays' wellfield is a confined system with no nearby significant sources of freshwater recharge. (Ex. 1-120 at Cities 0005502; Dougherty Test., Vol. 1 at 88:6–89:8; Letourneau Test. Vol. 4 at 843:12-23.)

73. The Dakota Wellfield provides Hays, on paper, with a total quantity of water of 882 acre-feet per year; however, the wellfield can sustainably provide no more than 120 acre-feet of water per year on average. (Ex. 2828 at Cities 0103744:16–17 (Direct Testimony of Paul A. McCormick); Dougherty Test., Tr. Vol. 1 at 88:6–89:8; 120:1–15; 121:1–122:25.)

74. Regional groundwater flow models of the Dakota aquifer that include the Hays wellfield vicinity indicate that there is a small amount of recharge in the upper Dakota aquifer as leakage from the overlying confining unit, on the order of a few percent of the lateral flow. (*Id*. at Cities 0005504.)

75. Groundwater withdrawals may locally deplete the aquifer or degrade aquifer water quality. (*Id.* at Cities 0005502.)

76. Water quality in Hays' Dakota wellfield is poor, with chloride concentrations that range from a few hundred to a few thousand mg/L and sulfate concentrations from a few to several hundred mg/L. (*Id.* at Cities 0005504; Ex. 2828 at Cities 0103783.)

77. Dakota water is blended with water from other sources but the quantity that Hays can use is also limited because of the poor water quality. (Ex. 2828 at Cities 0103764; Dougherty Test. Vol. 1 at 121:1–25 (noting that Dakota water is "brackish, very high in salts" making it "difficult to blend" and that "it requires advance treatment").)

78. Mr. McCormick explained that "multiple studies have been conducted for the City since 1992 evaluating the sustainable yield of the Dakota Wellfield" which conclude that "the annual quantity permitted by the [Dakota] water rights is not sustainable." (Ex. 2828 at Cities 0103764.)

79. "Historical pumping records indicate that a yield of 120 AF/y is all that the Dakota can sustain without significantly depleting the resource and requiring years of recharge to reestablish the available water." (Ex. 2828 at Cities 0103764.)

80. "Since the Dakota is highly confined, it should be able to yield 120 AF/y through a 2-year (moderate) or 5-year (exceptional) drought." However, "there is no data to verify if the aquifer could [continue to] support this yield in the long-term." (Ex. 2828 at Cities 0103764.)

4. Hays Public Water Supply Well C-20.

81. On May 28, 1991, the City filed an application to change points of diversion for Vested Right, EL-02. The Change Application and separate correspondence explained that Wells C-20 and C-23 have been contaminated with volatile organic compounds and requested that these wells be moved a "significant distance to ensure that water from the [new] well is not contaminated." (Ex. 1-60, Cities 0003055-59.)

82. The Chief Engineer subsequently suspended operation of Well C-20 and reduced the quantity available from the vested right, after which the City worked with KDHE to address the contamination issue, which involved a consent agreement and KDHE's treatment of the water, which allowed the City to use the water to augment its scarce supply. (Ex. 1-61, ¶ 7; Ex 1-62; Ex. 1-65.)

83. Currently, the City extracts water from the C-20 remediation well, filters it through an "air stripper" to treat the water and remove contaminants, and then pumps the water into the City's raw water collection system for treatment and distribution. (Dougherty Test., Tr. Vol. 1 at 111:16–112:11 (referring to wells depicted on Exhibit 255 at Cities 0017104).)

84. The City expects to continue to utilize this important water source because it supplements the City's water supply, and it removes potentially harmful chemicals from groundwater. (*See generally*, Exs. 1-60–1-66, 98–100, 113, 321, 1172, 1186, 1293, 1299,

1306, 1381, 1386, 1790, 1906, 1908, 1989–90, 1998, 2000, 2070, 2075, 2087, 2093–94, 2096, and 2276.)

85. The Presiding Officer finds that the City of Hays has taken all appropriate measures to remediate contamination of water currently available for use by the City.

C. Russell's existing water rights.

86. The City of Russell is a full-service municipality, owning and operating the electric utility, wastewater and sanitation, and water utility—a public water supply system with approximately 2,500 metered customers and about 92 miles of in-City distribution lines. (Quinday Test., Tr. Vol. 2 at 491:3–17.)

87. Russell owns the vested water right designated as DWR File No. RS-08 and water appropriation rights designated as DWR File Nos. 206, 1,267, 1,861, 7,628, 17,586, 17,587, and 36,680. (Table 2 and Appendix B.)

88. Russell also has access to File 34,505, an irrigation water right owned by Loran C. Zimmerman. (*Id. See also*, Ex. 1055.)

89. The City of Russell's existing water sources include both surface and groundwater rights in the Smoky Hill River alluvium near Pfeifer and surface rights in the Big Creek southwest of the City. (*Id.*)

90. The permitted quantities of Russell's water rights are set out in Table 2. The detailed characteristics of each water right, with citations to the record, are provided in Appendix B.

<table>
<tr><th colspan="7">Table 2</th></tr>
<tr><th>File No.</th><th></th><th>Acre Feet</th><th>Limitations</th><th>Limitations</th><th>IGUCA Limitations</th><th>Permitted Quantities</th></tr>
<tr><td colspan="7">Surface water rights in Big Creek</td></tr>
<tr><td>RS-08</td><td></td><td>767.00</td><td></td><td></td><td></td><td>767.00</td></tr>
<tr><td>206</td><td></td><td>1,000.00</td><td></td><td></td><td></td><td>1000.00</td></tr>
<tr><td colspan="7">Surface Water Rights in the Smoky Hill alluvium near Pfeifer</td></tr>
<tr><td>1,267</td><td></td><td>1,086.00</td><td></td><td rowspan="14">1840.00</td><td rowspan="14">1,435.50</td><td rowspan="18">1,435.50</td></tr>
<tr><td colspan="4">Groundwater Rights in the Smoky Hill alluvium near Pfeifer</td></tr>
<tr><td>1,861</td><td></td><td>315.00</td><td></td></tr>
<tr><td>17,586</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Well #5</td><td>26.54</td><td rowspan="6">456.00</td></tr>
<tr><td></td><td>Well #6</td><td>103.00</td></tr>
<tr><td></td><td>Well #7</td><td>101.75</td></tr>
<tr><td></td><td>Well #8</td><td>109.90</td></tr>
<tr><td></td><td>Well #9</td><td>114.19</td></tr>
<tr><td></td><td>Well #10</td><td>101.19</td></tr>
<tr><td>17,587</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Well #2</td><td>32.29</td><td rowspan="3">189.90</td></tr>
<tr><td></td><td>Well #3</td><td>82.44</td></tr>
<tr><td></td><td>Well #4</td><td>98.70</td></tr>
<tr><td colspan="5">Loran C. Zimmerman Irrigation Right</td><td></td></tr>
<tr><td>34,505</td><td></td><td>62.00</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">2,700 acre-feet of storage in Cedar Bluff Reservoir</td></tr>
<tr><td>7,628</td><td>2,700.00</td><td>2,000.00</td><td></td><td></td><td></td></tr>
<tr><td colspan="7">Recreation water right in Fossil Lake</td></tr>
<tr><td>36,680</td><td></td><td>286.65</td><td></td><td></td><td></td><td></td></tr>
</table>

91. Exhibit 2661 is a map showing the locations of wells in Russell's Pfeifer wellfield (in red). (Dougherty Test., Tr. Vol. 1 at 84:16–21.)

92. Exhibit 2619 is an aerial image showing the water transmission lines that run from Russell's Pfeifer wellfield in the Smoky Hill River alluvium to the City with the wells shown in orange and the associated 23-mile pipeline shown in yellow as well as the Big Creek surface-water intake and the separate associated pipeline to the City (green). (Quinday Test., Tr. Vol. 2 at 472:3–474:1.)

93. Exhibit 805 is a photograph of Russell's low-head dam on Big Creek to impound water for the purpose of maximizing the City's water supply from that source. (Quinday Test., Tr. Vol. 2 at 474:21–475:17.)

94. Because Russell's water right in Big Creek is a surface water right, the City has a surface-water intake to capture water that then goes to a pump house for pumping water to the City. (Quinday Test., Tr. Vol. 2 at 475:16–24.)

95. For Russell to utilize the water, Big Creek must be sufficiently high to flow into the surface water intake, and at the water level shown in Exhibit 805, the Creek is not high enough to operate as a usable water source. (Quinday Test., Tr. Vol. 2 at 475:25–476:12.)

96. The intake structure is depicted in Exhibit 806, again, showing the water at a level too low for Russell to produce water. (Quinday Test., Tr. Vol. 2 at 476:13–17.) Mr. Quinday explained:

> The City also faces another critical issue with their water supply. Even if the water rights were not restricted by DWR, the City would struggle supplying water for an extended time during hot summer months because of a lack of water in the region. The Big Creek intake typically has little water available because the Big Creek frequently runs dry. The Pfeifer wellfield is capable of supplying the water demand for a short duration but could be permanently damaged if the demand increases too much.

(Quinday Test., Tr. Vol. 2 at 514:23–515:9.)

97. Russell has two water treatment plants: (1) an electrodialysis reversal ("EDR") plant for treating water from the Smoky Hill River, built in 2006, and (2) a water

softening plant for treating water from Big Creek, built in 1938. (Quinday Test., Tr. Vol. 2 at 474:2–20; 494:17–495:7.)

98. Russell's EDR plant will be able to treat water from the R9 Ranch if the water transfer is approved. (Quinday Test., Tr. Vol. 2 at 496:4–9.)

99. Mr. Quinday testified that the 2,700 acre-feet in storage water rights Russell owns in the Cedar Bluff reservoir is, as a practical matter, often not usable by Russell during times of need for several reasons. (Quinday Test., Tr. Vol. 2 at 468:24–25.)

100. Water is not always available in Cedar Bluff Lake to be released and to benefit, Russell the conditions must be "just right." Otherwise releases would be wasteful. (Quinday Test., Tr. Vol. 2 at 470:19–471:12. *See also, e.g.*, Exs. 352, 878, 1407, 1573, 1574, 1627, 1649, and 2603.)

101. "There's a monthly accounting based on the available water in Cedar Bluff, and there are priorities for who can use the water and when. And in times of drought, that number is reduced proportionately by those water rights, so we don't always have 2,000 acre-feet of water available." (Quinday Test., Tr. Vol. 2 at 470:1–7.)

102. When water is released from Cedar Bluff it flows into the riverbed and must follow the river channel to the Russell wellfield near Pfeifer. (Quinday Test., Tr. Vol. 2 at 469:3–20.)

103. Releasing water from its Cedar Bluff storage right during a drought is rarely beneficial to Russell due to upstream dry riverbed conditions. As stated by Mr. Dougherty, during the 2011–2013 drought:

> A. You could stand in the river channel as the water was coming down, you could stand 5 foot away from the ... head of the water, and it would take it five minutes to get to you because it wasn't moving forward as much as it was moving laterally and down to the aquifer.
>
> Q. So it was soaking into the aquifer?
>
> A. Right.... Russell asked for release of their water from Cedar Bluff. They own water rights in Cedar Bluff. Their water rights ... made it to our wellfield in a matter of a couple days and then on through our wellfield in order to make it to [Russell's] Pfeifer[] wellfield ....

(Dougherty Test., Tr. Vol. 1 at 150:1–20.)

104. If Russell requests a release when the riverbed upstream and at Hays' Schoenchen wellfield is dry, little or none of the water would ever make it to the City's wellfield at Pfeifer because "anything they release is going to get caught up in our wellfield and never make it to their Pfeifer wellfield." (Dougherty Test., Tr. Vol. 1 at 152:9–16.)

105. "[I]f there is adequate saturation for water to make it to their wellfield, then they probably don't need the release. When conditions are as such that they do need the water, the aquifer is going to be depleted enough it's never going to make it there." (Dougherty Test., Tr. Vol. 1 at 152:22–153:3.)

106. While Russell's sources are vulnerable, to date, none have required remediation of contaminated groundwater. (Quinday Test., Tr. Vol. 2 at 481:9–482:12. *See*

also, 482:23–483:17 (describing a discharge of ammonia from the Hays wastewater treatment plant that made surface water in Big Creek unusable for a several weeks).)

107. The Presiding Officer finds that the City of Russell has not been required to take measures to remediate contamination of water currently available for use by the City.

D. The Cities' existing sources are inadequate, highly susceptible to drought, and inhibit future growth.

108. There was substantial evidence presented during the hearing that without precipitation in the Smoky Hill River and Big Creek resulting in streamflow, water levels in the alluvial aquifers of those water sources will continue to decline and the wellfield yield will decline with it. (*See, e.g.*, Ex. 2828 at Cities 0103760 and 0103763.)

109. Exhibit 2680 shows significant periods of time in which there was no flow in the Smoky Hill River and numerous periods in which there was minimal or no flow in Big Creek at the Cities' respective wellfields according to U.S. Geological Survey monitoring stations from 1990 through the present.

110. Paul McCormick provided direct testimony and an associated expert report titled "Wellfield Yield for the Cities of Hays and Russell, Kansas" addressing the vulnerability of the Cities' existing water supplies and the impacts of droughts over 2-, 5- , 10-, and 20-year durations. (Ex. 2828 at Cities 0103744:5–11.)

111. Mr. McCormick is a hydrogeologist and licensed Professional Engineer in Kansas, Missouri, Iowa, Nebraska, and South Dakota; he has worked in the groundwater

industry for 29 years providing design and consulting services for clients regarding hydrogeology, groundwater modeling, and water well and wellfield design for water supply purposes. (Ex. 2828 at Cities 0103743:7–13.)

112. Mr. McCormick's curriculum vitae is attached to his Direct Testimony as Exhibit "PM-01," and the Presiding Officer finds that he is eminently qualified to opine on the wellfield yield of the Cities' existing water sources in the event of drought as set forth in his testimony and attached report.

113. Mr. McCormick detailed each of the Cities' water sources, including observed water-level trends, tracking and modeling tools, and the respective vulnerability of each source to drought scenarios, including his findings relating to the sustainable yield of each source under each respective drought scenario. (Ex. 2828 at Cities 0103744:5–11.)

1. Impacts of a 2-year (moderate) drought and a 5-year (exceptional) drought.

114. From 2011 through mid-2013, a drought of relatively short duration and moderate intensity struck the Smoky Hill Watershed and the Cities of Hays and Russell. (Ex. 2679 at Cities 103344.)

115. During the 2011–2013 drought, Hays pumped 1,335.05 acre-feet in 2011 and 1,342.36 acre-feet in 2012 from its Big Creek wells. Water Levels did not decline sufficiently to limit production. This indicates that up to 1,429.46 acre-feet could probably

be diverted from Big Creek Wellfield during a 2-year drought. (Ex. 2828 at Cities 0103760.)

116. Hays went into water warning and then water emergency on two separate occasions during the 2011–2013 two-year flash drought. (Ex. 255 at Cities 0017106. *See* discussion of the Hays Aquifer Health Index tool below.)

117. A 5-year (exceptional) drought would result in significantly greater water level declines in the Big Creek aquifer. Water level declines that result in a 50 percent reduction in saturated thickness cause a significant reduction in the transmissivity (the ability of the aquifer to move water to a well) of the aquifer. This is due to the reduction in available pore space through which water can move. (Ex. 2828 at Cities 0103761.)

118. Extrapolating the water level declines from the 2011 to 2012 drought out for another three years (Figure 3) indicates that water levels in several of the Big Creek wells will drop below the 50 percent level during a drought and production will be reduced due to aquifer conditions. Loss of production from wells and decreased production from the remaining wells will limit the Big Creek wellfield to an estimated 85 percent of capacity. This indicates the sustainable yield of the Big Creek Wellfield after five years of exceptional drought would be approximately 1,040 AF/y. (Ex. 2828 at Cities 0103761.)

2. *The Aquifer Health Index ("AHI") Tool*

119. The methodology and opinions contained in Mr. McCormick's direct testimony and expert report are derived, in part, from the Aquifer Health Index ("AHI")

Tool, an aquifer-monitoring tool commissioned by the City of Hays to provide real-time information relating to the status of the aquifer at its Big Creek and Smoky Hill River wellfields. (Ex. 2828 at Cities 0103746:14–23. *See also* Dougherty Test., Tr. Vol. 1 at 112:25–113:12 (referring to Exhibit 255 and discussing the City's AHI monitoring wells in Big Creek at Cities 0017104), and 113:25–114:15 (same as to the Smoky Hill River).)

120. The AHI Tool incorporates information relating to saturated thickness, streamflow, and pumping, utilizing monitoring wells and USGS streamflow gages in both the Smoky Hill Wellfield and the Big Creek Wellfield in making its calculations and outputs for monitoring the relative health of Hays' water sources. (Crispin Test., Tr. Vol. 3 at 624:3–16; *id.* at 625:10–628:3 (discussing the AHI Tool and Exhibit 255, a memo describing the tool).)

121. Using those inputs, the AHI Tool develops a score measuring the relative health of the Cities' aquifers to convey the condition of each wellfield and provide a basis for initiating conservation measures. (Ex. 2625 at Cities 0098119; Crispin Test., Tr. Vol. 3 at 620:19–622:15.)

122. There are four categories of relative aquifer health measured by the AHI Tool: (1) Good, (2) Watch, (3) Warning, and (4) Emergency, which are monitored by City staff on a daily basis. (Ex. 2625 at Cities 0098124; Crispin Test., Tr. Vol. 3 at 628:6–629:10.)

123. "Once the AHI tool identifies 'fair' or 'poor' aquifer conditions, the City is forced to reduce production from that wellfield and rely on another water source to meet

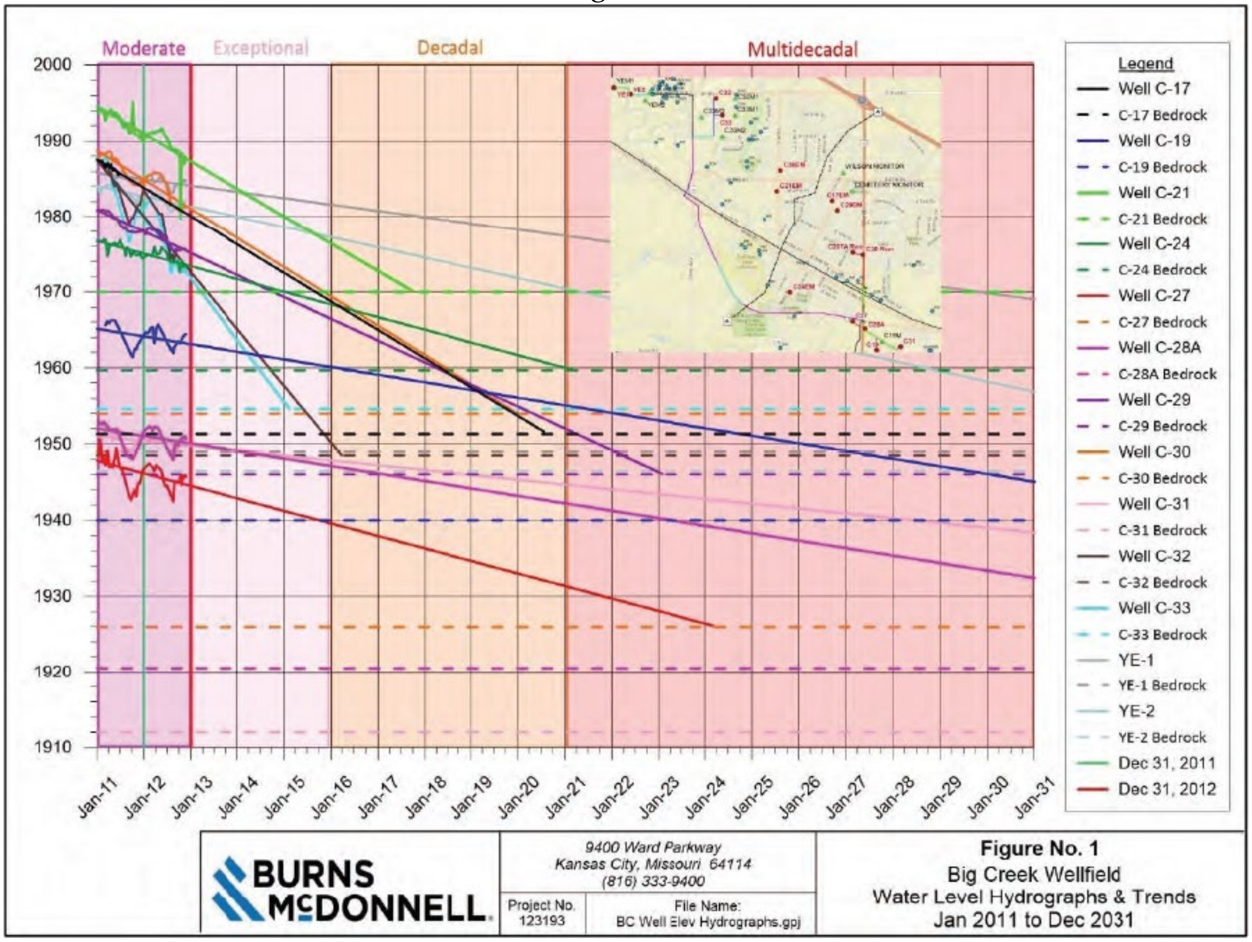
demand. Without recharge, the aquifer is in a state of managed depletion, and the resource will not recover until precipitation and surface water infiltration return." (Ex. 2828 at Cities 0103759.)

124. Using the AHI tool, Mr. McCormick illustrated the status of both the Big Creek Wellfield and the Smoky Hill River Wellfield during the relatively modest 2-year drought that struck the Cities and the Smoky Hill River Watershed during 2011 and 2012 and then extrapolated the aquifer conditions of the two wellfields for 5-, 10-, and 20-years to estimate the status of the wellfields in the event that drought conditions like those that occurred in 2011–2012 extended for each of the respective drought periods. (Ex. 2828 at Cities 0103759.)

125. Mr. McCormick then plotted the condition of the wellfields in Figures reflecting the water level relative to bedrock for each well in each wellfield in the event of 2-, 5-, 10-, and 20-year droughts. (Ex. 2828 at Cities 0103760 (Big Creek Wellfield); Cities 0103763 (Smoky Hill River Wellfield).)

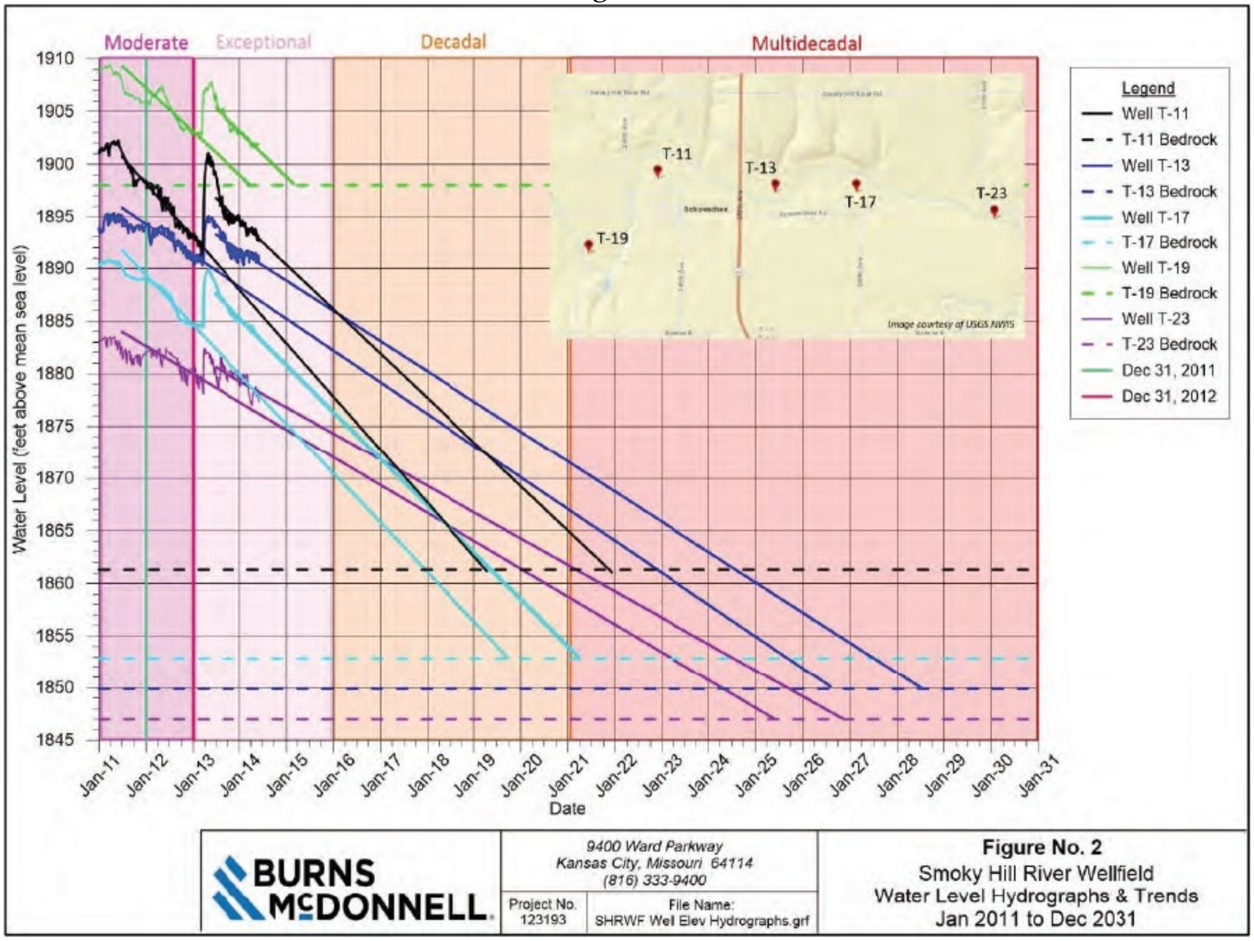
126. Figure No. 3 is Mr. McCormick's line graph showing the relative health of Hays' Big Creek Wellfield in the event of each analyzed drought duration. Figure 4 shows the same information relative to Hays' Smoky Hill River Wellfield.

Figure 3.



(Ex. 2828 at Cities 0103760.)

Figure 4.



(Ex. 2828 at Cities 0103763.)

127. Based on his work with the AHI Tool for the Big Creek and Smoky Hill River Wellfields, and the known limitations of Hays' Dakota Wellfield, Mr. McCormick concluded:

> Currently, Hays obtains water from three wellfield sources: (1) a wellfield in the Big Creek alluvial aquifer permitted for a maximum of 1,429.46 acre-feet per year; (2) a wellfield in the Smoky Hill River alluvial aquifer permitted for a maximum of 2,285 acre-feet per year; and (3) A wellfield in the Dakota groundwater aquifer permitted for a maximum of 882 acre-feet per year.

(Ex. 2828 at Cities 0103744:13–17.)

> [However, [t]he maximum permitted yield of these existing resources is subject to the physical limitations of each aquifer and water rights limitations to both annual volumes extracted and a maximum permitted instantaneous rate of the City's water appropriation rights. For example, the Hays' Dakota wellfield can sustainably provide no more than 120 acre-feet per year, regardless of precipitation conditions, despite having "paper" rights of up to 882 acre-feet per year. Periods of drought reduce the annual sustainable volume available from the City's other existing sources such that drought yields can be drastically less than the authorized quantities.

(Ex. 2828 at Cities 0103744:17–23.)

> The estimated yield of Hays's existing wellfields under the four above-referenced drought scenarios are summarized in Tables 1 and 2, below. In the event of a longer drought than is projected in these calculations, it is my opinion that water levels in the aquifer and the City's ability to produce water will continue to decline.

TABLE 1:
Estimated Wellfield Yield During 2-Year (Moderate) to 5-Year (Exceptional) Drought Conditions

Wellfield Name	Permitted Water Rights (acre-feet per year)	2-Year (Moderate) Drought Sustainable Yield (acre-feet per year)	5-Year (Exceptional) Drought Sustainable Yield (acre-feet per year)
Big Creek	1,429.46	1,429.46	1,040
Dakota	882	120	120
Smoky Hill	2,285	1,000	600
Total	3,675*	2,549.46	1,760

**Permitted water rights total is limited by permit conditions.*

TABLE 2:
Estimated Wellfield Yield During Decadal and Multidecadal Drought Conditions

Wellfield Name	Permitted Water Rights (acre-feet per year)	Decadal Drought Sustainable Yield (acre-feet per year)	Multidecadal Drought Sustainable Yield (acre-feet per year)
Big Creek	1,429.46	620	360
Dakota	882	120	120
Smoky Hill	2,285	100	0
Total	3,675*	840	480

**Permitted water rights total is limited by permit conditions.*

(Ex. 2828 at Cities 0103744:24–0103745:11.)

> Relating to the City of Russell: it has 1,842 acre-feet per year of permitted water rights, obtained from a surface water intake on Big Creek and from wells located in the Pfeifer Wellfield located in the Smoky Hill River alluvial aquifer. It is not uncommon for the flow in Big Creek to be low enough to restrict the usage of the surface water intake, which eliminates that water source during times of drought, rendering it unusable and leaving Russell entirely dependent on the Pfeifer Wellfield in the Smoky Hill River alluvium, which is downstream from and otherwise very similar to the Hays's Smoky Hill River Wellfield with respect to water-levels during drought. Because Russell's Pfeifer Wellfield is downstream from Hays's Smoky Hill River Wellfield, flows must make it past Hays's wellfield before they are available to recharge Russell's wellfield. Once flow stops in the Smoky Hill river, water levels in Russell's Pfeifer Wellfield decline steadily.

(Ex. 2828 at Cities 0103745:12–0103746:3.)

128. Mr. McCormick further concluded that "[i]n the event of a longer drought than is projected in these calculations, it is reasonable to assume that water levels in the aquifer and the City's ability to produce water will continue to decline." (Ex. 2828 at Cities 0103765.)

129. The Presiding Officer finds that Mr. McCormick's prefiled testimony, his expert report, and his live testimony at the hearing presented substantial competent evidence relating to the wellfield yield of the Cities' existing water sources in the event of 2-, 5-, 10-, and 20-year droughts. The Presiding Officer adopts and incorporates such evidence as factual in this proceeding.

3. ***Based on the Cities' recent firsthand experiences, droughts as short as two years can have dramatic impacts on the Cities' existing water sources.***

130. As discussed in Section V.A, the instrumental record shows that droughts of extended duration and great intensity have occurred with regularity in and around the Smoky Hill Watershed since 1895.

131. But even droughts of relatively short duration and moderate intensity have been shown to have significant impacts on the Cities' existing water sources. Mr. Dougherty testified:

> Q. So what happened in the '90, '91, '92 time frame?
>
> A. The City of Hays experienced a very severe but very short duration drought in 1991. And --
>
> Q. So if we look over here at these maps or this Exhibit 2679, the first page and -- and then the last page, you see some drought -- they indicate some droughts. Is that the time frame we're talking about?
>
> A. Correct. So the top visual here shows all of the stages of the Palmer Drought Index Rating, and the 1991 drought would be right here. This just shows exceptional drought in the past 100 years, and the 1991 drought would be right there. So as you can see, it was -- it was an exceptional drought, but it was very short lived. And what happened is is the City's wellfields were unable to meet demands, and that was the precipitating event that led to a lot of the issues that we're going to talk about.

(Dougherty Test., Tr. Vol. 1 at 105:20–106:14.)

> A. In 1991, the City experienced … very extreme drought that exploited the vulnerability of the City's sources, mainly the Smoky Hill wellfield. So the -- there were several wells in the Smoky Hill wellfield that were pulling air, and the City was not able to meet its daily demands for usage and so had to enact some pretty draconian responses in order to get usage under control to account for the situation.

(Dougherty Test., Tr. Vol. 1 at 124:10–19.)

> A. The 1991 drought was life changing in many ways for the City of Hays. First of all, it—it set off a—a frantic search for an additional water source that had been apparent but somewhat muted before that. The second thing it caused was the development of the Dakota wellfield. They weren't looking long-term Dakota, they were looking at we need water right now when that was developed. We implemented our conservation program at that time, and the conservation program that is still in existence today, that all started with the—the drought of the '90s. The—the water rate structures that we have in place today were all considered as a result of the 1990 drought.
>
> Q. Was—you had an election, you voted in a sales tax at that time too, didn't you?
>
> A. I believe that was in 1992 is when the residents voted for a half cent—they voted to impose on themselves a half cent sales tax allocated to water. Hays residents, when you read the record, they knew all along an additional source was going to be expensive. In 1991, the need for an additional source was amplified and, therefore, the governing body asked to be put on the ballot the sales tax question, and it was voted overwhelmingly and—and we have been benefitting from the proceeds of that sales tax since.

(Dougherty Test., Tr. Vol. 1 at 126:21–127:24.)

132. Hays' Water Conservation Specialist, Holly Dickman, testified about how rapidly the City's water situation deteriorated during the 2011–2013 drought stating, "we were in good shape and then within six months we were in exceptional drought, and it changed very, very quickly." (Dickman Test., Tr. Vol. 4 at 770:3–8.)

III. CONSERVATION – The Cities' conservation plans meet the statutory requirements under the Water Transfer Act.

A. The Cities' conservation plans are consistent with guidelines developed and maintained by the Kansas Water Office and have been in effect for many years. (K.S.A. 82a-1502(b)(2)(A)–(B); K.S.A. 82a-1502(c)(8).)

133. It is uncontroverted that both Hays and Russell have adopted and implemented water conservation plans that have been in effect for many years and reviewed and approved by the Kansas Water Office pursuant to K.S.A. 74-2608.

1. Hays' Water Conservation Plan.

134. On the heels of a "life changing" drought that exposed alarming vulnerabilities in its water sources, Hays implemented its conservation plan, which was approved by the Kansas Water Office, in 1991. (Dougherty Test., Tr. Vol. 1 at 166:17–167:19; 168:15–169:4; 126:21–127:10; Ex. 1-52 (consolidated document including: (1) a March 28, 2014 letter to the Chief Engineer relating to Hays' updated Water Conservation Plan, and (2) Hays' updated Water Conservation Plan).)

135. Hays' Water Conservation Plan is consistent with the Kansas Municipal Water Conservation Plan Guidelines. (*Compare* Ex. 817 (2007 Kansas Municipal Water Conservation Plan Guidelines) *with* Ex. 1-52 beginning at Cities 0002859; Crispin Test., Tr. Vol. 3 at 640:3–11.)

136. Hays' Water Conservation Plan has been approved by the Kansas Water Office. (Crispin Test., Tr. Vol. 3 at 640:12–14.)

137. Hays is in full compliance with its water conservation program. (*Compare* Ex. 817 *with* Ex. 1-52 at Cities 0002861–62.)

2. *Russell's Water Conservation Plan.*

138. Russell implemented its conservation plan, which was approved by the Kansas Water Office, in 1997. (*See* Ex. 1-68 (Russell's Water Conservation Plan); Ex. 940 at Cities 0029370-90; *id.* at Cities 0029369; *id.* at Cities 0029274–88; *id.* at Cities 0029269; Ex. 1-68 at Cities 0003183-98. *See also*, Ex. 1-71 (Russell's 5/16/19 Water Rate Ordinance) and Ex. 1-72 (Russell's 5/16/19 Water Conservation Ordinance); Quinday Test., Tr. Vol. 2 at 496:10–23; 496:24–497:15.)

139. Russell frequently updates its Water Conservation Plan, the most current of which is dated November 15, 2022. (Ex. 2653; Quinday Test., Tr. Vol. 2 at 496:10–23.)

140. Each time Russell substantively updates its Water Conservation Plan, it sends a copy to DWR and is in compliance with guidelines developed and maintained by the Kansas Water Office. (Quinday Test., Tr. Vol. 2 at 497:1–8.)

141. Russell is in full compliance with its water conservation program, which has been approved by the Kansas Water Office. (Quinday Test., Tr. Vol. 2 at 496:24–497:19.)

B. The conservation plans adopted and implemented by the Cities are effective.

142. DWR witness, Lane Letourneau, testified that, even before the hearing began, he was familiar with the conservation efforts that both Cities have undertaken and

that "'they're both looked up to, I'll say, as examples for conservation in cities." (Letourneau Test., Tr. Vol. 4 at 888:19–889:2.)

1. City of Hays

143. Hays' Drought Response Plan is codified in City ordinances and, consistent with its AHI Tool, includes normal operations and three drought stages: (1) Water Watch, (2) Water Warning, and (3) Water Emergency. (Ex. 1-52 at Cities 0002870); Ex. 820.)

144. Hays' determination of the conservation stage applicable to the existing conditions of its water sources depends on a variety of factors, including the applicable water-stage category as provided by the City's AHI Tool, discussed in Section II.D.2. (Ex. 2625 at Cities 0098124; Crispin Test., Tr. Vol. 3 at 628:6–20.)

145. The management and regulatory actions applicable to each successive drought stage are described in the City's Drought Response Plan and include increasing levels of mandatory conservation and education interventions. (Ex. 1-52 at Cities 0002871 (Stage 1 – Water Watch), Cities 0002872–73 (Stage 2 – Water Warning), Cities 0002874–75 (Stage 3 – Water Emergency); Crispin Test., Tr. Vol. 3 at 629:14–630:18.)

146. These conservation measures include locking of irrigation meters, prohibition on water in swimming pools (private and municipal), prohibition on all outdoor watering, and others. (Ex. 1-52 at Cities 0002872–75.)

147. Hays has adopted numerous regulations that encourage effective conservation measures by its residents such as limitations on the amount of cool-season

turf that can be installed, thereby limiting irrigated area, and prohibitions on overhead spray irrigation within 5 feet of a hard surface. (Dougherty Test., Tr. Vol. 1 at 163:2–20.)

148. Hays limits outdoor during the summer months, prohibiting it between noon and 7:00 p.m. from June 1 to September 30. (Dougherty Test., Tr. Vol. 1 at 164:12–19.)

149. Hays also regulates water use from private domestic wells in the same way as from the City's distribution system during times of drought. (Dougherty Test., Tr. Vol. 1 at 163:21–164:5. *See* the discussion of the Hays IGUCA in appendix D.)

150. During the hearing, Hays presented testimony from its Water Conservation Specialist, Holly Dickman relating to the City's conservation efforts and the impacts of same. (*See* Dickman Test., Tr. Vol. 4 beginning at 760.)

151. Hays was the first city in Kansas to hire a water conservation specialist and to implement the green plumbing code. (Dougherty Test., Tr. Vol. 1 at 168:15–23.) Hays has had a Water Conservation Specialist on staff since approximately 2012. (Dickman Test., Tr. Vol. 4 at 763:11–20.)

152. Water conservation is not a "silo" within the City's administration efforts; it is stressed throughout the entire water resources department "whether it's out in the field and we have a water main break and we need to get to that quickly so we're not wasting water." (Crispin Test., Tr. Vol. 3 at 623:2–10.) Water conservation is emphasized "citywide .... We live it." (*Id.* at 623:22–25.)

153. As Water Conservation Specialist, Ms. Dickman's responsibilities include the Cities' conservation rebate programs, education and outreach programs, and marketing the Cities' conservation program to its residents. (Dickman Test., Tr. Vol. 4 at 761:1–11.)

154. Exhibit 933 is a YouTube video of Ms. Dickman's annual presentation to the Hays City Commission given on February 27, 2020, which was shown during the hearing and incorporated into the transcript of Ms. Dickman's testimony, which Ms. Dickman affirmed was accurate. (Dickman Test., Tr. Vol. 4 beginning at 765:2–766:18.)

155. The City has numerous rebate programs to encourage and enhance conservation, including:

- Toilet rebate programs for installing low-flow toilets saving approximately 8.3 acre-feet of water per year. (Dickman Test., Tr. Vol. 4 at 768:5–22.)
- Washing machine rebate program, saving about 2.8 acre-feet per year. (Dickman Test., Tr. Vol. 4 at 770:17–771:2.)
- Lawn turf conversions, accounting for more than 41,000 square feet converted in 2019. (Dickman Test., Tr. Vol. 4 at771:19–774:9.)
- Showerhead replacement program, saving approximately 4.9 acre-feet per year. (Dickman Test., Tr. Vol. 4 at 774:10–19.)

(*See also generally* Ex. 1-52 at Cities 0002867–69 (City ordinances relating to the various conservation programs).)

156. The City invests significant time and resources working with Hays residents on conservation education and outreach initiatives, including: displays, press briefings and news releases (1,116,164 impressions and 461 clicks), letters to contractors,

radio (5,355 spots), T.V. ads (7,000 spots), social media (476,728 impressions with 5,247 clicks), informational booths at events, school programs, water festivals, the City's annual water poster contest, the City's website, "WaterSmart Wally," parade participation, local committee involvement, speaking engagements, World Water Day Fun Fest, demonstration plots, WaterSmart Landscape Awards, and partnership projects. (Dickman Test., Tr. Vol. 4 at 774:20–775:1; Ex. 933 at 7 minutes, 32 seconds.)

157. The City's residents interact at a high level with the City's conservation efforts; for example, the water conservation page on the City's website is among the top 10 highest pages accessed by visitors. (*See, e.g.*, Dickman Test., Tr. Vol. 4 at 775:2–11; 777:18–778:1 (noting that "almost 300 people attended the City's "World Water Day Fun Fest"); 778:2–14 (noting that the Fun Fest would not be possible "without community partners, ... the environmental office, master gardeners, and others in the community helped with ... this event"); 778:14–23 (noting that "a lot of people" visited the water booth at Fort Hays Ag Day and "just trying to be, again, where people are and talking about anything water conservation related"); 778:24–779:6 (Spring Art Walk was "another highly attended event.")

158. Ms. Dickman testified at length about the City's efforts to inform its residents, schools, and businesses, about the importance of water conservation. (Dickman Test., Tr. Vol. 4 at 776:14–777:17.)

159. The City's efforts focus on water conservation education of schoolchildren with, for example, "WaterSmart Wally," who is a volunteer that dresses up as a "big blue water drop" and "kids are always very excited to see him and take pictures with him. So, yeah, he's a big hit." (Dickman Test., Tr. Vol. 4 at 779:9–780:5; 785:25–15 (WaterSmart Wally is "hugely popular" with kids); 787:1–788:18 (discussing outreach to middle school children and noting that the City handed out more than 1,800 toilet dye tabs at schools for testing for toilet leaks at home.)

160. Ms. Dickman testified that the City's conservation efforts have increased since 2019. (Dickman Test., Tr. Vol. 4 at 791:25–792:7.)

161. In 2023 alone, Ms. Dickman gave more than 20 presentations to middle school and grade school students in Hays. (Dickman Test., Tr. Vol. 4 at 793:15–23.)

162. The Cities' water conservation poster contest, which is an annual event involving pre-school all the way to adult participants, with over 629 posters entered into the contest in 2023 with cash prizes from $50–$250 for winning entrants presented at an awards ceremony at the City's Art Walk event. (Dickman Test., Tr. Vol. 4 at 794:25–800:4.)

163. Exhibit 2690 includes each of the winning posters from the Poster Contest across the age groups. (Dickman Test., Tr. Vol. 4 at 794:25–798:1.)

164. The City's water conservation program is enforced; there are "water restrictions every summer" from June 1 to September 30, which "is enforced by the Hays Police Department." (Dickman Test., Tr. Vol. 4 at 802:4–9.)

165. Lifetime Hays resident Doug Williams testified that he has personally received calls from Hays' water utility department advising that water use for one or more of his properties is high during a given month. (Williams Test., Tr. Vol. 2 at 395:20–397:12.)

166. "[T]he City of Hays has a[n] ordinance prohibiting the wasting of water, and so if you had a ... misadjusted sprinkler head that was watering the street or if the lawn vegetation you were watering was overly saturated and what you were putting down was running onto the street, you can actually receive a ticket for that." (Dougherty Test., Tr. Vol. 1 at 160:24–161:7.)

167. Violations of Hays' water conservation measures can result in tickets issued by the police department and applies to both residential and commercial customers. (*See* Crispin Test., Tr. Vol. 3 at 616:13–618:13.)

168. Hays reuses effluent water from its wastewater treatment plant to irrigate ballfields, sports complexes, parks, and golf courses, utilizing up to 35% of total produced effluent. (Dougherty Test., Tr. Vol. 1 at 129:17–131:9.)

169. The green plumbing code ensures that new constructions in the City "are designed for efficient water use, both indoor use and irrigation systems used outdoors." (Dougherty Test., Tr. Vol. 1 at 168:25–169:4.)

170. Water conservation has become "a way of life" in Hays; "if you are born and raised there, you've lived there for many many years, you are accustomed to shutting the water off when you're brushing your teeth and thinking about those things, not taking long showers, trying to keep things as efficient as possible." (Dickman Test., Tr. Vol. 4 at 801:2–23.)

171. The Presiding Officer finds, and it is uncontroverted, that the conservation program implemented by the City of Hays is highly effective.

2. City of Russell

172. Russell's Water Conservation Plan is expansive and includes a specific intent to "reduce overall demand for water, diminish water usage at peak demand time, improve efficiency in water use, and reduce water losses." (Ex. 2653 at Cities 0103167.)

173. Russell has incorporated multiple education outreach initiatives into its Water Conservation Plan to improve water-use efficiency, including publication of use per billing period and conservation tips on bills; radio, media publications, and community events focused on conservation practices; classroom lectures and incentives for school children to conduct water-leak tests at home; and water conservation and xeriscaping classes targeted by May 2024. (Ex. 2653 at Cities 0103167–68.)

174. Russell has also implemented numerous management practices to improve conservation and water-use efficiency, including:

- 24-hour time limit for repairing or replacing water meters on raw water intakes with periodic testing and accuracy requirements;
- Monthly review of all management practices and leak detection and repair requirements;
- Regular replacement of meters at individual service connections;
- Random sampling of residential meters for accuracy and repair/replacement requirements for deviations in excess of 2%;
- Water conservation rebate program for high-efficiency/low-flow toilets;
- Free low-flow shower head program; and
- Implementation of automated water meter read system to improve efficiency and accountability.

(Ex. 2653 at Cities 0103167–68.)

175. Like Hays, Russell's Drought Response Plan is incorporated into its Water Conservation Plan; it includes normal operations and three drought stages: (1) Water

Watch, (2) Water Warning, and (3) Water Emergency. (Ex. 2653 beginning at Cities 0103164.)

176. The management and regulatory actions applicable to each successive drought stage are described in the City's Drought Response Plan and include increasing levels of mandatory conservation and education interventions. (Ex. 1-52 at Cities 0002871 (Stage 1 – Water Watch), Cities 0002872–73 (Stage 2 – Water Warning), Cities 0002874–75 (Stage 3 – Water Emergency); Crispin Test., Tr. Vol. 3 at 629:14–630:18.)

177. These measures include:

- News releases to local and social media describing conditions and the water-supply outlook;
- Expedited repair of water leaks;
- Restrictions on outdoor watering for customers—both residential and industrial;
- Reduction and/or elimination of street cleaning and outdoor use of water by the City;
- Restrictions or prohibitions on washing vehicles or buildings;
- Mandatory reduction of water consumption by industrial users;
- Prohibitions on filling of residential swimming pools;

(Ex. 2653 at Cities 0103169–73.)

178. The Presiding Officer finds, and it is uncontroverted, that the conservation program implemented by the City of Russell is highly effective.

C. No person or entity protesting or potentially affected by the water transfer has adopted any formal conservation plans. (K.S.A. 82a-1502(c)(8).)

179. There is no evidence that any person or entity opposed to or affected by the water transfer has adopted a formal conservation plan.

180. In contrast to the Cities' voluntary TYRA Limitation reduction, during cross-examination by counsel for Water PACK, Mr. Letourneau stated: "And I know that absolutely no one out there has done a voluntary reduction in any type of water use." (Letourneau Test., Tr. Vol. 4 at 1009:3–5.)

181. Mr. Wenstrom confirmed that neither he, nor any other water user within 3 miles of the R9 Ranch has voluntarily reduced their water use like the Cities have. (Wenstrom Test., Tr. Vol. 8 at 1418:9–21.)

182. To the contrary, during times of ample rainfall, Mr. Wenstrom and others use the GMD5 "water banking" system by "depositing" unused water to be withdrawn in later years. This allows Water PACK members to withdraw and divert water over-and-above their permitted quantities, further depleting the aquifer when it is at its most vulnerable. (*See, e.g.*, Ex. 2683 (2022 Term permit issued in response to Mr. Wenstrom's application to withdraw "water bank safety deposit credits.").)

183. Despite this system, Mr. Wenstrom still overpumped his water rights in 2022. (Ex. 2683 at Cities 0103398–99.)

184. The Presiding Officer finds that no person or entity protesting or potentially affected by the water transfer has adopted a formal conservation plan and that Water PACK presented no credible testimony that any irrigator in the area near the R9 Ranch is conserving water.

IV. RATE STRUCTURE – The Cities' rate structures encourage the efficient use of water and will continue to result in wise use and responsible conservation and management of water used within the Cities' public water supply systems, meeting the requirements of K.S.A. 82a-1502(b)(2)(C).

A. City of Hays

185. Hays' water rate structure is codified in section 65-224 of its regulations. (Ex. 1762; Crispin Test., Tr. Vol. 3 at 633:3–16.)

186. To encourage the efficient use of water, the City's water rates include several tiers of escalating charges applicable to different customer classes; as the tiers increase, and after a customer uses the 500 cubic feet that makes up the "base rate," the price per 100 cubic feet of water begins to increase. (Ex. 1762 at Cities 0072736. Crispin Test., Tr. Vol. 3 at 634:3–635:2)

187. When a customer's water use exceeds the average quantity for a given customer class, the increasing charges applicable to the escalating water tiers are triggered; the more a customer exceeds the average, the more that customer must pay for water per 100 cubic feet. Consequently, even during times of normal or above-average precipitation, the City's water-rate structure encourages the efficient use of water. (*Id.* at Cities 0072735. Crispin Test., Tr. Vol. 3 at 637:4–638:3.)

188. In times of drought, the "Conservation tier 2—Water warning or water emergency" rate is triggered, which increases rates over the base tier by 453% for residential customers and 347% for businesses and multi-family dwellings. (Ex. 1762 at Cities 0072736. *See also* Dougherty Test., Tr. Vol. 1 at 162:6–13; Crispin Test., Tr. Vol. 3 at 638:4–13.)

189. As a result of Hays' escalating tier structure, there are residents of Hays who "pay over $1,000 a month for their water bill because they choose to put some water down on their lawn in the summertime." (Dougherty Test., Tr. Vol. 1 at 162:1–3.)

190. The Presiding Officer finds, and it is uncontroverted that, Hays' water rate structure encourages the efficient use of water and will continue to result in wise use and responsible conservation and management of water used within the City's public water supply system.

B. City of Russell

191. The City of Russell has adopted an ordinance with water rate schedules for residential, commercial, and industrial customers, which is codified in Russell's regulations at Article 2, Section 15-201, *et seq*. (Quinday Test., Tr. Vol. 2 at 497:23–499:21; Ex. 1-71.)

192. Russell's water rate structure is similar to Hays'. To encourage the efficient use of water, the City's water rates include several tiers of escalating charges applicable

to different customer classes. After a customer uses 3,000 gallons, which is included in the "base rate," rates escalate as water use increases. (Ex. 1-71 at Cities 0003257–61.)

193. Consequently, even during times of normal or above-average precipitation, the City's water-rate structure encourages the efficient use of water. (*Id.*)

194. The Presiding Officer finds, and it is uncontroverted that, Russell's water rate structure encourages the efficient use of water and will continue to result in wise use and responsible conservation and management of water used within the City's public water supply system.

V. PAST AND FUTURE DROUGHTS – The Cities introduced substantial competent evidence that droughts of great intensity and significant duration have frequently occurred in the area of the Cities and that the prospect of future drought is increasing.

195. One of the guiding principles of the 2021 Kansas Water Plan states: "Effective water planning must account for the occurrence of extreme events, such as drought …. As already evident from climate change, these events are becoming more intense and less predictable." (Ex. 823 at Cities 0021973.)

A. The instrumental record shows that severe multi-year drought occurs frequently in the Smoky Hill Watershed—the area on which the Cities' existing water supplies are directly reliant.

196. The Cities presented testimony from Dr. Anthony L. Layzell, an Assistant Scientist with the Kansas Geological Survey at the University of Kansas, whose specialties include fundamental and applied research in Quaternary geology and

chronostratigraphy and paleoclimatology of Cenozoic deposits in Kansas. (Ex. 2826 Cities 0103616:10–17; Cities 0103622–39.)

197. Dr. Layzell's curriculum vitae is attached as Exhibit "ALL-01" to his Direct Testimony, and the Presiding Officer finds that he is eminently qualified to opine on the frequency, duration, intensity, and prospect of drought as set forth in his testimony and exhibits attached thereto. (Ex. 2826.)

198. Dr. Layzell testified that droughts of extended duration and significant intensity have occurred regularly in the Smoky Hill Watershed within the timeframe encompassing the instrumental record, roughly spanning 1895 through the present time. (Ex. 2826 at Cities 0103618; 0103647–48.)

199. Dr. Layzell testified that the Palmer Drought Severity Index ("PDSI") values calculated from available instrumental data "provide a valuable means to assess drought variability over the instrumental record." (Ex. 2826 at Cities 0103641.)

200. The Palmer Drought Severity Index (PDSI) is one of the most widely used indices in North America to measure the severity of drought occurrence for a specified period. (Ex. 2679 at Cities 0103618:6–8.)

201. Exhibit 2665 shows the various categories of drought used under the PDSI and the associated impacts of those drought categories in Kansas.

202. Exhibit 2679 is a series of plots showing the occurrence and intensity of droughts that have occurred in Kansas within the instrumental record from 1910–2023 based on PDSI values. (Ex. 2679 at Cities 0103343–47.)

203. The instrumental drought record as reflected in Exhibit 2679 was uncontroverted at the hearing.

204. Exhibit 2679 shows that Kansas has experienced numerous droughts, many of which are categorized as "severe," "extreme," or "exceptional" beginning in 1910 and extending through the present time.

205. For example, Kansas was in a severe drought beginning in about 1952 and extending through 1958, and the large majority of that time consisted of the most severe, "exceptional," drought category. (Ex. 2679 at Cities 0103345.)

206. There was a drought of slightly less intensity—but even greater duration—during the "dust bowl," spanning from about 1929 through 1942, which included only a brief window of recovery in about 1938, before returning to exceptional and extreme drought from approximately 1939 through 1942. (Ex. 2679 at Cities 0103344.)

207. Exhibit 2646 shows a partial summary by the U.S. Geological Survey of significant droughts in Kansas from 1929 through about 2000.

208. Exhibit 755 is a 2008 article published by the U.S. Geological Survey addressing hydrologic droughts in Kansas, which notes that streamflow levels in parts of Kansas from October 1, 1999, through September 30, 2006, "were lower than those during

historic droughts of the 1930s and 1950s, even though the precipitation deficit was not as severe." (Cities 0020660.)

209. No party controverted any of the facts contained in this Section V.A at the hearing.

210. The Presiding Officer finds that the Cities presented substantial competent uncontroverted evidence relating to the occurrence, frequency, duration, and intensity of droughts reflected in the instrumental record and adopts and incorporates such evidence as factual in this proceeding.

B. The paleo record shows that extended-duration droughts have occurred frequently in the past in the area of the Cities and the Smoky Hill Watershed.

211. Dr. Layzell also provided direct testimony titled "Kansas Droughts: Climatic Trends Over the Past 1,000 Years" as well as associated exhibits. (Ex. 2826.)

212. As stated above, Dr. Layzell's testimony established the importance and relevance of using PDSI values to assess drought variability over the instrumental record; however, the central focus of Dr. Layzell's testimony related to the calculation of PDSI values through the study of tree rings, sediments, and other proxies to reconstruct "paleoclimates" (past climates dating back thousands of years). (Ex. 2826 at Cities 0103618:6–12.)

213. Through studying paleoclimatic records, Dr. Layzell was able to "assess the full range of drought variability by utilizing data that span longer periods of time" than the instrumental record. (Ex. 2826 at Cities 0103642.)

214. For example, Dr. Layzell testified that annual growth rings in preserved wood are used to reconstruct climatic patterns, which allows for a determination of the exact calendar year a tree ring was formed "by crossdating, a technique that statistically matches the patterns in tree-ring characteristics among several living or dead trees in a region." (Ex. 2826 at Cities 0103618:13–19.)

215. Dr. Layzell utilized the collected data specific to Kansas, which are available as far back as 837 A.D. in western Kansas, and the whole State to 1,000 A.D., to calculate the durations of drought episodes in the State. (Ex. 2826 at Cities 0103619:4–5.)

216. Dr. Layzell included several figures in his testimony illustrating the frequency and duration of drought in pertinent areas of Kansas, including for: northcentral Kansas (Exhibit 2826 at Cities 0103651 (light-gray bars indicate droughts of similar duration to the 1930s and 1950s droughts; dark-gray bars indicate droughts of greater duration)); northwestern Kansas (Ex. 2826 at Cities 0103649); and southwestern Kansas (Ex. 2826 at Cities 0103650).

217. Dr. Layzell further concluded that "droughts of longer duration than the Dust Bowl and 1950s droughts in Kansas have occurred on multiple occasions over the past 1,000 years, including several droughts of 50+ years and one drought lasting for 110

years. These droughts of unusually long duration are commonly referred to as 'megadroughts,' generally considered to be a drought lasting 20 years or more." (Ex. 2826 at Cities 0103620:1–5. *See also* Ex. 759 (Ault, et al., *Relative impacts of mitigation, temperature, and precipitation on 21st-century megadrought risk in the American Southwest*, Science Advances, Oct. 5, 2016).)

218. Based on his analysis of historical droughts as evidenced in the paleo record, Dr. Layzell concluded that it is likely a drought as severe as the Dust Bowl drought will occur in Kansas 3 to 4 times a century and there is an 80% chance that a decadal-length drought will occur within any 40-year period in western Kansas. (Ex. 2826 at Cities 0103654. *See also* Cities 0103649 ("[W]e should expect decadal droughts on average two times a century in western Kansas ….").

219. No party presented rebuttal expert testimony controverting or challenging Dr. Layzell's opinions or methodology about the occurrence and duration of drought in the paleoclimatic record or his conclusions about the prospect of future drought.

220. The Presiding Officer finds that the Cities presented substantial uncontroverted competent evidence about the occurrence, frequency, duration, and intensity of droughts reflected in the paleo record as well as the prospect of future drought based on Dr. Layzell's evaluation of the paleo record and adopts and incorporates such evidence as factual in this proceeding.

221. The Presiding Officer further finds that it is reasonable for cities to make water supply and planning decisions and investments based on the best scientific evidence available, and the Presiding Officer finds that Dr. Layzell's analysis and conclusions about droughts in the paleo record and how those historical droughts relate to and inform the Cities' understanding of the risk of future drought is reliable and reasonable.

C. Climate models show that the risk of multi-year and mega-droughts are dramatically increasing in the Smoky Hill Watershed, which present existential risk to the Cities if the Water Transfer is denied.

222. The Cities provided direct testimony and an associated report with exhibits from climatologist Dr. Jeffrey Basara relating to the increased likelihood of future drought in and around the Cities that will directly and materially impact their existing water supplies in the event the water transfer is denied. (*See generally* Ex. 2822 (Direct testimony of Dr. Basara and associated exhibits).)

223. With over 20 years of professional experience working on weather-climate research and education, Dr. Basara was an Associate Professor at the University of Oklahoma with a joint appointment between the School of Meteorology (SoM) and the School of Civil Engineering and Environmental Science (CEES).[2] He also served as the

[2] Since providing his testimony at the Water Transfer Hearing, Dr. Basara has accepted a position as Chair of the Meteorology & Atmospheric Science Department at the University of Massachusetts.

Executive Associate Director for the Hydrology and Water Security (HWS) Program at the University of Oklahoma. Dr. Basara holds a Bachelor of Science degree in Atmospheric Science from Purdue University and M.S. and Ph.D. degrees in Meteorology from the University of Oklahoma. He joined the Oklahoma Climatological Survey (OCS) as a Research Scientist in 2001 and served as the Director of Research from 2002–2018. He served as adjunct faculty in the School of Meteorology (SoM) at the University of Oklahoma from 2010–2011 before joining as regular faculty in the SoM in 2012 and CEES in 2018. (Ex. 2822 at Cities 0103401:3–0103401:3.)

224. Dr. Basara's curriculum vitae is attached as Appendix E to his Direct Testimony, and the Presiding Officer finds that he is eminently qualified to opine on the frequency, duration, intensity, and prospect of future drought as set forth in his testimony and exhibits attached thereto.

225. Dr. Basara's testimony related to the impact that drought as "an ever-present risk in the Smoky Hill Watershed and climate change has had and will continue to have on the hydroclimate of the Great Plains and especially in the Smoky Hill Watershed ("SHW") and, in particular, (1) the likelihood of increased drought conditions over the next 25 to 100 years for the Cities, and (2) the associated impacts to water sources that supply those areas." (Ex. 2822 at Cities 0103402:17–23.)

226. Dr. Basara's conclusions are set forth in detail in his expert report (Ex. 2822 at Cities 0103409–86), including, in general that "the climatological record demonstrates

consistent, regular, and recent high-impact and multiyear drought events for the area [of the SHW] including droughts in the 1930s, 1950s, and 2011–2012." (Ex. 2822 at Cities 0103403:1–5.)

227. "Perhaps more importantly, the state of the science demonstrates that the risk of multiyear (i.e., two-year, five-year, decadal or multi-decadal droughts) will increase significantly for the area over the next 25 to 100 years. More specifically, the evolution of the hydroclimate into the future poses a significant risk to water resources across the SHW domain, and for the citizens of Hays and Russell, KS." (Ex. 2822 at Cities 0103403:6–10.)

228. Dr. Basara further concluded that:

- "Drought occurrence at multiple temporal scales will continue within the hydroclimate of the SHW region including multidecadal 'megadroughts,' decadal, annual, subseasonal to seasonal, and flash droughts. All scales of drought should be planned for." (Ex. 2822 at Cities 0103403:13–16.)
- "An increase in seasonal, annual, and interannual drought intensities with a 4–8 mm/month (0.16-0.32 inches/month) reduction in precipitation and an 8–16% increase in consecutive dry days from mid-century through 2100. Such increased precipitation deficits will yield an additional water loss of approximately 6.8–13.6 billion gallons per month across the SHW during drought events." (Ex. 2822 at Cities 0103403:17–21.)
- "In addition, an 8–16% increase in consecutive dry days from mid-century through 2100 is projected to occur with increased precipitation deficits of 1–3 inches of rainfall during the summer and reduced water input of approximately 42–126 billion gallons across the SHW. Such water losses represent a total (input) water loss from the system that cannot be gained back until sufficient, excessive precipitation occurs. As a result, such reductions of precipitation will have both direct and indirect impacts on the

municipalities of Hays and Russell." (Ex. 2822 at Cities 0103403:21–0103404:3.)

- "A significant increase in decadal and multi-decadal drought risk of 35–60% and 60–85%, respectively. Using the Dust Bowl as a proxy, a decadal drought in the future would lead to water loss from the SHW of approximately 2 trillion gallons, and if the intensity were more consistent with the drought of the 1950's, a decadal drought could yield water losses in excess of 3 trillion gallons." (Ex. 2822 at Cities 0103404:4–8.)

- "Further, given the increased risk of multidecadal megadrought in the region. It is likely, that by 2100, a megadrought in the Great Plains could yield water loss values in the SHW ranging between 5–10 trillion gallons or more with associated historic and devastating impacts to water resources." (Ex. 2822 at Cities 0103404:8–12.)

- "The timing of subseasonal to seasonal drought is critically important. Flash drought events are more likely in an environment with increased evaporative stress (i.e., warmer temperatures and reduced soil moisture)." (Ex. 2822 at Cities 0103404:13–15.)

- "As evidenced by the 1980 and 2012 events, seasonal events that occur during the climatological peak of precipitation can yield significant water losses (300 billion gallons or more across the SHW) and impacts to water resources due to intensity and timing." (Ex. 2822 at Cities 0103404:15–18.)

- "Scenarios that incorporate the eastward shift of the precipitation/aridity boundary along and adjacent to the 100th Meridian. This should include planning for potential decreases in total annual precipitation of 10% or more, which corresponds to 2.4 inches for Hays, KS and 2.6 inches for Russell, KS." (Ex. 2822 at Cities 0103404:19–22.)

- "Such deficits in annual precipitation at 10% will yield a reduction of approximately 175 billion gallons of water annually across the combined SHW and SHW Headwaters per year." (Ex. 2822 at Cities 0103404:22–24.)

- "An extension of the growing season by 2–4 weeks. This extended period will drive increased water stress due to increased temperatures and evaporation over a larger annual window." (Ex. 2822 at Cities 0103405:1–3.)

- "Reduced soil moisture from the current climatology (e.g., 10-20%). Increased aridity and reduced precipitation will contribute to reductions of soil moisture on an annual scale and periods of enhanced and prolonged soil dryness especially at subseasonal to seasonal periods." (Ex. 2822 at Cities 0103405:7–10.)

- "A reduction of average monthly streamflow of 0–60%. At the annual scale, total streamflow reductions will decrease to approximately 50% by 2100 with individual years reaching 100% reductions during drought periods. The impacts of input water loss at all temporal scales and intensities of drought noted in this report, combined with changing environmental conditions due to climate change in the region, will strongly and negatively impact streamflow." (Ex. 2822 at Cities 0103405:11–16.)

- "As such, it is likely that overall streamflow will decrease throughout the SHW with extended periods at or below historic minimum values. At the same time, because the variability of precipitation is increasing, excessive precipitation will likely occur at shorter temporal scales causing significant runoff and enhanced erosion when the events occur." (Ex. 2822 at Cities 0103405:16–20.)

- "Elevated temperatures across the region due to drought and increasing aridity will increase evaporation and transpiration and decrease soil moisture. This will not only impact the SHW but also upstream regions, including the Cedar Bluff Reservoir. As such, less available water in the SHW will occur due to these impacts and should be planned for accordingly." (Ex. 2822 at Cities 0103405:23–0103406:2.)

- "The socioeconomic impacts of (A) drought, (B) increasing aridity, and (C) the combined effects of A-B will extend to the communities of Hays, KS, Russell, KS, and across the SHW. As such, local businesses reliant on available water, including agriculture and recreation, will be significantly impacted in the absence of mitigation efforts." (Ex. 2822 at Cities 0103406:3–7.)

229. In summary, Dr. Basara presented extensive competent evidence demonstrating that the effects of climate change will result in significantly increased risk that the Cities of Hays and Russell will experience droughts of increasing frequency, duration, and intensity as compared to the droughts reflected in the instrumental record.

230. No party presented a climatologist expert responding to or opining on the opinions and methodology of Dr. Basara.

231. It is reasonable for cities to make water supply and planning decisions and investments based on the best scientific evidence available, and the Presiding Officer finds that Dr. Basara's analysis and conclusions about the prospects of future drought based on climate modeling by the Cities for purposes of water supply planning are reliable and reasonable.

232. The Presiding Officer finds that the Cities presented uncontroverted substantial competent evidence about the occurrence, frequency, duration, and intensity of droughts due to climate change as set forth in the testimony and report of Dr. Basara and adopts and incorporates such evidence as factual in this proceeding.

VI. The evidence shows that all of the statutory factors in K.S.A. 82a-1502(c) weigh in favor of approving the water transfer.

233. The WTA includes a number of factors that must be considered when evaluating the Cities' Water Transfer Application. This Section, as well as the Sections relating to the Cities' conservation and water rate structures above, include the Presiding Officer's discussion of each of those factors and the respective findings of fact related to each.

234. As a preliminary matter, the evidence shows that all of the statutory factors for evaluating the statewide benefits comparison of the proposed water transfer weigh in favor of approving the Cities' application. (K.S.A. 82a-1502(c).)

VII. The economic, environmental, public health and welfare, and other impacts of approving or denying the transfer. (K.S.A. 82a-1502(c)(3).)

A. ECONOMIC IMPACTS: HAYS – The City of Hays is vital to the regional economy of north central and western Kansas as well as the State as a whole.

235. The City of Hays is a city of the second class, with a growing population of approximately 22,000 residents. (Dougherty Test., Tr. Vol. 1 at 76:24–77:25.)

236. Hays is the regional economic hub of northwest Kansas, home to Fort Hays State University, Hays Medical Center, and myriad retail, dining, and medical services. (Dougherty Test., Tr. Vol. 1 at 78:5–16.)

237. Mr. Dougherty testified that "[t]he statewide impact of approval [of the water transfer] is maintaining the health of a $2 billion regional economy.... [E]very dollar of sales tax and income tax and commerce that's generated in the Cities of Hays and Russell benefits the State of Kansas." (Dougherty Test., Tr. Vol. 1 at 206:5–11.)

238. Approval of the water transfer will allow the Cities' $2 billion regional economy to "grow in an unfettered manner, without the cloud of a lack of available water over our heads. That's something unmeasurable ... [but] it's real and I think it's a benefit to the State of Kansas." Mr. Dougherty went on to testify that "The statewide impact of approval [of the water transfer] is maintaining the health of a $2 billion regional economy.... [E]very dollar of sales tax and income tax and commerce that's generated in the Cities of Hays and Russell benefits the State of Kansas." (Dougherty Test., Tr. Vol. 1 at 206:5–207:6. *See also* Ex. 1-42 (list of publicly owned and leased property in Ellis County,

showing $237,172,060.00 total appraised value); Ex. 1-44 (list of publicly owned and leased property in Russell County, showing $49,812,310 total appraised value); Ex. 1-45 (Docking Institute Report, Economic Impact of the Hays and Russell Region on the Kansas Economy (2014)); Ex. 1-46 (Docking Institute Report, Estimation of Average Daily Population and Peak Population Levels During Special Events in Hays, Kansas (2010)); Ex. 1-51 (Docking Institute, The Value of Ogallala Aquifer Water in Southwest Kansas, at PDF p. 4 (2001).)

239. As stated in the 2006 order expanding the Smoky Hill River wellfield, and as reiterated during the hearing, Hays "believes that an actual shortage of water, as well as a perception of a water shortage, has stymied economic development." (Ex. 1-100 at Cities 0004737; Dougherty Test., Tr. Vol. 1 at 164:25–165:12.)

240. The Cities presented testimony from Hays resident, Doug Williams, to testify about Hays' role in the region and State, and the impacts that the City's inadequate water supplies have on day-to-day life. (Williams Test., beginning at Tr. Vol. 2 at 383:10.) Mr. Williams has continuously lived in Hays since about 1960. (Williams Test., Tr. Vol. 2 at 387: 14–15.)

241. Since 2019, Mr. Williams has been the Executive Director of "Grow Hays," which is the "economic development organization for Ellis County … charged with promoting the economic development within the county." (Williams Test., Tr. Vol. 2 at

385:2–5.) Prior to that, Mr. Williams was a real estate broker in Hays "for many years" since 1977. (Williams Test., Tr. Vol. 2 at 384:1–15.)

242. As part of his role as a realtor and with Grow Hays, Mr. Williams works with existing and prospective businesses who are considering locating in Hays and Ellis County. (Williams Test., Tr. Vol. 2 at 385:14–24.)

243. On numerous occasions, Mr. Williams has educated businesses and individuals considering relocating to Hays about the significant conservation measures required by the City of its residents "to make sure they understand that it's a different set of rules in our community and that … we take conservation very seriously in Hays and in our county as a whole" while at the same time trying to put a "positive spin" to both promote the community and, at the same time, make sure "they understand there are rules they have to follow." (Williams Test., Tr. Vol. 2 at 393:1–395:19.)

244. Hays' lack of water has resulted in lost and inhibited commercial opportunities available to the City and stunted Hays' population growth. (Williams Test., Tr. Vol. 2 at 407:2–408:25.)

245. Mr. Williams also testified about the conditions and resulting attitudes of Hays residents during the 2011–2013 drought: "[I]t was pretty challenging, lots of dead yards, lots of heat." "And there are times when you think how bad could it really get? You know, they're putting out announcements about how bad the wellfield down in the Smoky is and that it continues to drop, and you wonder, is there going to come a time

when I turn on the spigot and nothing comes out?" (Williams Test., Tr. Vol. 2 at 410:11–411:6.)

246. Obtaining water from the R9 Ranch would be "a game changer for our community. I think it opens up all kinds of opportunities for our community for next 50 to 100 years." (Williams Test., Tr. Vol. 2 at 411:15–412:2.)

247. Obtaining an adequate water supply for Hays is "absolutely" an existential issue for the City: "water is basically the lifeblood of the community and existential in keeping that community, it's pretty hard to put a value on that. But it—it's just very, very high." (Williams Test., Tr. Vol. 2 at 413:17–20; 415:3–7.)

248. Hays is critical to northcentral and western Kansas, including Hays Medical Center, Hays' consistently high trade pull factor ranking in Kansas, and Fort Hays State University, noting that "Hays is very important to the region, and people count on Hays for medical care, they count on Hays for—education, for shopping, and those type of things. And so it's important to everybody in western Kansas that—that we are successful and that we have sufficient water to make sure we are successful." (Williams Test., Tr. Vol. 2 at 416:18–417:24.

249. Lane Letourneau concurred that the Cities are extremely important to not only northcentral Kansas, but to the entire State:

> Q. Are you aware of any other impacts, I mean, the statute says that -- that the hearing officer and the panel must consider a wide range of things and then there's a list, but are you aware of any other issues or concerns,

positive or negative, that have any -- that bear on whether or not the transfer should be approved?

A. I'm not aware.

Q. Of any negative -- are you aware -- we've talked about a lot of factors here.

A. Right.

Q. Okay. And so do you see the benefits of – do you see a benefit to the State as a whole of approval of the transfer?

A. On a personal level, if that's appropriate. I mean, I talk to a lot of people from western Kansas, and you'll hear on their schedule, because they're going to -- what I hear about most in Hays is their hospital and folks from western Kansas going to Hays to take advantage of the medical complex, pretty much that hub, so I know that folks will benefit from that.

Q. Okay.

A. And then Russell, I learned in this hearing that that one plant was going to double in size, I mean, that's - that's a lot of commerce. When you think about the number of trucks coming in and out of Russell, that is commerce. So ...

Q And it benefits Russell, just --

A. No, that benefits all of Kansas, people paying taxes, I mean, every gallon of fuel we buy there's state tax on that so -- it's not my job to -- to look at the economics of something, but, I mean, I -- so that was a personal – just a personal level.

(Letourneau Test., Tr. Vol. 4 at 903:4–904:13.)

250. In fact, Hays is consistently ranked in the top 5 highest trade pull factors of all cities in the State of Kansas. (Ex. 2857; Dougherty Test., Tr. Vol. 2 at 229:5–230:9. (A "trade pull factor" is a sign of relative retail health. It is a ratio of local shoppers and

shoppers from outside the community. A 1.74 trade pull factor means Hays is providing retail services to a population 1.7 times greater than its local population.).)

251. Mr. Williams testified that water is "the main thing that stands in the way of us and—and a lot more growth than we've been able to experience thus far." (Williams Test., Tr. Vol. 2 at 424:3–6.)

252. If the water transfer is not approved, Mr. Williams testified that people who currently live, eat, and shop in Hays were likely to travel to Kearney, Nebraska for those activities, and that would be a net detriment to the State of Kansas. (Williams Test., Tr. Vol. 2 at 441:16–443:8.)

253. Mr. Dougherty agreed that denial of the water transfer will have significant detrimental impacts to the State of Kansas as a whole: "the State is going to be realizing a loss of revenue during times of drought in Hays and Russell, and I think that could compound in the future if because of a lack of available water we see depopulation or the closure of major industries or even the shrinking in Hays of the university, the ... Hays Medical Center, some of our retail, or some of the industrial productivity that Russell has. (Dougherty Test., Tr. Vol. 1 at 208:15–25.)

B. ECONOMIC IMPACTS: RUSSELL – The City of Russell is important to the regional and statewide economy.

254. The City of Russell called Brad Wagner, lifelong resident of the City and City councilperson as a witness at the hearing. (Wagner Test., Tr. Vol. 2 beginning at 444:17; 453:1–4.)

255. Mr. Wagner spent 35 years working as a financial adviser with Edward Jones and UMB Bank and is recently retired, he graduated from Russell High School and graduated with a bachelor's in finance from Fort Hays State University. (Wagner Test., Tr. Vol. 2 at 445:12–446:10.)

256. From his youngest memories, Mr. Wagner recalls Russell being under frequent water restrictions, even before he graduated from high school in 1978, including limitations on outdoor watering and bans on washing vehicles. (Wagner Test., Tr. Vol. 2 at 447:1–448:17.)

257. More recently, beginning at the 2011–2013 drought, Russell has been under continuous water restrictions for more than ten years at various levels and, on numerous occasions has banned all outdoor use of water, including using a faucet on the outside of homes to water a plant or a garden. (Wagner Test., Tr. Vol. 2 at 448:22–449:9.)

258. Due to the severe restrictions on water use, Mr. Wagner captures water in rain barrels from the downspout at a shed he owns at a different property, transports those barrels of water to his home and uses it to water his lawn and trees, stating "you have to have a plan like that in place or you can potentially lose your trees." (Wagner Test., Tr. Vol. 2 at450:12–23.)

259. Russell residents, including Mr. Wagner also capture "gray water," which is excess water from their shower or bath and use it to water smaller plants outside,

though such a solution is not viable for watering larger trees or for keeping a garden alive. (Wagner Test., Tr. Vol. 2 at 451:2–11.)

260. In light of its lack of a reliable water source, Russell has no choice but to proceed with the R9 Ranch water transfer. According to Mr. Wagner, "it would be irresponsible for us not to pursue this option—to develop water from the R9. When we've already experienced a level of restriction that you can't use water outside, I think it's, again, it's just irresponsible for us not to pursue this option. I think we are obligated to, and I think ***the future of Russell depends on it***." (Wagner Test., Tr. Vol. 2 at 455:16–25 (emphasis added).)

261. Russell's largest employer is an ethanol and wheat gluten facility owned by Purefield Ingredients, which is vital to Russell's continued and future prosperity, providing numerous high-paying jobs, health insurance, retirement benefits, and a previously unrealized level of economic stability to the City, but Russell must "find a way to give them the water that they need." (Quinday Test., Tr. Vol. 2 at 494:8–11. Wagner Test., Tr. Vol. 2 at 459:8–15.)

262. Purefield has plans to significantly expand, but that "hinges on whether or not we're allowed to transfer water from the R9 to Russell." (Wagner Test., Tr. Vol. 2 at 460:7–13.)

263. Expansion of Purefield, and the other positive impacts Russell will receive from the R9 Ranch water transfer will benefit the entire State of Kansas, "[n]ot only do

we have the direct jobs that's provided to Russell, but … all the trucks drive by to deliver grain and then haul off the by-products, and there are about 20 semitrucks, trailer trucks an hour going up and down that street. 20 truck an hour, think about how much product is being hauled in and out." (Wagner Test., Tr. Vol. 2 at 461:4–12.)

264. Mr. Wagner continued: "And think about the trucking jobs for the people driving those trucks, they live—they live in Kansas. And most of the product, the grain that's going in there and the by-product coming out, it all—it's all happening in Kansas. So how can that not benefit the State?" (Wagner Test., Tr. Vol. 2 at 461:12–17.)

265. Mr. Quinday testified that for Purefield to consider the proposed expansion to its wheat gluten plant, the City of Russell would need to commit to an additional firm supply of 500,000 gallons of water per day. (Quinday Test., Tr. Vol. 2 at 541:13–17.)

266. Mr. Quinday also testified that the industry projected expenditure for the gluten plant expansion was $300 million. (Quinday Test., Tr. Vol. 2 at 540:12–22.)

267. Dr. Hamilton confirmed during his testimony that expansion of the Purefield facility would be an additional statewide benefit above and beyond those addressed in his pre-filed testimony and expert report. (Hamilton Test., Tr. Vol. 7 at 1137:16–1138:10.)

C. ECONOMIC IMPACTS: HAMILTON – The statewide economic impacts of approving the transfer outweigh the statewide economic impacts of denying the transfer.

268. The Cities presented direct testimony and an associated report from Dr. Stephen F. Hamilton titled "Economic Impact to the State of Kansas of Water Transfer." (Ex. 2823 at Cities 0103487.)

269. Dr. Hamilton is currently Professor of Economics at California Polytechnic State University, San Luis Obispo ("Cal Poly"). (Ex. 2823 at Cities 0103497.)

270. Dr. Hamilton's academic work addresses water valuation, water rationing, the conjunctive use of surface and groundwater sources, discounting, the internal rate of return, and the dynamic analysis of non-renewable and renewable resources. (Ex. 2823 at Cities 0103497.)

271. Dr. Hamilton received a Ph.D. in Agricultural and Resource Economics from the University of California, Berkeley in 1996, and has held positions as a Professor at Kansas State University, the University of Arizona, the University of Central Florida, Toulouse School of Economics, and Cal Poly. He was selected as Chair of the Department of Economics at Cal Poly in 2005 and served in that capacity over the period 2005–2017 and served as Director of Graduate Studies over the period 2016–2019. He has published over 60 articles on a wide range of topics, including the analysis of economic losses from water supply disruptions and the economic benefits of groundwater use. He has won numerous research awards for his academic work, including the *Early Career Award*, the

Atlas Award, the *Quality of Research Discovery Award*, and the *Distinguished Scholarship Award*. (Ex. 2823 at Cities 0103488; Cities 0103496; Cities 0103534–49 (Dr. Hamilton's Curriculum Vitae).)

272. Dr. Hamilton's curriculum vitae was attached as Appendix A to his Direct Testimony, and the Presiding Officer finds that he is eminently qualified to opine on the statewide economic impacts of approving versus denying the water transfer as set forth in his testimony and documents attached thereto.

273. Summarized, Dr. Hamilton's economic-impact analysis included two principal components: (1) in the event the water transfer is approved, the statewide economic impacts due to the investments in water infrastructure, and (2) in the event the water transfer is denied, the economic impacts to the Cities caused by drought-induced water shortages the Cities will experience based on their inadequate and drought-susceptible existing water supplies. (Ex. 2823 at Cities 0103489–90.)

274. Dr. Hamilton provided the following summarized description of the methodology he used to arrive at his conclusions:

> As explained in more detail in my report, my analysis compares two hypothetical but-for worlds—one in which the water transfer is approved and another in which the water transfer is denied—and compares the economic impact to the State of Kansas under each scenario. The difference in value between these scenarios provides a measure of the economic impact to the State of Kansas of approving the water transfer.
>
> My analysis is further broken out into: (i) the economic benefit to the State derived from new water infrastructure investments to connect water from the R9 Ranch to the Cities' distribution system through use of the IMPLAN

> input-output model, and (ii) after the project is completed, the value to the State of avoided water shortages by having access to water from the R9 Ranch during periods of drought."

(Ex. 2823 at Cities 0103490:17–25.)

275. Dr. Hamilton begins his economic analysis by describing in detail the Cities' present circumstances relating to their inadequate water supplies, relying on the findings and conclusions of Dr. Layzell, Dr. Basara, and Mr. McCormick's wellfield yield analysis (Ex. 2823 at Cities 0103502–06.)

276. As explained herein, the Presiding Officer finds the conclusions of Dr. Layzell, Dr. Basara, and Mr. McCormick are reasonable and reliable, and further finds that Dr. Hamilton's reliance on those conclusions in setting forth his opinions about the economic impacts to the State of Kansas caused by droughts of those durations in the event the water transfer is denied is also reasonable.

1. There will be significant economic benefits to the State of Kansas from construction of the project infrastructure.

277. With respect to the statewide economic impacts of the water infrastructure construction project, Dr. Hamilton concluded: "Approving the water transfer will positively impact the State of Kansas economy because, in terms of the conveyance infrastructure alone, I estimate that ***these investments would produce a statewide economic impact of $167 million, a statewide employment impact of 752 full-time equivalent jobs, and a statewide tax revenue impact of $4.4 million***." (Ex. 2823 at Cities 0103499 (emphasis added).)

278. In arriving at his conclusions about the economic impacts of the infrastructure project, Dr. Hamilton relies on the opinion of probable costs of the construction project by the Cities' construction expert, Kevin D. Waddell, P.E. (Ex. 2823 at Cities 0103509–10.)

279. Mr. Waddell is a licensed engineer and construction professional with 30 years of design, preconstruction, estimating, management, and construction experience. Since September of 2019, he has been employed by Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) as a National Preconstruction & Estimating Manager for Water Infrastructure. Mr. Waddell has worked in the heavy/civil construction industry for over 29 years, with 26 years of that experience as a contractor constructing water infrastructure of various types around the United States. (Ex. 2829 at Cities 0104716.)

280. Mr. Waddell's curriculum vitae is attached as Exhibit "KDW-01" to his Direct Testimony, and the Presiding Officer finds that he is well-qualified to opine on the opinion of probable costs of the water transfer construction project as set forth in his testimony and attachments thereto.

281. Mr. Waddell presented testimony on behalf of the Cities about probable construction costs of the R9 Ranch water transfer construction project. (Ex. 2829 at Cities 0104711.)

282. In his testimony, Mr. Waddell concluded, "with an 80% confidence level that by 2025, the project will cost rate payers in Hays $134.9 million, a 26.53% increase from the current estimate and an 85.1% increase from 2015." (Ex. 2829 at Cities 0104177.)

283. Mr. Waddell's opinion of probable costs of the construction project was developed using the R.S. Means cost index, Division of Labor data, and representative material cost quotes obtained from vendors and was completed in accordance with industry standards based on Association for Advancement of Cost Engineering (AACE) estimate classification for a Class 5 estimate. (Ex. 2829 at Cities 0104181.)

284. Mr. Waddell testified at the hearing that his probable-costs estimate was based on a preliminary understanding of the wellfield, the pipeline route, and the construction materials based on the fact that the construction project has not yet commenced (since it has not yet been approved by the Water Transfer Panel in this proceeding). (Waddell Test., Tr. Vol. 5 at 986:22–987:12.)

285. The Presiding Officer finds that Mr. Waddell's conclusions and methodology to be reasonable and credible and adopts his opinions relating to the probable construction costs of the R9 Ranch Water Transfer as factual in this proceeding. The Presiding Officer further finds that Dr. Hamilton's reliance on Mr. Waddell's opinion of probable construction costs is reasonable.

286. Dr. Hamilton explains that the Cities' investment in water infrastructure will create "economic opportunities for businesses directly involved in the design,

engineering, and construction of water supply infrastructure. Importantly, these opportunities are not confined by the boundaries of the Cities but, instead, are shared by individuals and businesses specialized in water projects across the State of Kansas. Infrastructure investment also creates stable, well-paying employment opportunities and full-time head-of-household jobs that are accessible to a broad segment of the labor force in the State of Kansas." (Ex. 2823 at Cities 0103512.)

287. Dr. Hamilton further found that the construction project will create "ripple effects" impacting the regional supply chain and "amplify[ing] the economic impact of the initial investment in infrastructure. And the economic impact does not stop here: Increased economic activities and employment generated by the project, in turn, contributes to fiscal capacity by generating tax revenue at different levels of government." (Ex. 2823 at Cities 0103512–13.)

288. In quantifying these economic impacts, Dr. Hamilton utilized IMPLAN (Impact Analysis for Planning), "an input-output model developed and maintained by the Minnesota IMPLAN Group ("MIG"). As summarized by Dr. Hamilton, "[t]he IMPLAN model aggregates the US economy into 546 unique sectors and allows for regional disaggregation down to the county level." IMPLAN is used for economic impact analysis by many public and private institutions, including the Kansas Department of Agriculture and the Kansas Department of Transportation." IMPLAN "draws on data collected from numerous state and federal sources, including the Bureau of Economic

Analysis, Bureau of Labor Statistics ("BLS"), and the U.S. Census Bureau." (Ex. 2823 at Cities 0103513.) .)

289. More specifically, "IMPLAN uses regional economic data to estimate the direct, indirect, and induced effects of a given economic event, including output, value added, wage income, proprietary income, and employment. IMPLAN also estimates changes to tax revenues at different levels of government, including sales tax, federal and state personal income tax, and payroll taxes." (Ex. 2823 at Cities 0103514–15.)

290. Dr. Hamilton utilized the IMPLAN model to "estimate the direct, indirect, and induced impacts on employment, earnings, and output as a result of final demand changes initiated by a new investment" in the industries associated with the construction project. "The ***direct effect*** captures the initial change in economic activity resulting from the new investment. The ***indirect effect*** reflects new economic activity that is stimulated by the direct Investment in industries that supply inputs to the sector of initial change. The ***induced effect*** captures the economic activity that results when the increased earnings generated by the direct and indirect economic activity is spent on goods and services." (Ex. 2823 at Cities 0103513.)

291. IMPLAN also estimates changes to tax revenues at different levels of government, including sales tax, federal and state personal income tax, and payroll taxes." (Ex. 2823 at Cities 0103514–15.)

292. In so doing, IMPLAN provides a "quantitative assessment of how an economic event, such as investing in water transfer infrastructure, benefits a region via increased economic output, increased employment, and increased fiscal capacity." (Ex. 2823 at Cities 0103514–15.)

293. Dr. Hamilton explained in detail the various ways that the Cities' water project will generate economic impacts across the State of Kansas, including:

- The ***direct effect*** of spending, such as, e.g., procurement of fabricated pipelines, pumps, and associated materials from one of the numerous urban centers across the State. (Ex. 2823 at Cities 0103514.)
- The ***indirect effect*** as well as the ripple effects in other regions of the State via the regional supply chain; e.g., a sale of fabricated pipelines from Wichita generates additional sales of resin plastics generated in Topeka, and additional sales of piping materials from Lawrence. (Ex. 2823 at Cities 0103514.)
- These economic activities across the State "also connect through the mobility of workers and the geographical distribution of their consumption activities." (Ex. 2823 at Cities 0103514.) For example, Dr. Hamilton explains, if a construction worker is hired to work on the project with a salary of $40,000, the worker's income (and, consequently, his spending) will occur and benefit a variety of enterprises across the State: "going to a Jayhawks game, visiting the Sedgwick County Zoo, or paying for a son or daughter's tuition at Kansas State University." (Ex. 2823 at Cities 0103514.) These economic effects are captured and measured by the IMPLAN model because "the additional income generated from a water project in Hays ends up creating additional spending and demand in other parts of Kansas. This channel of economic impact is termed the ***induced effect***."

(Ex. 2823 at Cities 0103514.)

294. In applying IMPLAN to the Cities' construction project, Dr. Hamilton developed a Multi-Region Input-Output ("MRIO") analysis, which consisted of three

regions: "(i) the Phase I Region, comprised of Edwards County, Pawnee County, Rush County, and Ellis County; (ii) the Phase II Region, which consists of solely of Russell County; and (iii) all other counties of Kansas (the "Rest of Kansas")." (Ex. 2823 at Cities 0103515.)

295. Dr. Hamilton's analysis shows that the total level of economic activity in Kansas will be "$167 million higher as a result of the infrastructure investment if the water transfer is approved," which includes "$112.2 million of direct impact, $32.2 million of indirect impact, and $22.5 million of induced impact." (Ex. 2823 at Cities 0103516.)

296. Dr. Hamilton further concludes that the construction project will have an "estimated statewide employment impact of 752 full-time equivalent jobs." (Ex. 2823 at Cities 0103516.) Most of these employment impacts will occur in the pipeline manufacturing and construction industries; however, jobs created via indirect and induced channels "would spread over many sectors." (Ex. 2823 at Cities 0103516.) "Industries receiving the most employment impact via the induced effect include restaurants, retail, and hospitals. According to IMPLAN, these jobs would generate average earnings of $53,881 per year per full-time equivalent job, which is higher than the average salary the Bureau of Labor Statistics estimated for Kansas." (Ex. 2823 at Cities 0103516.)

297. Dr. Hamilton summarized the statewide economic impact of the construction project in Table 2 of Exhibit 2823 at Cities 0103516:

Table 2: Statewide Economic Impact of Infrastructure Investment

Impact	Job Years (FTEs)[1]	Employee Compensation[2]	Economic Output
Direct	448	$23,959,569	$112,425,036
Indirect	166	$9,719,355	$32,202,857
Induced	138	$6,839,432	$22,514,971
Total	**752**	**$40,518,356**	**$167,142,864**

1. Job estimates include part-time and full-time employment.
2. Employee compensation includes wages and fringe benefits paid for by employers.
Source: IMPLAN® model, 2019 Data.

298. The construction project will also result in significant tax revenues at both the State and county level, which Dr. Hamilton summarized in Table 3 of Exhibit 2823 at Cities 0103517:

Table 3: State and County Tax Impact of Infrastructure Investment

	State	County[85]
Sales Tax	$1,356,332	$403,569
Income Tax	$800,267	$333
Property Tax	$237,865	$1,212,535
Other Taxes	$302,103	$87,096
Total	**$2,696,567**	**$1,703,533**

299. The Presiding Officer finds that Dr. Hamilton's methodology and conclusions relating to the statewide economic impacts in the event the water transfer is approved to be reasonable and credible and adopts his conclusions as factual in this proceeding.

2. *The statewide economic impacts in the event the water transfer is denied are highly detrimental.*

300. Denial of the water transfer will have significant detrimental impacts to the State of Kansas as a whole as testified by Mr. Dougherty: "the State is going to be realizing a loss of revenue during times of drought in Hays and Russell, and I think that could compound in the future if because of a lack of available water we see depopulation or the closure of major industries or even the shrinking in Hays of the university, the ... Hays Medical Center, some of our retail, or some of the industrial productivity that Russell has. (Dougherty Test., Tr. Vol. 1 at 207:15–25.)In addition to calculating the statewide economic impacts of approving the water transfer caused by the construction project, Dr. Hamilton also calculated the statewide economic impacts in the event the water transfer is denied measured by the economic benefit of avoiding water shortages in the Cities due to drought. (Ex. 2823 at Cities 0103499–500.)

301. Dr. Hamilton concluded that approving the water transfer mitigates the risk of economic losses to the Cities from periodic water shortages, providing a direct benefit to water users as well as indirect and induced benefits to the regional economy through supply chain development to support industrial and commercial uses in Kansas which will inure to the benefit of the State. (Ex. 2823 at Cities 0103489.) Dr. Hamilton's analysis "recognizes both the commendable conservation efforts by the Cities' citizens and their vision for economic growth, and the harsh reality that, without water from the

Ranch, the Cities face significant risks of water shortages resulting in economic losses." (Ex. 2823 at Cities 0103517.)

302. Dr. Hamilton's calculation of the economic benefit of the water transfer in mitigating future economic losses during periods of drought measures both (1) residential losses and (2) commercial and industrial ("C&I") losses in the event of water shortages. (Ex. 2823 at Cities 0103518.)

303. Dr. Hamilton measures residential losses by calculating "consumer willingness to pay to avoid water shortages," which "describes "the maximum dollar amount a consumer is willing to spend on a good or a service." (Ex. 2823 at Cities 0103519.)

304. This involves further separating water use into several categories, reflecting how consumers prioritize some categories of water use over others; e.g., "households' willingness to pay for water used for drinking and basic sanitation is greater than their willingness to pay for water used for bathing and laundry which, in turn, is greater than their willingness to pay for water used for outdoor irrigation." (Ex. 2823 at Cities 0103519.)

305. For residential users, economic losses in the event of a water shortage "depend on the price of water in a region prior to a water shortage." (Ex. 2823 at Cities 0103519.) When water is less expensive, consumers are more willing to invest more water on "low-value" water uses, such as, e.g., outdoor irrigation. And, for those consumers, if

a water shortage occurs, "there are low-cost opportunities for water conservation because consumers can cut back on outdoor irrigation," yielding a small economic loss. (*Id.*)

306. However, if water was expensive even prior to the water shortage, "the same 'low hanging fruit' would not exist, as consumers would have already restricted water usage in low value areas to prioritize water for high value uses such as drinking and sanitation." (*Id.*)

307. Dr. Hamilton explains that the circumstances under which cities and their residents are able to take advantage of such low-cost conservation measures largely do not exist in Hays and Russell because both Cities have already "attempted to overcome their water supply limitations with aggressive conservation efforts" going back to at least 1991. (Ex. 2823 at Cities 0103506-08 (summarizing the Cities' conservation efforts).)

308. Consequently, "demand for water is hardened by existing conservation efforts, making further conservation costly" and, absent the water transfer, "when the Cities are forced to deal with insufficient water supply by restricting water use beyond what they have already accomplished, achieving further reductions … is more costly because the most economical methods of conservation have already been exhausted." (Ex. 2823 at Cities 0103508.) "Thus, during droughts, the economic impact in Hays and Russell is higher than in other communities that have not actively engaged in conservation measures." (Ex. 2823 at Cities 0103520.)

309. In light of the Cities' conservation measures, the "cost" associated with drought is much greater because demand becomes "less elastic," meaning that the communities are not able to cut back further because they have already exhausted all reasonably accessible conservation measures and, as a result, "the damages get much larger from drought or from a water shortage." (Hamilton Test., Tr. Vol. 7 at 1178:18–1179:16.)

310. Relating to the conservation implemented by the Cities, Dr. Hamilton stated: "they're quite intensive.... Even in California where we're very susceptible to droughts, I've not seen the level of investment in conservation measures that I see in the record here." (Hamilton Test., Tr. Vol. 7 at 1179:17–25.)

311. Dr. Hamilton uses two components to measure the economic impact of residential water use during a water shortage. The first is consumer willingness to pay to avoid a water shortage of a given magnitude, which is calculated by "aggregating consumer willingness to pay for each successive unit of reduction in water use by integrating the area under the demand curve, until total water reduction is equal to the amount of shortage." (Ex. 2823 at Cities 0103520.) Dr. Hamilton provides the following example for illustration:

> For illustration, consider a simplified example where a residential consumer who wishes to use 100 gallons of water but, because of drought, is supplied with only 80 gallons (i.e., there exists a water shortage of 20 gallons). The consumer is willing to pay $10 to increase her water consumption from 80 gallons to 90 gallons but, afterwards, only $5 more to increase consumption from 90 gallons to 100 gallons. This decline in

> willingness to pay for the same incremental quantity reflects the law of diminishing marginal returns in economics. It follows that, in my approach, the economic loss due to the first 10 gallons of water shortage (i.e., from 100 to 90 gallons) is $5 and the economic loss due to the next 10 gallons of water shortage is higher at $10. Again, the increase in economic loss of the same quantity of water shortage reflects the fact that consumers are forced to cut water use of increasingly higher value as shortage deepens. The total economic loss due to 20 gallons of water shortage in this example is thus $10 + $5, or $15.

(Ex. 2823 at Cities 0103521.)

312. The second component is the avoided cost of water delivery, which measures the reduced cost of water distribution in the network provided by water purveyors. (Ex. 2823 at Cities 0103521.) Because the cost of water distribution includes substantial fixed costs that do not vary with the amount of water delivered through the system, "the avoided cost that results from a water shortage is relatively small in relation to total cost." (Ex. 2823 at Cities 0103521.)

313. "The reduction in the cost of water service that occurs in response to a one-unit reduction in water deliveries is referred to as the avoided ***marginal*** cost of service, for instance the avoided energy cost of conveying and treating water units that are no longer delivered." (Ex. 2823 at Cities 0103521.)

314. Measuring the economic loss of a water shortage for the commercial and industrial segment is the same as for residential use, except Dr. Hamilton includes a third component: "the indirect and induced impact on the regional economy." (Ex. 2823 at Cities 0103522.)

315. This additional component is necessary for Dr. Hamilton's analysis because reduced water use among commercial and industrial users causes "indirect and induced impact via local supply chain and employment effects. (Ex. 2823 at Cities 0103522.)

> For example, when a gluten plant is forced to reduce production because of a water shortage, some local workers lose their paychecks, and some suppliers lose their contracts. Thus, the overall economic loss needs to account for not only the direct production loss at the gluten plant, but also subsequent losses created through the regional supply chain. These indirect and induced impacts for the C&I sector are estimated using IMPLAN.

(Ex. 2823 at Cities 0103522.)

316. The economic loss caused by water shortage in the C&I segment is calculated as "the sum of direct impacts (the willingness to pay of urban commercial and industrial water users) and indirect and induced impacts that arise through local employment effects, net of the avoided cost of water delivery." (Ex. 2823 at Cities 0103522.)

317. Dr. Hamilton incorporated the Cities' applicable water rate structures; 2006–2020 water use; "as well as detailed production costs, including chemicals, energy, labor, and other costs" to calculate the marginal cost of water production under various drought conditions per the water yield information provided by Mr. McCormick's Wellfield Yield Report. (Ex. 2823 at Cities 0103523. *See also* Section II.D (discussion Mr. McCormick's Wellfield Yield Report).)

318. Under Dr. Hamilton's approach, the "magnitude of water shortage at any given point in time depends on water demand and firm water supply." (Ex. 2823 at Cities 0103524.)

319. Dr. Hamilton set initial water demand by "using the Cities' water use records by class from 2018–2020." (Ex. 2823 at Cities 0103524.) He then modeled that demand to grow "at the same rate as population growth projected in the Cities' comprehensive plans," which is a 1% growth rate for Hays and a 0.25% growth rate for Russell. (Ex. 2823 at Cities 0103524.)

320. An additional factor incorporated into Dr. Hamilton's methodology is the difference in "institutional responses" in the event of a water shortage, which accounts for the fact that users in the residential segment are better able to adjust to water shortages (i.e., residential demand is more "elastic") and because water shortages impacting the C&I segment create cascading losses to the local economy through supply chain and employment impacts, which is why "most water agencies respond to water shortages with programs that specifically target the residential segment such as limits on car washing and outdoor irrigation, rather than targeting water restrictions in the C&I segment." (Ex. 2823 at Cities 0103524–25.)

321. To account for the disparity in elasticity between these segments, Dr. Hamilton's analysis imposes the entirety of losses for water supply shortages of less than 20% on the residential segment. (Ex. 2823 at Cities 0103525.)

322. "If a shortage still remains after the conservation response in the residential segment, the residential and C&I segments are jointly rationed in a manner that allocates water to each segment until the willingness to pay for the last unit of water is equal across the residential and C&I segments." (Ex. 2823 at Cities 0103525.)

323. Using this methodology, Dr. Hamilton took the yield estimates from Mr. McCormick's Wellfield Yield Report and, applying the growth factors discussed above (1% for Hays and 0.25% for Russell), simulated future drought conditions over a 50-year period from 2023–2072 (the "Model Period") "by taking sequential 50-year draws from the historic hydrologic record and applying them to the Model Period." (Ex. 2823 at Cities 0103526.)

324. Each 50-year "draw" used by Dr. Hamilton "represents a different, continuous 50-year segment of historical annual drought data recorded at the official weather station in Hays over the period 1893–2020." (Ex. 2823 at Cities 0103526.)

325. In so doing, Dr. Hamilton was able to calculate the statewide economic impacts of water shortages in the event the water transfer is denied across 79 separate historical 50-year "splices" of precipitation conditions that actually occurred in the Cities. (Ex. 2823 at Cities 0103526.)

326. He then used that data to calculate the economic impacts of water shortages over the ***next*** 50 years across the entire spectrum of historical precipitation scenarios from

the instrumental record—from the wettest historical 50-year time period to the driest historical 50-year time period. (Ex. 2823 at Cities 0103526.)

327. For example, the first 50-year precipitation splice that Dr. Hamilton overlayed onto the 2023–2072 Model Period was the 50-year period from 1893–1942, the second was the 50-year period from 1894–1943, the third was from 1895–1944, and so on, identifying drought conditions in each draw based on the recorded Palmer Hydrological Drought Index and applying Mr. McCormick's Wellfield Yield report "to generate a simulated record of firm water yields for the Model Period." (Ex. 2823 at Cities 0103526.)

328. After identifying the drought conditions, Dr. Hamilton applied the drought-specific firm yield data from Mr. McCormick's Wellfield Yield report "to generate a simulated record of firm water yields for the Model Period." (Ex. 2823 at Cities 0103526.)

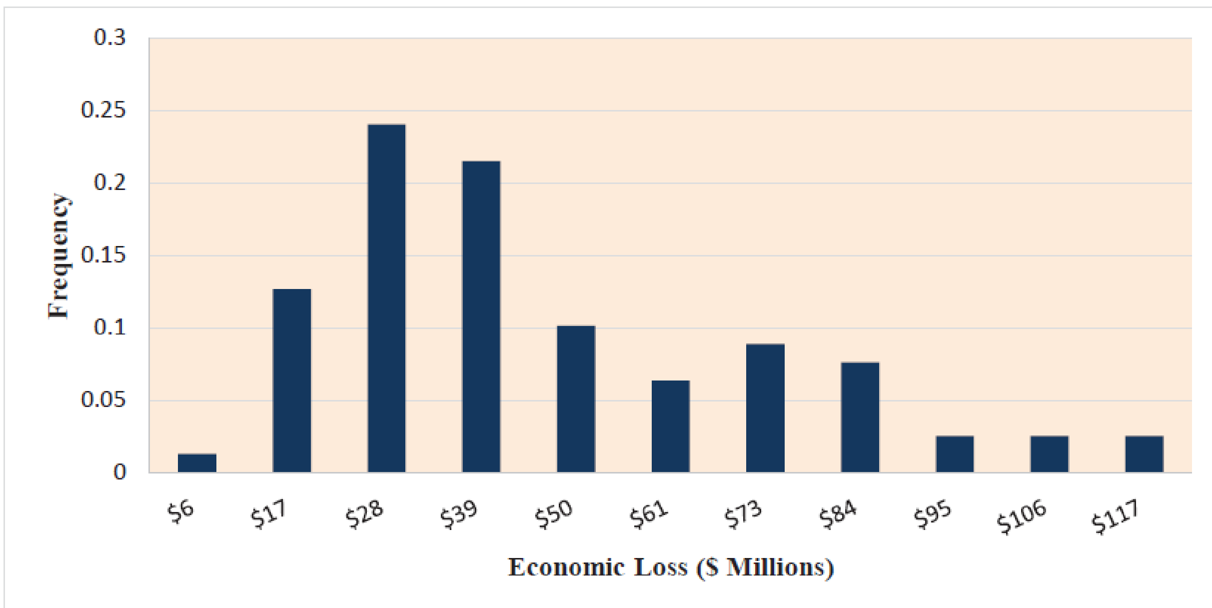
329. Having identified the periods of drought in the respective 50-year draws, Dr. Hamilton then applies his economic-impact analysis—restricting the economic losses to the year 2028 and after, since "the water infrastructure is not scheduled for completion until that date," and, in this way, his calculation "captures only economic loss that could be avoided or mitigated if the water transfer is approved.". (Ex. 2823 at Cities 0103526.)

330. Since the Model Period extends 50 years into the future, Dr. Hamilton "discount[s] future losses to provide a fair comparison between loss in the present versus loss in the distant future" using an annual discount rate of 2%, which is "broadly in line

with the inflation-adjusted yield on 30-year treasury bonds ….” (Ex. 2823 at Cities 0103527.)

331. Dr. Hamilton illustrated the distribution of economic losses across the 79 hydrologic draws over the 2023–2072 Model Period in Figure 3 of his expert report:

Figure 3: Economic Loss of Water Shortages, 2023-2072



(Ex. 2823 at Cities 0103527.)

332. Based on his analysis, Dr. Hamilton concludes that the “distribution has a statistical mean of $43 million. Thus, if the water transfer is denied, the economic loss to the Cities and the regional economy, on average, is $43 million over the next fifty years,” which is “economically significant—it is roughly equivalent to six years of general fund sales tax receipts for the city of Hays from 2016 to 2021.” (Ex. 2823 at Cities 0103527.)

333. Dr. Hamilton also identified a significant "tail risk" reflected in Figure 3; i.e., "the possibility that economic loss significantly exceeds its statistical average," noting that the cumulative probability that the economic loss would exceed $84 million—roughly twice the predicted average loss—is 15 percent." (Ex. 2823 at Cities 0103527–28.)

334. And the most "adverse draw, which corresponds to the historical drought record that occurred over the period 1893-1942, the economic loss to the Cities is roughly $117 million. This loss amounts to 6.5 percent of the combined gross domestic output for Ellis and Russell Counties and is roughly equivalent to erasing 13 years of cumulative economic growth for the region. (Ex. 2823 at Cities 0103528.)

335. Dr. Hamilton summarized these scenarios in Table 4 of Exhibit 2823 at Cities 0103528:

Table 4: Components of Economic Loss

	Average Loss Scenario	Adverse Scenario
Direct Loss Due to Water Shortage	$38,525,910	$103,391,199
Avoided Cost of Water Delivery	($827,990)	($1,361,202)
Indirect Effect	$3,289,495	$9,234,521
Induced Effect	$1,910,362	$6,180,589
Total Economic Loss	**$42,897,777**	**$117,445,107**
State Tax Loss	$1,185,655	$3,863,065
County Tax Loss	$881,244	$2,851,431
Total Tax Loss	**$2,066,899**	**$6,714,496**

336. In addition to calculating the economic losses in the event of a 2- or 5-year drought, Dr. Hamilton also incorporated Dr. Basara's conclusions relating to the

increased likelihood of future drought, projecting a significant increase in decadal and multi-decadal drought risk of 35–60% and 60–85%, respectively, acknowledging that the "historic hydrologic record … does not consider the effect of a potentially drier water future due to climate change," and noting that the "economic loss from approving the water transfer would be larger if droughts turn out to be more frequent, more severe, or longer in duration in the future, compared to those in the relatively recent past." (Ex. 2823 at Cities 0103529.)

337. In that event, Dr. Hamilton concludes, "the economic benefits of approving the water transfer would be larger." (Ex. 2823 at Cities 0103529.)

338. Dr. Hamilton then calculates the economic impact of water shortage under those prolonged drought events, relying on Dr. Basara's Climate Change report, which projects a significant increase in decadal and multi-decadal drought risk of 35–60% and 60–85%, respectively, and using the wellfield yield conclusions from Mr. McCormick's Wellfield Yield Report, Dr. Hamilton concluded that during a decadal drought, "[w]ater shortages would deepen drastically, and the resulting economic loss could increase exponentially…[and] could also cascade into the C&I sector where economic loss is magnified via the multiplier effect." (Ex. 2823 at Cities 0103529.)

339. Dr. Hamiliton's calculation "shows that for a single year of a decadal drought event, the economic loss is $251 million, and the associated tax revenue loss is $17 million," as shown in Table 5 of Exhibit 2823 at Cities 0103530:

Table 5: Economic Loss for the Year 2028 During Decadal Drought

	Economic Loss
Direct Loss Due to Water Shortage	$214,736,983
Avoided Cost of Water Delivery	-$290,130
Indirect Effect	$20,475,697
Induced Effect	$16,198,862
Total Economic Loss	**$251,121,412**
State Tax Loss	$10,196,597
County Tax Loss	$7,474,305
Total Tax Loss	**$17,670,902**

340. In the event of a multidecadal drought, Dr. Hamilton observes that the annual quantity of water available to Hays would reach "an extraordinarily low level of water use that would not suffice to even support basic needs." (Ex. 2823 at Cities 0103530–31.)

341. The Presiding Officer finds that Dr. Hamilton's economic-impact analysis is reasonable and credible and further finds that the economic benefits to the State of Kansas of approving the water transfer far outweigh the economic impacts of denying the water transfer.

D. Water PACK's witness analysis of the economic impacts of approving versus denying the water transfer is not credible and is focused exclusively on purported local—not statewide—impacts.

342. Water PACK presented testimony from Susan Walker "to evaluate the net future water needs of the Cities …." (Walker Report at 4.)

343. The Master Order contingently approving the Cities' Change Applications established Reasonable-Need Limitations for the Cities that limit each City's municipal use from the R9 Water Rights when combined with that City's use of water from all other sources. (Ex. 1 at Cities 0000049; Ex. 1-2 at Cities 0000150–51 and Cities 0000167–68 (Master Order, Calculation of Hays' Reasonable-Need Limitation); Cities 169–71 (Master Order, Calculation of Russell's Reasonable-Need Limitation).)

344. In calculating the Cities' Reasonable-Need Limitation, the Master Order utilizes 2% population growth for both Hays and Russell. (Ex. 1-2 at Cities 0000167 and 0000169.)

345. The Master Order further applied the average per capita water use of comparable cities in calculating the Cities' reasonable needs, acknowledging that water use is "largest in western Kansas and smallest in eastern Kansas because of more arid conditions in the west, and is typically lower for small towns than large cities." (Ex. 1841 at Cities 0073707.)

346. The Cities attached to the First Amended Transfer Application a series of annual reports prepared by DWR and the USGS providing the per capita use by existing water suppliers in Kansas, all of which show that water use in both Hays and Russell are far below their respective regional averages. (Exs. 1-73–1-91. *See also* Ex. 1 at Cities 0000051–52; *See* Lane Letourneau's explanation of the annual reports beginning at Tr. Vol. 4 at 890:10.)

347. In recognition of the differences in precipitation from west to east across Kansas, the State is divided into 8 different "regions" to compute average annual GPCD water use. Hays is in Region 5 and Russell is in Region 6. (Ex. 1841 at Cities 0073707.)

348. In contrast to Hays' average GPCD water use, Cities with populations above 500 in Region 5 average 149.57 GPCD, which is the quantity used by the Chief Engineer when calculating Hays' Reasonable-Need Limitation in the Master Order. (Ex. 1-2 at Cities 0000167.)

349. In contrast to Russell's average GPCD water use, Cities with populations above 500 in Region 6 average is 137.25 GPCD, which is the quantity used by the Chief Engineer when calculating Russell's Reasonable-Need Limitation in the Master Order. (Ex. 1-2 at Cities 0000169.)

350. Walker attacks the Reasonable-Need Limitation established by the Chief Engineer in the Master Order, claiming that the amount of water allocated to the Cities should instead be determined "by offsetting future water demands against existing water supplies." (Walker Report at 11.)

1. Walker's analysis punishes the Cities' historical conservation efforts.

351. In making her calculations, Ms. Walker used the Cities' historical "long-term average" water use in gallons per capita per day ("GPCD"), which, Ms. Walker stated, is 86 GPCD for Hays and 79 GPCD for Russell. (Walker Report at 5.)

352. Ms. Walker then projected the Cities' future populations by using the population projection included in the 2021 Kansas Statistical Abstract for Ellis County (for Hays) and Russell County (for Russell). Using that approach, Ms. Walker projected Hays to grow at 0.34% and Russell to grow at 0.06%. (Walker Report at 5.)

353. Under that approach, Ms. Walker concluded that the Cities "might not need any additional water supplies for the foreseeable future." (Walker Report at 5.)

354. As discussed herein, because of their inadequate and drought-susceptible water supplies, the Cities have implemented draconian conservation measures, which have led them to have some of the lowest water use levels per capita of any municipality in the State. And, as discussed in Section II.D., their current supplies are already inadequate, even during a moderate 2-year drought like the 2011–2013 drought.

355. Ms. Walker's approach to calculating future water needs is also contrary to Kansas policy. K.S.A. 82a-744 provides:

> The Chief Engineer "shall give due consideration to water management or conservation measures previously implemented by a water right holder when implementing any further limitations on a water right pursuant to any program established or implemented on and after July 1, 2015. The chief engineer shall take into account reductions in water use, changes in water management practices and other measures undertaken by such water right holder.

356. DWR witness, Lane Letourneau, testified that Kansas statutes require water that users be given "[d]ue consideration for past conservation." (Letourneau Test., Tr. Vol. 4 at 1050:6–17. *See also* Section X.A.)

357. The Presiding Officer finds that Ms. Walker's approach of capping the Cities prospective water needs by their historical per-capita water use fails to address water supply shortages that already occur during even moderate droughts, is highly inequitable, contrary to Kansas law and policy, and would create a perverse incentive for other water users in the State when considering whether to implement proactive conservation measures.

2. *Walker's "future water needs analysis" fails to account for the prospect of drought and contains numerous other flaws.*

358. In support of her "future water needs" calculation, Walker cites the 1998 "Water Supply Handbook" (Ex. 1-201), published by the U.S. Army Corps of Engineers, although she does not provide a detailed discussion of the methodology or a page citation. (Walker Report at 11.)

359. The Water Supply Handbook addresses various methods for "water demand forecasting" beginning at Cities 0008125, including the "extrapolative forecast" method, "based on the extension of past trends into the future and is based on past levels of water demand …." The extrapolative forecast method appears to be the one adopted by Ms. Walker. (*See* Ex. 1-201 at Cities 0008125.)

360. In addition to the extrapolative forecast method, the Water Supply Handbook provides other "methods specifically designed for forecasting water demand during periods of drought," which Ms. Walker declined to adopt or address despite the

fact that the Cities' drought-susceptible water supplies precipitated their acquisition of the R9 Ranch and initiation of this proceeding. (Ex. 1-201 at Cities 0008125.)

361. The Water Supply Handbook further notes some known shortcomings of the extrapolative forecast method that Ms. Walker used, including:

- "Analysts using the extrapolation method place great faith in historical demand patters to predict future demand patterns." (Ex. 1-201 at Cities 0008125.)
- The extrapolative forecast method "makes no attempt to predict deviations of significant magnitude." (Ex. 1-201 at Cities 0008125.)
- "One of the key problems with this method is that the period of demand used as the basis for extrapolation greatly affects demand projects, even from year to year." (Ex. 1-201 at Cities 0008125.)
- "Unless the pattern of demand is particularly stable, using a long time series of data does not necessarily yield more reliable results." (Ex. 1-201 at Cities 0008126.)
- "Frequent adjustments to the forecast may be required, and planning may be greatly hindered." (Ex. 1-201 at Cities 0008126.)
- "Extrapolation is unconcerned about the factors underlying changes in water demand." (Ex. 1-201 at Cities 0008126.)
- "The method is especially weak with regard to changes in different components of water use … [and] assumes continuous growth in all use categories, including leakage and other forms of unaccounted-for water, even though this assumption is not necessarily valid." (Ex. 1-201 at Cities 0008126.)

362. The extrapolative method used by Ms. Walker depends entirely on the "period of demand" to establish future water needs and does not account for "deviations

of significant magnitude"—such as prolonged or intense drought—from that baseline period. (Ex. 1-201 at Cities 0008125.)

363. Those issues are of particular importance in this case in light of the Cities' extremely low historical average GPCD water use due to their extensive conservation efforts and the fact that the Cities' existing water supplies are highly susceptible to drought.

364. Ms. Walker made no attempt to account for the "frequent adjustments" that may be required when using the extrapolative forecast method or give credence to the specific caveat provided by the Water Supply Handbook that "planning may be greatly hindered" absent such adjustments.

365. Nor did Ms. Walker apply one of the alternative water demand forecast methods "specifically designed for forecasting water demand during periods of drought," as referenced by the Water Supply Handbook. (Ex. 1-201 at Cities 0008125.)

366. For example, the Cities presented evidence during the hearing that GPCD water use increases during periods of drought, which increases water shortages in the Cities. (*See, e.g.*, Ex. 2823 at Cities 0103505 ("[D]uring periods of drought, water users rely more on publicly supplied water, which further exacerbates the risk of shortage. Rainfall that could substitute for public water supply (e.g., watering lawns) during normal climate conditions becomes unavailable during droughts."). *See also* (Dougherty Test., Tr. Vol. 1 at 158:11–17.)

367. In his expert report, Dr. Hamilton accounts for this difference, noting that "[i]n 2014, a year with slightly above-average precipitation, Hays used 1,954 acre-feet of water, or 81 GPCD, whereas during the 2012 drought in the State of Kansas, Hays used 2,391 acre-feet of water or 102 GPCD," a more than 25% increase. (Ex. 2823 at Cities 0103505. *See also* Ex. 2869 at Cities 0172028:3–7 (Hamilton's Rebuttal Testimony noting that his analysis "is based on actual water consumption by water use sector in each city for the period 2018–2020.").)

368. But Ms. Walker's "future water needs analysis" did not account for the increased GPCD water use during drought; she simply applies the same GPCD, regardless of the conditions.

369. Ms. Walker's analysis does not account for the Cities' need for a redundant water supply in light of the fact that their existing water supplies are highly susceptible to drought, in addition to providing an opportunity to prosper. (*See* Ex. 1-47 at Cities 0002720 (2002 Docking Report discussing the R9 Ranch project and noting that the project's goals are twofold: (1) "provide a redundant source of water for Hays so that it may conserve its current supplies of water, which are more resistant to drought conditions," and (2) "provide Hays and Russell with additional sources of water for economic growth ... to meet their long term needs").) As noted by a 2002 report by the Docking Institute:

> The project under consideration has two main goals. First, to provide a redundant source of water for Hays so that it may conserve its current

> supplies of water, which are more resistant to drought conditions. The second goal is equally important. It is to provide Hays and Russell with additional sources of water for economic growth. [The Cities] need[] additional water resources to assure themselves and prospective business seeking new locations that there will be adequate water supplies to meet their long term needs. A project that meets only one of these goals makes little sense ….

(Ex. 1-47 at Cities 0002720.)

370. Ms. Walker acknowledges that Hays would experience a water shortage of 643 acre-feet in a single year in the event of only a 5-year drought—which is approximately 40% of Hays average water use from 2018–2020—yet she makes no effort to measure the economic, public health and welfare, or other impacts of such an event. (Walker Rebuttal Report at PDF pg. 21.)

371. Instead, Ms. Walker dismisses such impacts because "drought periods and related impacts to supplies are temporary." (Walker Rebuttal Report at PDF pg. 21.)

372. In addition to providing drought resiliency, there are numerous reasons the Cities will avoid incurring substantial economic costs from having the R9 Ranch Water Rights as a redundant source of water to which Mr. Quinday testified during the hearing:

> Q. In addition to drought as being a threat to the Big Creek source, are there other threats to that source?
>
> A. Contamination.
>
> Q. And why is that?
>
> A. It's open, there's no protection along the Big Creek, as far as I've been all the way to Cedar Bluff. So you have cattle, we've had algae blooms that have happened, and luckily just down from our intake an oil well lead line broke and leaked into there.

(Quinday Test., Tr. Vol. 2. at 481:9–19.)

> Q. You—or recently, actually, the City of Russell experienced some stress and concerns with respect to its water source because one of its plants was being worked on; is that correct?
>
> A. Correct.
>
> Q. Can you tell—tell us, just summarize what happened. First of all, when did this happen?
>
> A. Well, we were unable to use the plant, I believe, beginning September of 2022 because of the rehabilitation project, it had to be taken out of service.
>
> Q. Which plant is that?
>
> A. That's the water softening plant.
>
> Q. Okay.
>
> A. The EDR plant or plant B is not able to treat Big Creek. So during the time when the water softening plant was down and we were unable to use Big Creek, we relied solely on the Pfeifer wellfield and the EDR plant. And then in January, the operators noticed an issue with the quality of Big Creek water and conferred with KDHE and we had an algae bloom in January.
>
> Q. Do you know what kind of algae bloom that was?
>
> A. No, we sent numerous samples into KDHE and separate labs just to determine that it was not a harmful algae bloom or blue-green algae, but we still had to, regardless, take down the plant again, completely clean everything, the media, and we were not authorized to use Big Creek until KDHE gave permission. That was in May. So for six months, from September of '22 until May of '23, during that time frame we were able to use Big Creek for about two weeks and two days.

(Quinday Test., Tr. Vol. 2 at 484:6–486:4.)

373. Mr. Quinday went on to testify that because the algae bloom struck Big Creek at the same time that Russell's EDR plant was undergoing maintenance:

> A. we had to shut down our industrial customers and it was a critical 24 hours until we could get it back up.
>
> Q. When you say shut down, do you mean completely shut down?
>
> A. Turn off the water, yes.

(Quinday Test., Tr. Vol. 2 at 488:15–21.)

374. Russell's problems were then compounded because it was forced to rely solely on its Smoky Hill River water rights, the annual quantity of which the City projected would be entirely depleted by August, leaving it entirely reliant upon Big Creek, which does not reliably produce water from Mother's Day to Labor Day (*id.* at 487:5–15)—as was true in the summer of 2023. (Quinday Test., Tr. Vol. 2 at 489:5–490:15.)

375. DWR witness, Lane Letourneau, testified that holding multiple, duplicate, or redundant water rights is "just smart business" for municipalities, feedlots, or any water user. (Letourneau Test., Tr. Vol. 4 at 889:22–890:9.)

376. Mr. Letourneau testified on cross-examination by Mr. Cole for the City of Russell:

> Q. One of the things that you mentioned that I found interesting, and I think this had—came up in the area of the reasonable-needs limitation or the reasonable-needs cap, is the idea of a redundant supply. What does that mean?
>
> A. Well, there are—to where you would have the same amount of water from different sources. I'm just thinking of a city that might have wells but they also might have a surface water supply and they might also

> have storage in a reservoir; and then when the surface water supplies or the storage is used up, then they'll rely on the wells in a drought. So it's just having a duplicate source, it's just—it's just good business.

(Letourneau Test., Tr. Vol. 4 at 906:25–907:15.)

377. The Presiding Officer finds that Ms. Walker's "future water needs" analysis is invalid for the reasons addressed herein and as provided in the rebuttal report of Dr. Hamilton:

> More troublesome, however, is that application of the methodology proposed by [Walker's] Report would not improve the Cities' water problems; in fact, it would make their circumstances even worse than they are now. The HE Report takes the Cities' conservation measures, which were enacted ***because*** of their lack of drought-resistant water sources, and then caps the Cities' available quantity based on GPCD values that are unheard of anywhere in the State of Kansas. The [Walker] Report then uses that number as the basis for setting a purported ***maximum*** quantity of water the Cities should be permitted to divert.
>
> Such analysis in the [Walker] Report ignores the inevitable occurrence of serious drought and the fact that municipalities require more water during drought than in times of normal precipitation…. [I]t is unclear, and the [Walker] Report fails to address, why any municipality with a lack of access to drought-resistant water sources would go through the time and expense of acquiring new water supplies and navigating the regulatory hurdles of the Water Transfer Act if the end result of the process leaves the Cities in a worse situation than before initiating the proceeding. That is particularly true in a case such as this in which the Cities purchased the R9 Ranch water rights—real property rights—on the open market.

(Ex. 2869 at Cities 0172030–31.)

378. In essence, Walker's analysis assumes a scenario in which the Cities experience no drought in the future and receive exactly the historical average water supply; the Presiding Officer finds that assumption to be out-of-step with the real world

and with the underlying water needs that precipitated the Cities' filing a Water Transfer Application to begin with.

379. Ms. Walker also conflates the "reasonable needs" cap on water usage contained in the Master Order with the City's ability to reasonably plan for future growth in the event the water transfer is approved with an adequate water source in light of the significant investments the Cities are making in securing that water. As noted by Mr. Dougherty relating to the reasonable needs estimate contained in the Master Order, "reasonable needs is the cap on what we could grow into ... the future, and when we went into discussions with [DWR], we made it very clear this is an extremely expensive project that is going to have to last us for 50 years plus, and we can't do this, it's not cost effective to do this if we know we can only utilize part of it for a 20-year period." (Dougherty Test., Tr. Vol. 1 at 195:8–16. *See also id.* at 202:16–23; Dougherty Test., Tr. Vol. 2 at 327:6–329:13 (Mr. Dougherty testifying under cross-examination by Water PACK's counsel "[t]hey are different applications of population projections, meant for different outcomes").)

380. The Presiding Officer finds persuasive the following analogy by Dr. Hamilton to summarize the flaws inherent in Ms. Walker's analysis:

> To see this, consider that minimum water needs for sanitation are roughly 1 gallon per person per day. Suppose a person faces variable water supply conditions throughout the year of 0.5 gallons per day half the time and 2.5 gallons per day half the time. On average, the person has 1.5 gallons of water available per day, which is enough to meet basic sanitation needs. But in reality, half of the time, basic sanitation needs would not be met. The [Walker] Report essentially argues that there is no economic loss in this instance based on the average outcome, which is not a valid methodology.

(Ex. 2869 at Cities 0172036.)

3. *Walker's population projection is not credible.*

381. As noted, Ms. Walker argues that the water available to Hays and Russell should be calculated based on the population projections of Ellis (0.34%) and Russell (0.06%) counties.

382. The Cities presented evidence that population trends of Ellis and Russell County are often much different than for the Cities of Hays and Russell, for example, as shown by Ms. Walker's own report, the average growth in Hays from 1980–1990 was 0.89% compared to -0.04% for Ellis County. And from 1990–2000 Hays grew at nearly 1.2% whereas Ellis county only grow at 0.56% during that same time period. (Walker Report at 14.)

383. From 1980–2020, the City of Hays grew in excess of 2x more than Ellis County. (Walker Report at 14.)

384. The Presiding Officer finds that historic county-wide population trends is not a reliable indicator of the future population trends applicable to the Cities of Hays and Russell.

385. Ms. Walker supports her population projection by comparing historic population trends of "select" western Kansas communities. (Walker Report at 17.)

386. Among the communities selected by Ms. Walker are WaKeeney and Oakley (populations of about 2,000)[3], Hugoton and Scott City (populations of about 4,000), Colby and Goodland (populations of about 5,000), and the Presiding Officer finds that these communities are not reliable comparators to use for projecting Hays' population, which is approximately 22,000. (Dougherty Test., Tr. Vol. 1 at 76:24–77:25.)

387. Ms. Walker includes Garden City and Dodge City as comparators, both of which have populations closer to that of Hays, both of which experienced population increases of 1.09% since 1980, and both of which have access to reliable drought-resistant water supplies and with much higher water use per capita than Hays. (Ex. 2869 at Cities 0172031–32. *See also* Ex. 2659 (map showing Garden City and Dodge City overlying the High Plains Aquifer); Ex. 899 Municipal Water Use in Kansas Report published by DWR and USGS showing 134 GPCD for Dodge City (Cities 0023581) and 185 GPCD for Garden City (Cities 0023583).)

388. Neither Dodge City nor Garden City is home to a major regional university which provides an additional source of population growth opportunity not available in

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[3] Ms. Walker lists the comparison communities in Exhibit 3-4 on page 17 of her expert report, which includes identical population figures for WaKeeney and Oakley, an apparent error. Online Census numbers indicate that WaKeeney's population as of 2020 was 1,799.

https://datacommons.org/place/geoId/2074450/?utm_medium=explore&mprop=count&popt=Person&hl=en.

either of those places, and unlike Hays, which is home to Fort Hays State University with a combined in-person/online enrollment of more than 14,600 students. (Ex. 1 at Cities 0000024; Ex. 1-41 at Cities 0002517.)

389. Ms. Walker rejects the notion that lack of water has constrained the Cities' population growth, stating that the Cities "believe that lack of water supply has constrained growth in recent decades is invalid" without explaining why, asserting that the reasons are "complex." (Walker Report at 18.) Hays has never argued that its population growth was constrained by, and only by, a lack of water supply, but it has materially contributed as discussed herein.

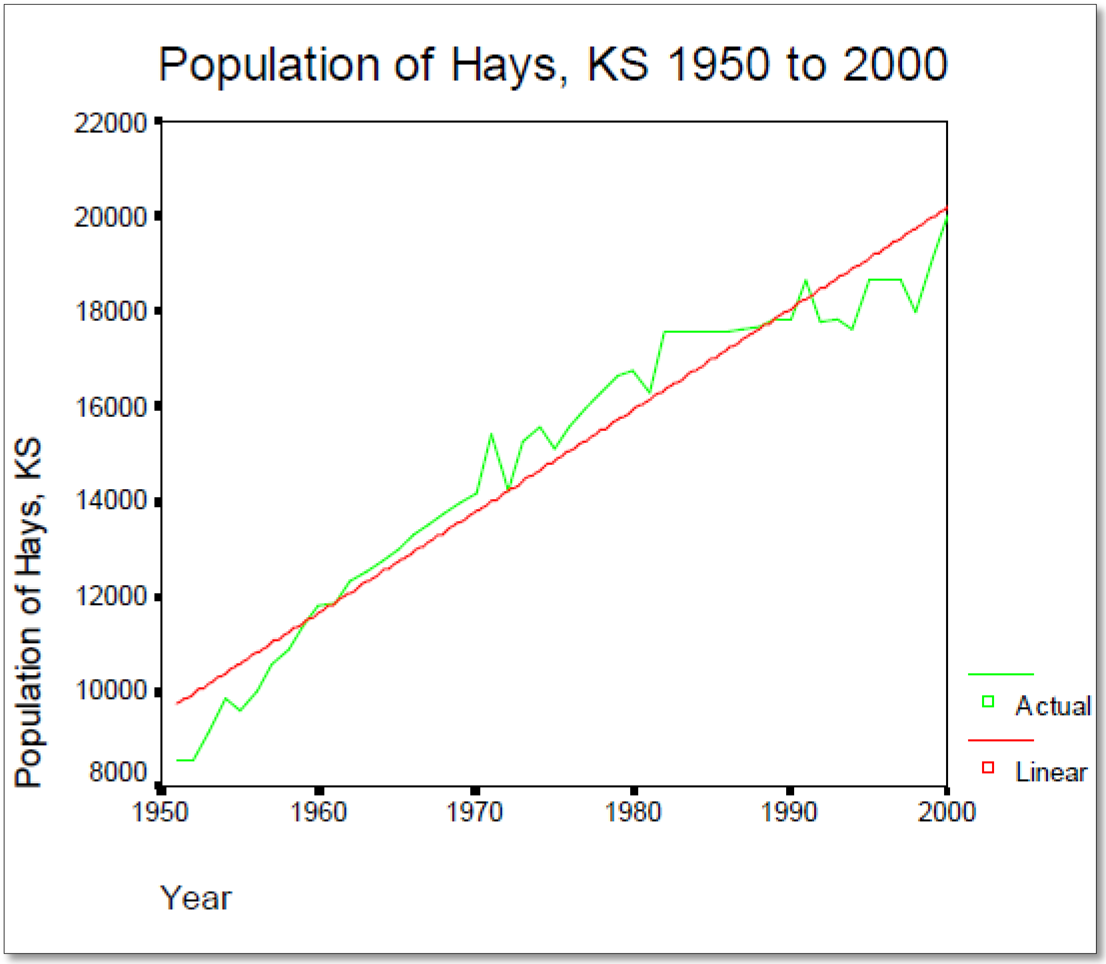
390. But the Cities presented substantial evidence that lack of water has had a significant impact on their growth; for example, Exhibit 1-47 is a report by the Docking Institute of Public Affairs, which provides:

> [T]he availability of water has been a key component of population growth in Western Kansas. Western Kansas counties that used a significant amount of water from the Ogallala had a rate of population change between 1980 and 1990 that was 10% greater than in counties where water was scarce (Case 2000 White 1992 1994). Likewise, water rich counties had a rate of population change that was 4% greater than others between 1990 and 2000 (Case 2000).

(Ex. 1-47 at Cities 0002719–20.)

391. The same Docking Institute Report cross-referenced drought in the early 1990s with Hays' population growth, showing that the City's "resulting restriction of

water supplies are directly associated with the population of Hays dropping below its linear projection." (Ex. 1-47 at Cities 0002720.)



(Ex. 1-47 at Cities 0002733; Ex. 2555 at Cities 0096256.)

392. The City's average annual percent of population change before the 1991 drought was 1.81%, which dropped to 1.01% after 1991 (though the total change from 1950 through 2000 was still 1.66%). The correlation between the City's population and the impacts of drought on its inadequate water supplies are strong indicators that the City needs additional water. (*See* Ex. 2555 at Cities 0096269.)

393. In addition to the flaws in Ms. Walker's population projection, the Cities presented substantial competent evidence during the hearing that the Cities and the area have experienced population growth in the past far in excess of the figures used by Walker in her analysis as discussed below.

394. The Cities presented a Population Projection Analysis from Amy Haase, Principal at RDG Planning & Design, who concluded that the City of Hays is likely to grow at an estimated rate of 1% over the next 10 to 20 years. (Ex. 2825 at Cities 0103607.)

395. Ms. Haase has been an urban planner for more than 24 years and led numerous population and housing market studies in Hays, Russell, and elsewhere. (Ex. 2825 at Cities 0103610; Hasse Test., Tr. Vol. 5 at 922:17–923:19.)

396. Ms. Haase's methodology includes analyzing historical population data and trends as well as going into the community and taking firsthand accounts from residents such as landlords, property owners, business owners, community leaders, and city officials. (Haase Test., Tr. Vol. 5 at 950:4–21.)

397. Ms. Haase's rebuttal report of Ms. Walker's pre-filed direct testimony underscores the flaw in Ms. Walker's complete reliance on historic growth trends in attempting to predict future population, in particular because the source Ms. Walker relied on failed to consider the current economy's impact on growth in the Cities. (Ex. 2868 at Cities 0172025.)

398. Ms. Haase noted that there are 430 job openings within 25 miles of Hays and, due to an aging population, workers will need to come from outside the county to fill those positions at a greater pace than occurred between 1990 and 2020. (Ex. 2868 at Cities 0172025.)

399. Ms. Haase also testified about known Census undercounts in both Fort Hays State University students who were absent due to the COVID pandemic as well as a 50% undercount in the Census of Hispanic populations in western Kansas and that approximately 7%, or 2,000 residents of Ellis County are Hispanic. (Haase Test., Tr. Vol. 5 at 950:22–951:16; Ex. 2868 at Cities 0172024–25.)

400. Ms. Haase's population projection was also conservative in part because she removed 3,796 students attending Fort Hays State University who lived off campus in 2021 from her analysis. (Haase Test., Tr. Vol. 5 at 951:17–953:8; Ex. 2825 at Cities 0103612.)

401. Ms. Haase evaluated the historic population change in Hays, noting that its population grew at 2.5% from 1960–1970 and 1.2% from 1990–2000, and stated that it is "absolutely" possible that the City could grow at those rates in the future and having access to a reliable drought-resistant water supply would help meet that growth opportunity. (Haase Test., Tr. Vol. 5 at 953:15–955:3.)

402. Relating to Russell, Ms. Haase testified that completion of the Purefield expansion project, which depends on completion of the water transfer, would likely result in a further increase in population. (Haase Test., Tr. Vol. 5 at 955:10–958:4.)

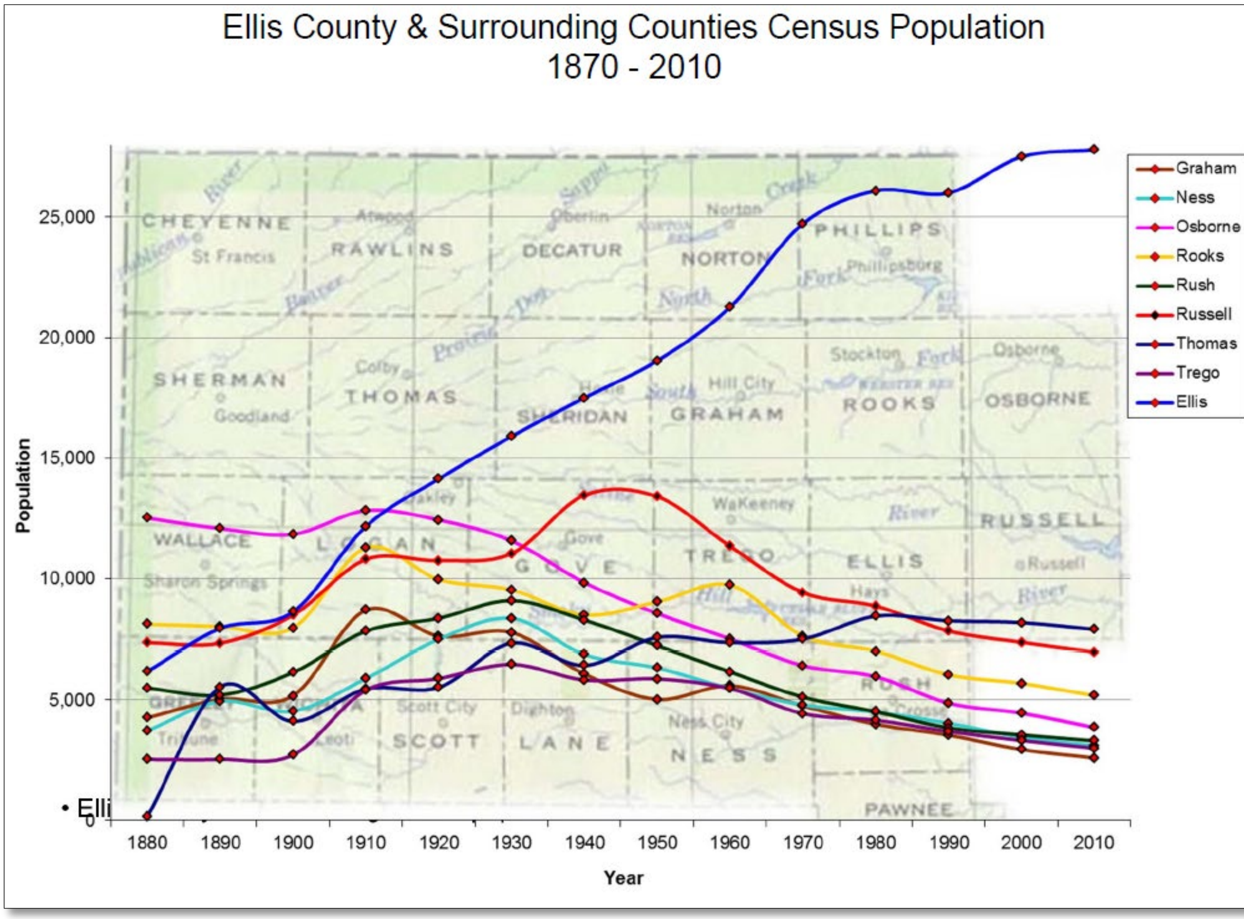
403. Mr. Quinday testified that Russell has experienced a recent influx of young people moving back into the City, "so I think we're actually seeing a population growth…. We're getting a lot of young people move back, to the point that housing is very limited and rentals are—there's a wait list." (Quinday Test., Tr. Vol. 2 at 491:22–492:5.)

404. Ms. Haase also testified that lack of a reliable water supply restricts construction of new homes and that, in the absence of water, economic development and population growth opportunities are likely to go elsewhere, such as Kearney Nebraska. (Haase Test., Tr. Vol. 5 at 960:3–25.)

405. This fact was reinforced by the testimony of Doug Williams, Director of Grow Hays and a long-time realtor in the City (*See* Section III.B.1) who agreed that the population of Hays is being depressed "not because people don't want to live there but because construction has not kept up." (Williams Test., Tr. Vol. 2 at 426:8–12.)

406. In addition to Ms. Haase's expert report and testimony, evidence was introduced during the hearing that Hays has maintained a growth rate of significantly more than 1% at times in the past. (*See generally*, Ex. 2825.)

407. Exhibit 58 shows that Ellis County's population has continually increased, even as many other counties in northwest Kansas have declined, including growth at 2.5% between 1960 and 1970 and 1.2% between 1990 and 2000:



(Ex. 58 at Cities 0015259. *See also* Ex. 2825 at Cities 0103612 (graph showing Hays' population change by percentage).)

408. Mr. Letourneau testified that projecting 2% annual population growth to establish reasonable needs for municipalities is "very common" and is not unreasonable. (Letourneau Test., Tr. Vol. 4 at 884:4–5; 887:2–11.)

409. If a municipality can provide justification, DWR will consider other factors when determining reasonable need, including for example, the City of Russell's need for additional water to serve expanding industrial use by Purefield from the City's distribution system, as well as need for golf courses and additional housing. (Letourneau Test., Tr. Vol. 4 at 884:8–17; 885:21–24.)

> Q. And 2 percent is common, do you think 2 percent is unreasonable in the case of Hays and Russell?
>
> A. No. We wouldn't think it would be unreasonable if anybody -- we wouldn't think that was unreasonable of anybody that brought us an application.
>
> Q. Doesn't mean they're going to use it all, does it?
>
> A. No.
>
> Q. Is one of the contingencies ... that cities plan for is drought? Is that a fair thing to be concerned about?
>
> A. That's very fair.

(Letourneau Test., Tr. Vol. 4 at 887:6–18.)

4. PLANNING HORIZON – Walker's planning horizon for the water transfer project is unreasonably truncated.

410. Ms. Walker assumes that the planning horizon for the water transfer project is through 2041 (*See* Walker Report at 4.) In fact, the planning horizon extends out much further than that.

411. Her assumption appears to be based on the fact that the Reasonable-Need calculations in Appendices D and E of the Master Order are through 2041. (Ex. 1-2 at

Cities 0000167 and 69.) Ms. Walker ignores Master Order, ¶ 234, at Cities 0000150, stating that by providing the Chief Engineer with appropriate supporting documentation the Reasonable-Need Limitations can be increased at any time using the method set out in ¶¶ 237–238 of the Master Order. (Ex. 1-2 at Cities 0000150.)

412. The Cities presented substantial evidence that the R9 Water Rights and the related infrastructure project have a very long planning horizon for the purpose of meeting the Cities' water needs many decades into the future. (Dougherty Test, Tr. Vol. 1 at 193:1–194:1; 201:1–203:17; 356:1–357:4; 365:16–20; 369:5–370:8; …

> Q. What's the design life -- once you get it in place and operating, how long does this – is this -- do you expect this -- the pipeline and the -- and the wells, the infrastructure on the ranch and the pipeline, if properly maintained, repair, replace, retain, maintained, to last?
>
> A I would say for the wellfield, as long as it's maintained, probably 50 years. For the pipeline, it could be 75, 100 years. I've worked on projects where we've replaced pipe that's been in service for 115 years.

(Heidrick Test., Tr. Vol. 5 at 1094: 13–23.)

413. Mr. Dougherty concurred and elaborated: "[W]e view this as a long-term water source.... It's also very expensive, so our planning horizon for this project is significantly longer ...." (Dougherty Test., Tr. Vol. 1 at 193:1–9.) He continued: "Our estimates are ... that this project is going to provide a reliable source of water for a minimum of 50 years ... and probably significantly longer than that. So that is our planning horizon for ... this property and this project." (Dougherty Test., Tr. Vol. 1 at 193:21–195:1.)

414. In fact, the Cities' initial applications to change the R9 Water Rights was premised on an extended planning horizon, which stated that the project will have a "a design life of at least 50 years and to be productive for even longer," and due to financing issues a 20-year planning horizon "is not appropriate for the Cities' water-transfer project." (Ex. 3-2, Cities 0008498-500.)

415. The Chief Engineer agreed with the Cities' request, noting in a letter that "we agree with the Cities' assertion that planning horizon of 50 years or more may be justified." (Ex. 253, Cities 0017089.) And, in the Master Order, stated: "[A] longer planning horizon is a practical necessity in this case and is consistent with the overall purposes of Kansas water law and its underlying policies, as long as the longer planning horizon does not permit the Cities to use water in excess of their reasonable municipal needs. See K.A.R. 5-5-9(a)(6) (1994 version)." (Ex. 1-2 at Cities 0000140.)

416. Published materials also undercut Ms. Walker's truncated planning horizon. The Water Supply Handbook (used by Ms. Walker for her demand forecast) acknowledges the extended planning horizon required for water infrastructure projects such as the one at issue here. That document provides: "The construction of major water facilities are planned over many years to meet expected water demands extending many decades into the future." (Ex. 1-201 at Cities 0008085.)

417. The need to plan for an extended period into the future is even greater for Hays and Russell, who, unlike other Kansas cities, must look far afield to find an

adequate, drought-resistant water supply. (*See* Ex. 2659 (map of Kansas showing the proximity of cities with populations over 5,000 to available water supplies).) (Dougherty Test, Tr. Vol. 2 at 356:1–357:4.)

418. As with her proposal to cap the Cities' future water needs based on their extremely low per-capita water use, Ms. Walker's proposal that an 18-year planning horizon be used is similarly punitive: a 20-year planning horizon "effectively penalizes a growing community by requiring the acquisition of a new long-term water resource every 20 years." (Ex. 843. Cities 0022752.)

419. Her proposal fails to account for the fact that the Cities are miles away from adequate sources that require the financing and construction of extensive infrastructure. (Ex. 2659)

420. Mr. Dougherty testified:

> So the idea that we would get just enough, just enough and maybe you could go back and get more is absurd, knowing that you get just enough and then in two years we have to go through another 15-year process to get just enough more and then we automatically start the 15-year process again. So that's why the reasonable-need cap that we asked for was granted, knowing that this is a very expensive project and it needs to be there in the future.

(Dougherty Test., Tr. At Vol. 1 196:9-18. *See* Ex. 2659.)

421. The Presiding Officer finds that the Cities presented substantial competent evidence that their populations are likely to grow in excess of the amount estimated by

Ms. Walker ***if*** they have access to a drought-resistant and sufficient water source, without which such growth will be greatly hindered.

422. The Presiding Officer further finds that Ms. Walker's attempt to apply a "future water needs analysis," including her truncated planning horizon, flawed population projection, and claim that the water available to the Cities should be capped at their historical GPCD water use averages is unreasonable, not credible, and a collateral attack on the Reasonable-Need Limitation in the Master Order, which is not at issue in this proceeding.

5. Walker's economic impact analysis is incorrect and is focused entirely on local impacts, not statewide impacts.

423. In her rebuttal testimony and related report, Ms. Walker provided a critique of the Cities' economic-impact analysis, addressing (1) Dr. Hamilton's IMPLAN analysis of the economic impacts of the water transfer infrastructure construction project in the event the water transfer is granted, and (2) Dr. Hamilton's analysis of the economic impacts of future water shortages in the event the water transfer is denied. (Walker Rebuttal Report at 15–20.)

424. First, relating to Dr. Hamilton's IMPLAN analysis, Ms. Walker declined to measure any economic benefits that would inure to Kansas from the construction project; instead claiming, without supporting evidence, that there will be no economic benefits to the State of Kansas from the construction project because the materials and equipment

needed for the project "are generally not produced in the State of Kansas and so must be purchased from out of State producers." (Walker Rebuttal at 15.)

425. Similarly, Ms. Walker argued that Kansas will receive zero economic benefits from the labor needs generated from the construction project because there is a "labor shortage in the local area, it is unlikely that many workers will come from Hays and Russell or possibly across Kansas." (Walker Rebuttal at 16.) Even assuming that she was correct, she failed to account for the economic benefit to the State of Kansas when workers move to the area and spend money on food, shelter, parts, equipment, and other ancillary goods and services.

426. Ms. Walker then stated that "regardless of where" the economic benefits occur "they are very short lived," essentially admitting that at least some benefits will accrue to the State of Kansas, but she did not attempt to measure any of those benefits. (Walker Rebuttal at 16.)

427. Ms. Walker then doubled down stating, without any analysis, that the construction project will be an economic detriment because it will result in increased water rates for the residents of Hays. (Walker Report at 29.)

428. The Presiding Officer finds Ms. Walker's premise that none of the equipment, materials, or labor will be sourced from Kansas and that Kansas will receive no economic benefits whatsoever from the construction project—whether short-lived or

long lived—to be without foundation, against the great weight of contrary evidence, and not credible.

429. When asked at the hearing whether Kansas has sufficient economic capacity to source the materials and labor for the construction project, Dr. Hamilton testified:

> [W]e did analyze that, so in the water infrastructure investments, there's certain very commonly invested things, there's wells, there's pump stations, and there's pipes. And so all of those basic materials, the core of the project are all available in Kansas. So there's a potential that all of this project could be derived from the State of Kansas, and it's unclear if anything else would be the case. And this is the default value in IMPLAN ....

(Hamilton Test., Tr. Vol. 7 at 1170:16–25.)

430. According to Dr. Hamilton's testimony and expert report, IMPLAN draws its data collected from numerous state and federal sources, including the Bureau of Labor Statistics, in assessing whether the construction industry in Kansas is large enough to absorb the economic activity resulting from the construction project. Dr. Hamilton's analysis shows that it is. (Ex. 2823 at Cities 0103513; Hamilton Test., Tr. Vol. 7 at 1167:21–1168:6.)

431. And when asked about the likelihood of whether Kansas would "achieve zero economic benefit from the construction project," as Ms. Walker presumes, Dr. Hamilton testified: "That would be impossible." (Hamilton Test., Tr. Vol. 7 at 1171:17–1172:3.)

432. Relating to Ms. Walker's claim that none of the workers on the project will come from Kansas, Dr. Hamilton further testified: "there are sufficient workers in Kansas to complete 100 percent of this project. It's small relative to the State of Kansas." (Hamilton Test., Tr. Vol. 7 at 1173:10–13.)

433. Dr. Hamilton further testified that the labor shortage referred to by Ms. Walker is actually nationwide, and, even if some of the workers come from out of State, when asked whether some could permanently relocate to Kansas, Dr. Hamilton testified: "Yes, I would expect many of them would," and many would bring their families with them to continue living in Kansas, which would "help restaurants, hotels, if they buy houses, it would help the real estate market, it would help retail sales, it would stimulate the economy" "[d]irectly in Kansas." (Hamilton Test., Tr. Vol. 7 at 1174:4–1175:10.)

434. The Presiding Officer finds that Ms. Walker's critique of Dr. Hamilton's IMPLAN analysis is not credible and finds that the construction project will produce substantial direct, indirect, and induced economic benefits to the State of Kansas as provided by Dr. Hamilton.

435. The Presiding Officer finds that Ms. Walker's theory that the construction project will yield a net cost because of the potential of higher water rates for the residents of Hays to be irrelevant and inapplicable as those are strictly local impacts and the passing of funds from residents of Hays to the City of Hays is, at worst, a net balance in terms of statewide economic impacts.

436. The Presiding Officer further finds that Ms. Walker provided no substantive analysis to support her claim that the construction project will lead to higher water rates and would have no offsetting statewide benefits, nor did she provide a valid basis for her assumption that all (or any) of the costs relating to the construction project will be passed on to the Cities' rate bases.

437. Any water transfer project, regardless of the source will have costs associated with completing the regulatory, design, and construction projects necessary to finalize the project and the Presiding Officer finds that the R9 Ranch is the most economically feasible water supply available to meet the Cities' current and long-term needs and will, unlike other alternatives, provide the Cities with a drought-resistant source of water, as discussed in Appendix D at Section I.

438. The Presiding Officer finds that Ms. Walker's claim that there are no economic benefits from the construction project because they would be "short lived" is not credible. Regardless of the duration over which economic benefits are derived, they are still benefits; money derived from a construction project over time is beneficial, whether it is accrued over a short period or a long period; a benefit of $1 per day for a million days is worth the same amount of dollars as $1 million dollars in one day.

439. Ms. Walker also criticized Dr. Hamilton's analysis of the economic impacts of water shortages in the Cities due to drought in the event the Water Transfer is denied for a variety of reasons.

440. First, Ms. Walker criticized Dr. Hamilton's assumption that the first 20% of any water shortage would be shouldered entirely by the residential sector. (Walker Rebuttal at 17.)

441. The Presiding Officer finds Dr. Hamilton's approach relating to allocation of economic losses between the residential and commercial/industrial segments to be reasonable as the Cities' conservation measures apply more towards residential uses than C&I uses and, regardless, doing so results in a more conservative loss estimate because economic losses in the residential segment are less than in the C&I segment for the reasons addressed in Dr. Hamilton's report. (Ex. 2823 at Cities 103524–25.)

442. Ms. Walker criticized Dr. Hamilton for relying on elasticity of demand research studies for his estimate of "residential, ***commercial and industrial*** customers … focusing on larger cities outside of Kansas, including the San Francisco Bay Area in California and the Chicago metropolitan area in Illinois, ***among others.***" She asserted that "[t]hose studies and the resulting valuations, are not likely representative of value judgments by Hays and Russell residents and businesses." (Walker Rebuttal at 17. Emphasis added.) Ms. Walker suggests that residential spending choices in San Francisco "are likely different than in" Hays and Russell but she does not say how they are different or what effect different choices would have on demand or elasticity. (Walker Rebuttal at 17.) Presumably, Hays and Russell residents drink about the same amount of water and bathe as regularly as San Francisco and Chicago residents.

443. But Ms. Walker's analysis ignores the fact that residents of the Cities appear to overwhelmingly support the Cities' efforts to obtain a drought-resistant and sustainable water source, for example, the residents of Hays overwhelmingly approved (by a vote of about 75% in favor) a half-cent sales tax, beginning in 1991 and still in effect, devoted exclusively to procuring a reliable water source, and because they are complying with the City's conservation requirements. (Dougherty Test., Tr. Vol. 1 at 127:11–24; 128:11–129:3; Ex. 332 at Cities 0018059).

444. Ms. Walker ignores the fact that Dr. Hamilton cited much broader studies for his elasticity of demand for residential customers. (Ex. 2823 at Cities 0103520, n. 89.)

445. Dr. Hamilton's sources included an expansive study of 221 Texas communities, a comprehensive study of residential water demand in California, and an analysis of eight California Water Agencies. (Ex. 2823 at Cities 0103520, n.89.)

446. Dr. Hamilton testified that the Cities' conservation measures are "quite intensive. I've not -- I've actually not seen -- even in California where we're very susceptible to droughts, I've not seen the level of investment in conservation measures that I see in the record here." (Hamilton Test., Tr. Vol. 7 at 1179:17–1180:24.)

447. He went on to note that he applied "elasticities that have been estimated for several regions, Texas, Chicago, Los Angeles, greater Los Angeles area, San Francisco," because there hasn't been a similar study in Kansas but because of demand hardening,

demand could even be less elastic and have worse effects in Hays and Russell. (Hamilton Test., Tr. Vol. 7 at 1180:1–13.)

448. Dr. Hamilton said that his conclusions are more conservative than if there had been a study of towns in Kansas that have implemented those conservation measures. (Hamilton Test., Tr. Vol. 7 at 1180:14–24.)

449. Ms. Walker, unlike the Cities' population expert, Ms. Haase (whose research includes face-to-face meetings with Hays and Russell community leaders), presented no evidence that she is familiar with the "value judgments" of residents of the Cities.

450. Finally, during the Hearing, Dr. Hamilton testified about the extensive conservation efforts enacted by the Cities that, as discussed above would result in significant demand hardening, making the damages incurred by Hays and Russell during a drought even more significant than estimated in his report. (Hamilton Test., Tr. Vol. 7 at 1179:17–1180:24.)

451. Ms. Walker criticized Dr. Hamilton's conclusion about water bills during a drought, assuming customers' water bills would decrease. (Walker Rebuttal at 17.)

452. Her assumption is not valid in light of the Cities' water rate structures, which increase during times of water shortage, so even in the unlikely event that residents use less water during drought (a proposition refuted by the weight evidence), their water bills may remain high, or even go up, during a drought due to the Cities'

drought conservation rate structure. (*See, e.g.*, Ex. 1762 (Hays water rate ordinance, showing increasing block structure during water warning or water emergency declarations); Ex. 255 at Cities 0017106 (showing that Hays went into water warning and then water emergency on two separate occasions during the 2012–2013 two-year flash drought)

453. The Presiding Officer also finds it to be a dubious assumption that a lower water bill could reasonably be considered a "benefit" to residents of the Cities during a drought, which would be akin to saying to a hungry person during a food shortage: "You may be starving, but just think of all the money you're saving on your grocery bill."

454. Ms. Walker argues that a reduction in water deliveries is merely a "quality of life issue," such as "brown lawns." (Walker Rebuttal at 17.)

455. The Presiding Officer rejects Ms. Walker's argument that a reduction in water deliveries is merely a "quality of life issue," such as "brown lawns" which assumes that the Cities' water supply issues do not carry significant economic implications. (Walker Rebuttal at 17.)

456. It also assumes that "quality of life issues" are not a valid basis to establish a city's need for additional supplies.

457. During a brief 2-year flash drought, there was legitimate concern among Hays residents that water would no longer flow from their faucets. (Williams Test., Tr. Vol. 2 at 410:11–411:16 (Hays resident Doug Williams testifying about the 2011–2013

drought and stating "you wonder, is there going to come a time when I turn on the spigot and nothing comes out?").)

458. And Russell presented evidence that significant economic opportunities hinged on its procurement of a sufficient drought-resistant water source, such as the expansion of the Purefield gluten plant. (Quinday Test., Tr. Vol. 2 at 541:13–17.)

459. The Presiding Officer finds that Ms. Walker's claim that Dr. Hamilton shuffled the years in the historical record" and chose the "most adverse" draw in evaluating the economic impacts of denying the water transfer is inaccurate. (Walker Rebuttal at 16–17.)

460. Dr. Hamilton took sequential 50-year draws from the historic hydrologic record; he did not "shuffle" years (Ex. 2823 at Cities 0103526 ("Each draw represents a different, continuous 50-year segment of historical annual drought data recorded at the official weather station in Hays over the period 1893–2020.").)

461. Dr. Hamilton did not choose the "most adverse" draw. He presented the distribution of economic losses from water shortages "across the 79 hydrologic draws," which included "a statistical mean of $43 million," with the most adverse being $117 million. (Ex. 2823 at Cities 0103527.)

462. The Presiding Officer finds that Ms. Walker's criticisms of Dr. Hamilton's economic impact analysis ignore the overwhelming contrary evidence, lacks credibility, and is without a reasonable scientific foundation.

E. Walker's critique of McCormick, Layzell, and Basara is unpersuasive.

463. Ms. Walker also criticized the testimony and associated reports prepared by Dr. Layzell and Dr. Basara as well as Mr. McCormick's Wellfield Yield Analysis.

464. Ms. Walker is not a hydrologist, hydrogeologist, engineer, paleo-scientist, climatologist, or meteorologist. She has no professional experience or training relating to investigating or evaluating the hydrogeologic characteristics of any ground- or surface-water resource, the complex hydrogeological factors present in the Smoky Hill River and Big Creek alluvial aquifers, or the impacts that droughts—of any duration or intensity—will have on those water sources and on which the Cities' existing water supplies rely. (CV of Ms. Walker, at pages 37–39 of Harvey Economics Expert Report)

465. Ms. Walker does not have professional experience or training relating to simulating the probability, duration, intensity, or frequency of historical or future droughts based on review and analysis of the paleo record. (*Id.*)

466. Ms. Walker has no professional experience or training relating to urban or regional planning nor is she accredited by any city planning accreditation board or organization. (*Id.*)

467. Ms. Walker has no professional experience or training relating to climate change modeling, whether in making city or land-management decisions or otherwise. (*Id.*)

468. Ms. Walker has no professional experience or training relating to simulating the probability, duration, intensity, or frequency of future droughts based on either running or reviewing climate models. (*Id.*)

469. The Presiding Officer finds Ms. Walker's criticisms of Mr. McCormick, Dr. Layzell, and Dr. Basara lack a valid scientific methodology and is unpersuasive and further concludes that she lacks qualifications to opine on the scientific or engineering basis of the testimony and evidence presented by those witnesses.

F. ENVIRONMENTAL IMPACTS – The statewide environmental impacts of approving the transfer outweigh the statewide environmental impacts of denying the transfer.

470. The Cities presented substantial competent evidence during the hearing that converting the R9 Ranch from irrigated agricultural farmland to native grassland will have beneficial environmental impacts.

471. The Cities presented testimony and an expert report from Dr. Keith Harmoney, a professor for Kansas State University at its Agricultural Research Center, whose specialties include native rangeland soil cover and plant population dynamics, and who has been on contract with the City of Hays for the past three growing seasons to assess the success of grassland reestablishment efforts on the R9 Ranch and to provide consulting and management advice on those efforts. (Ex. 2824 at Cities 0103560.)

472. Dr. Harmoney provided testimony about the environmental, habitat, and erosion impacts of converting the R9 Ranch circle land units from a tilled and cropped

monoculture back to a mixture of managed native grasses as well as the characteristics of the R9 Ranch soils, and the Presiding Officer finds that he is eminently qualified to opine on those matters. (*See* Ex. 2824 at Cities 0103580–92.)

473. The R9 Ranch is no longer being farmed and the City of Hays is working with a consultant to reestablish native grasses. (Crispin Test., Tr. Vol. 3 at 619:10–20.)

474. In summary, Dr. Harmoney concluded:

> The majority of the circle land units on the R9 Ranch have become, and the others will become, much more similar to the diverse native grassland ecosystem that once covered these lands. After conversion back to native grasses, these circle land units should: (1) function similarly to the grassland dominated ecological sites that once covered the landscape; (2) have reduced erosion, in terms of water and especially wind erosion, than prior tilled croplands; (3) provide a year-round vegetative ground cover with less water loss and water consumption than prior harvested field crops; and (4) provide critical habitat to native grassland birds and other wildlife

(Ex. 2824 at Cities 0103561.)

475. Dr. Harmoney further concluded that the vast majority of the native grasses reestablished on the R9 Ranch will utilize much less water than agricultural crops because of the native grasses' "greater water use efficiency to survive hot and dry periods and can form leaf tissue for photosynthesis and production of sugars to sustain meristems and perennial buds each year based on precipitation alone." (Ex. 2824 at Cities 0103562.)

476. The Presiding Officer finds that the Cities presented substantial competent evidence about the environmental, habitat, and erosion impacts of converting the R9 Ranch circle land units from a tilled and cropped monoculture back to a mixture of

managed native grasses based on Dr. Harmoney's evaluation and adopts and incorporates such evidence as factual in this proceeding.

G. NO FEASIBLE ALTERNATIVES – There are no economically or practically feasible alternative sources of water available to the Cities or other present or future users for any beneficial use. (K.S.A. 82a-1502(c)(4).)

477. After decades of searching and investment of extensive money and resources in locating a long-term, drought-resistant water supply that would empower future growth, the R9 Ranch was selected by the Cities as the only economically feasible water supply that would satisfy the Cities' long-term needs.

478. Appendix D and Exhibit 760 summarize the Cities substantial efforts to secure a long-term water supply.

479. Exhibit 1343 consists of two pages. The first is a timeline showing the various water source exploration projects undertaken by the Cities from 1969 through the filing of the change applications that led up to the present proceeding relating to the R9 Ranch water transfer project. The second page is a Gantt chart showing the Cities' overlapping efforts relating to each of the water-supply alternatives investigated by the Cities over the years. Mr. Dougherty also provided extensive testimony about the Cities' historical efforts to identify a feasible water supply. (*See generally* Dougherty Test., Tr. Vol. 2 at 244:2–282:5.)

480. Appendix D details those and other efforts with citations to the agency record.

481. DWR witness, Lane Letourneau, testified that he has been a DWR employee for 36 years and is familiar with the various water supply alternatives explored by Hays and Russell over the years. For example, he is aware that Hays and Russell filed a new application for water from Wilson; that they formed Public Water Supply District No. 15; that they have drilled test wells; that Hays developed the Dakota wellfield; that they looked at Cedar Bluff which is "extremely unreliable"; that they looked at the Cedar Bluff Cattle Feeders because he knew the owner of that facility; that they considered Kannapolis and Post Rock but declined to proceed because Post Rock's infrastructure was inadequate. (Letourneau Test., Tr. Vol. 4 at 901:1–903:3.)

482. The Presiding Officer finds that the Cities undertook an exhaustive search for alternative water sources that would feasibly address their water issues and concludes that the R9 Ranch is the only economically and practically feasible source of water available to the Cities.

VIII. GROUNDWATER MODELING – The R9 Ranch is a sustainable, long-term, drought-resistant source of municipal water for the Cities.

A. McCORMICK – Groundwater Model Report by the Cities' Expert, Paul McCormick.

483. Mr. McCormick provided direct testimony and an expert report titled "R9 Ranch Modeling Results Summary" addressing the long-term impacts to the aquifer at and surrounding the R9 Ranch caused by use of the R9 Water Rights as a municipal water supply for the Cities. (Ex. 2827.)

484. Mr. McCormick's qualifications are discussed above in Section II.D and attached to his Direct Testimony as Exhibit "PM-03." The Presiding Officer finds that he is well qualified to opine on the topics addressed in his direct testimony and related report.

485. A groundwater model is a mathematical representation of the important features of a physical hydrogeological system that uses "documented data to construct a conceptual representation of the physical groundwater system," which includes "aquifer dimensions, hydraulic characteristics, and the recharge and discharge processes within the system." (Ex. 2827 at Cities 0103699.)

486. When constructed with sufficient detail, groundwater models "can be used as a predictive scientific tool to quantify the impacts on the system of specified hydrological or pumping stresses." (Ex. 2827 at Cities 0103699.)

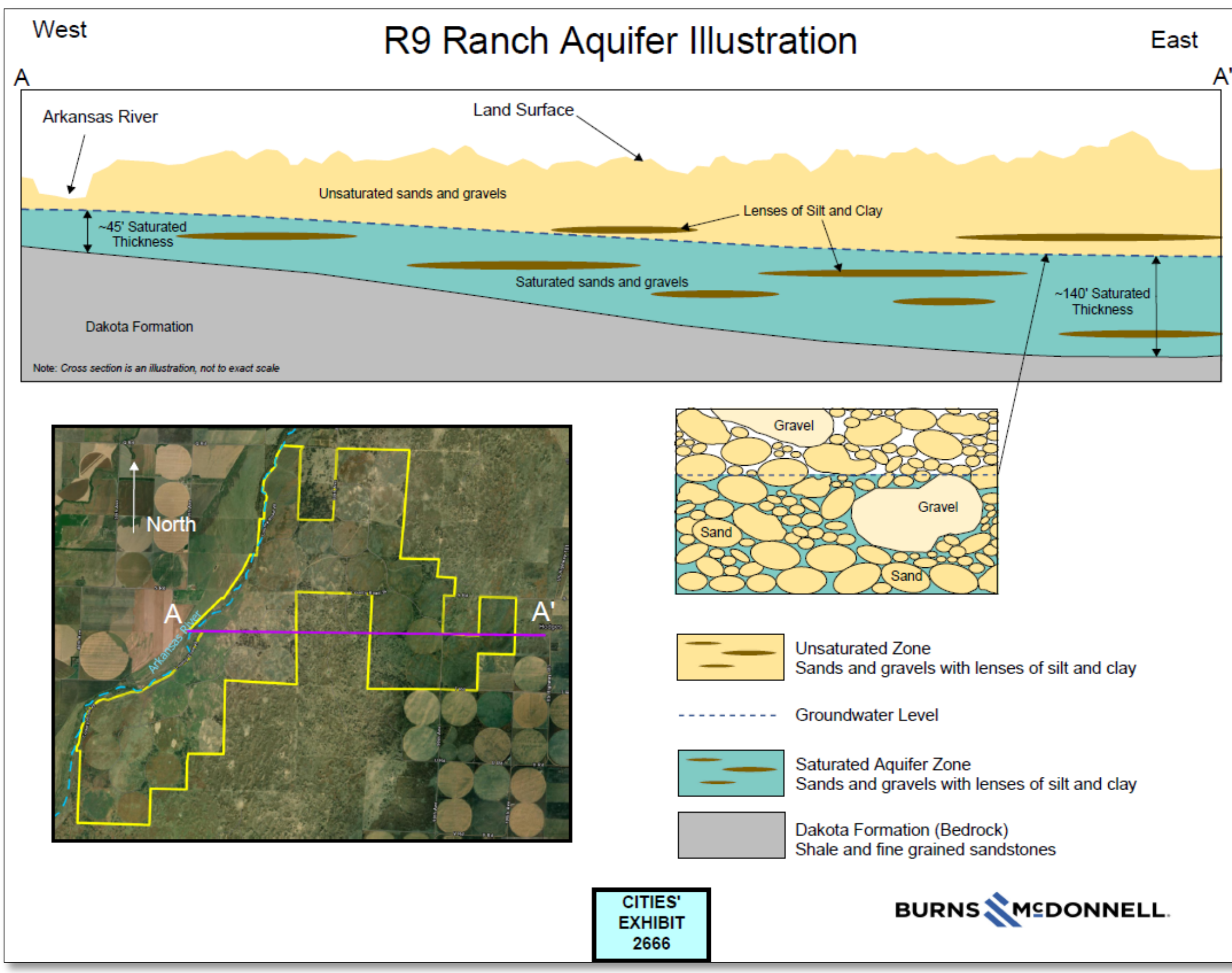
487. For his analysis, Mr. McCormick used a groundwater model developed by Balleau Groundwater, Inc. for GMD5, referred to as the "BGW Model." (Ex. 2827 at 0103700.)

488. The BGW Model was "'designed to address [GMD5] management questions regarding impacts of alternative actions on future hydrologic conditions, and to project future conditions in the aquifer and interrelated streams.'" (Ex. 2827 at Cities 0103700 (quoting the "BGW Model Report," Ex. 2297 at Cities 0080979).)

489. Using the BGW Model, Mr. McCormick quantified the long-term yield of the R9 Ranch as a municipal water source. (Ex. 2827 at Cities 0103673.)

490. Mr. McCormick testified that the saturated thickness of a groundwater aquifer is "the portion of the thickness that is saturated with water to where it is … extractable …." In other words, saturated thickness is "where the water is." (McCormick Test., Tr. Vol. 3 at 699:3–19.)

491. With respect to the area at and surrounding the R9 Ranch, the saturated thickness is depicted in Exhibit 2666.



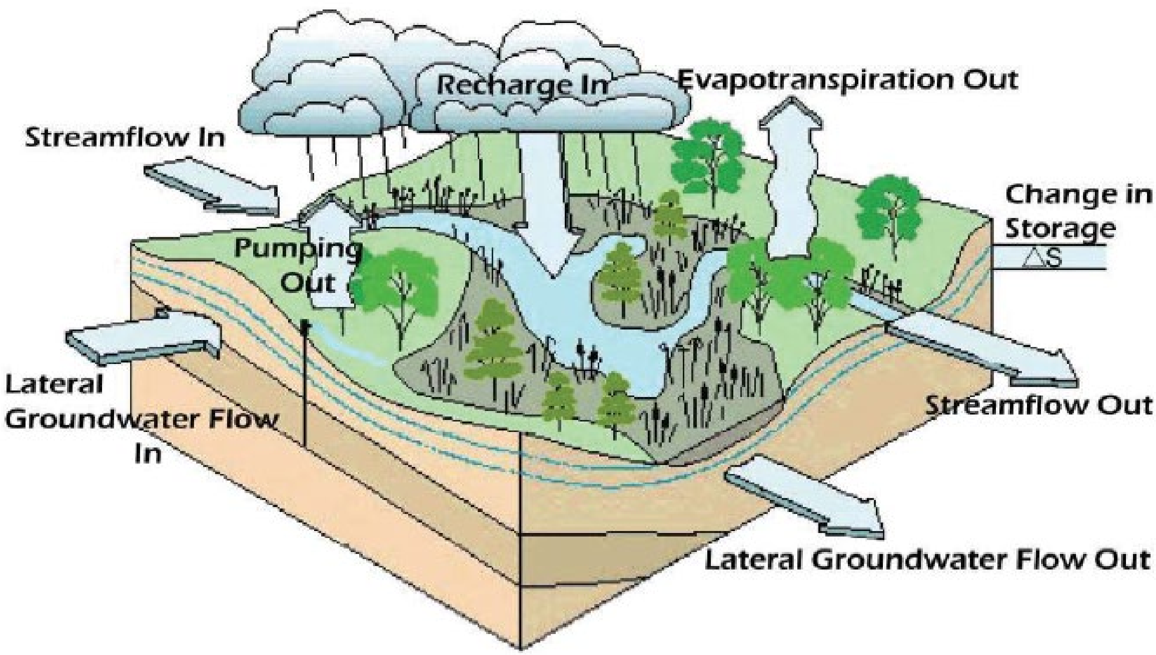
492. The ground surface elevation at the Ranch generally rises from west to east by about 10–20 feet, while the top of bedrock elevation decreases from west to east by about 60 feet, from approximately 2,185 feet above mean sea level ("AMSL") at the Arkansas River, to approximately 2,125 feet AMSL at the east boundary of the property. (Ex. 2827 at Cities 0103697.)

493. As a consequence of the R9 Ranch's geological features, the saturated thickness increases moving from west to east; on the west and southwest side of the R9 Ranch there is approximately 140 feet of saturated thickness, and the average saturated thickness across the Ranch is approximately 100 feet. (Ex. 2666; Ex. 2827 at Cities 0103697–98.)

494. Mr. Wenstrom confirmed during his testimony that the best saturated thickness on the R9 Ranch is on the southwest side of the property in the area around proposed Municipal Well E, in Section 5-T26S-R19W. (Wenstrom Test., Tr. Vol. 8 at 1407:12–21; Ex. 300.)

495. Figure 3-2 of Mr. McCormick's Groundwater Model Report is a graphical representation of a hypothetical groundwater system that illustrates the various flows that make up the water balance in the BGW Model.

Figure 3-2: Typical Water Balance Parameters.



(Ex. 2827 at Cities 0103702.)

496. Mr. McCormick discussed in detail each of these "flows" in his Report. (Ex. 2827 at Cities 0103706–07.)

497. To verify that the model was accurately simulating groundwater levels on the R9 Ranch, Mr. McCormick "compared the water levels calculated by our runs of the BGW Model with observed water levels from USGS monitoring wells located on the R9 Ranch." (Ex. 2827 at Cities 0103708.)

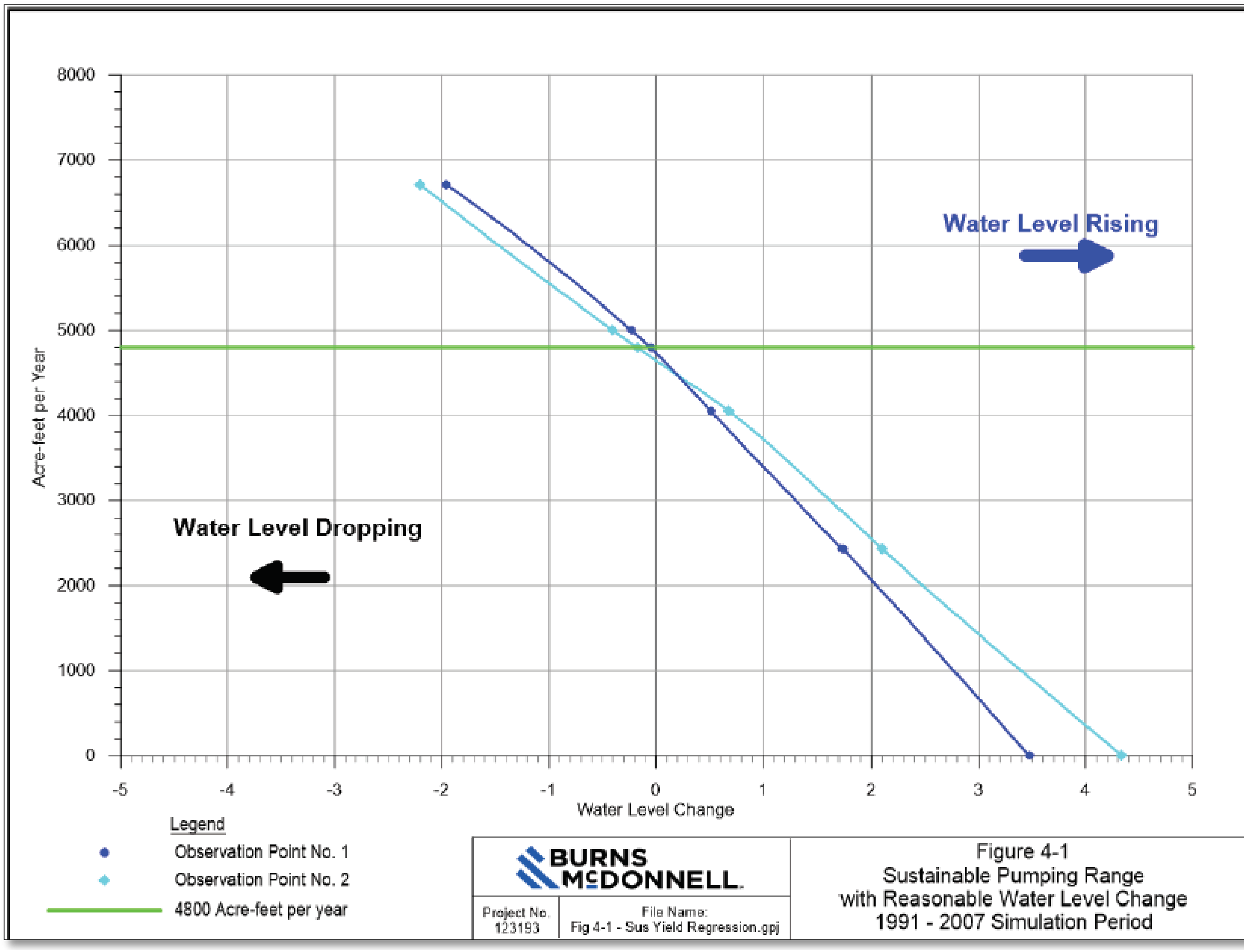
498. The comparison showed that "[t]he calculated and observed water levels correlate well, indicating that the BGW Model is accurately simulating water levels on the R9 Ranch." (Ex. 2827 at Cities 0103708.)

499. Mr. McCormick used the BGW model to "compare diversion of water from 14 simulated municipal well diversions with the documented 'baseline' irrigation well diversions from a 17-year period, from 1991 to 2007." (Ex. 2827 at Cities 0103694.)

500. The 1991–2007 timeframe was selected because it "has the most accurate pumping data available." Pre-1991 data "is inferred or estimated." (Ex. 2827 at Cities 0103694. *See also* BGW Groundwater Model Report, Ex. 2297 at Cities 0081037 ("DWR has quality checked the WIMAS database records since 1990, so meter records from 1991 through 2007 provide key information for simulated groundwater pumping over the historical period from 1940 through 2007.").)

501. To simulate the impacts of municipal pumping, Mr. McCormick "removed the existing irrigation wells and return flows on the R9 Ranch for the 1991 to 2007 time period …." "Fourteen (14) municipal wells were then added into the BGW Model at the proposed locations on the R9 Ranch …." (Ex. 2827 at Cities 0103711.)

502. Preliminary model runs with the 14 municipal wells incorporated into the model showed that water levels are reasonably stable when pumping at a volume of 4,800 acre-feet per year, as shown in Figure 4-1 of Mr. McCormick's Groundwater Model Report, pumping at that quantity results in very close to zero water level change (showing a green horizontal line for 4,800 acre-feet per year of municipal pumping intersecting with the water level change curves at very near zero water-level change):



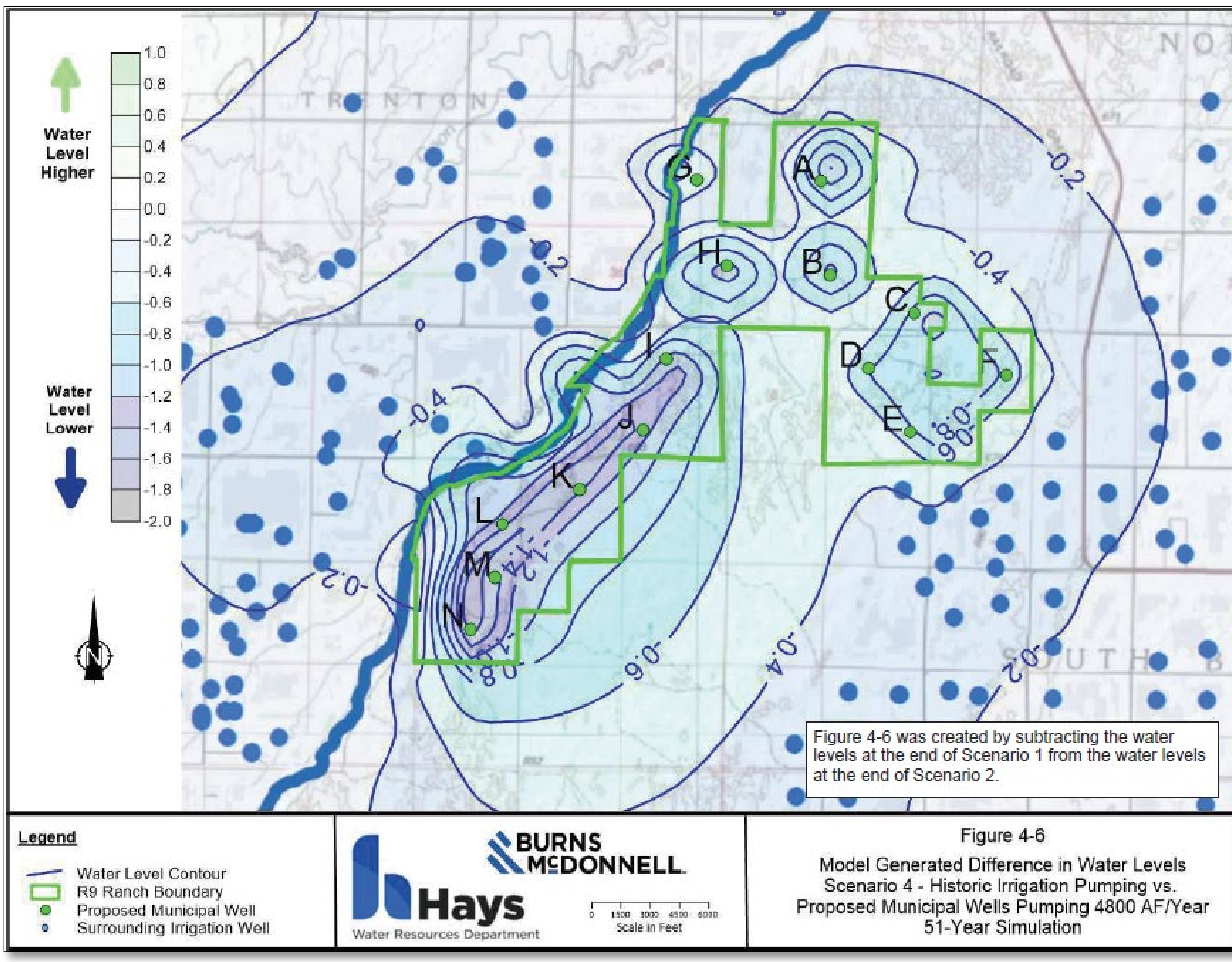
(Ex. 2827 at Cities 0103712.)

503. Mr. McCormick then ran a series of simulations showing both short-term (17-year) and long-term (51-year) effects of municipal pumping as compared to historical "baseline" irrigation pumping on the R9 Ranch. (Ex. 2827 at Cities 0103713–36.)

504. Summarized, Mr. McCormick's groundwater modeling conclusions include:

- The R9 Ranch can sustainably support long-term groundwater withdrawal of 4,800 acre-feet per year for the Cities' municipal use. (Ex. 2827 at Cities 0103695.)

- Fifty-one years of municipal pumping at the maximum allowed quantity of 4,800 acre-feet per year, results in an average water level decline of 0.4 feet at the neighboring wells closest to the southwest corner of the R9 Ranch boundary as shown in Figure 4-6 of Mr. McCormick's Report, which, as noted above, is an area with 140 feet of saturated thickness. (Ex. 2827 at Cities 0103726–27; McCormick Test., Tr. Vol. 3 at 702:23–703:18.)



(Ex. 2827 at Cities 0103726.)

- Fifty-one years of municipal pumping at the Cities' actual planned usage based on phased construction of the infrastructure and estimated operational use of the municipal wellfield indicates that groundwater levels will ***rise*** approximately 6 inches (0.5 feet) on average at the southwest boundary of the R9 Ranch over the 51-year period. (Ex. 2827 at Cities 0103727–31. *See also id.* at Cities 0103730 (Figure 4-7).)

- Mr. McCormick also ran the 51-year simulation of municipal pumping at the Cities' planned operational use with a 2% drought, which indicated that groundwater levels will, again, ***rise*** approximately 0.2–0.4 feet at the southwest boundary of the R9 Ranch over the 51-year period. (Ex. 2827 at Cities 0103734–36.)

- DWR Regulations adopted at the behest of Big Bend Groundwater Management District No. 5 define "sustainable yield" as "the long-term yield of the source of supply, including hydraulically connected surface water or groundwater, allowing for the reasonable raising and lowering of the water table." K.A.R. 5-25-1(l).

- It was determined in consultation with the Chief Engineer that the increases and decreases described in Mr. McCormick's Groundwater Model Report and testimony were "reasonable." *See, e.g.*, Master Order, ¶¶ 159–70. (Ex. 2827 at Cities 0103696. *See also* Ex. 1-2 at Cities 0000136–39 (Master Order, ¶¶ 159–70.)

505. The Presiding Officer finds that the Cities presented substantial competent evidence relating to the short- and long-term changes in groundwater conditions at the R9 Ranch as a municipal water source in the event the Water Transfer is approved and adopts the conclusions of Mr. McCormick contained within his pre-filed direct testimony and associated report.

B. LARSON – Water PACK's expert's groundwater modeling lacks credibility.

506. Water PACK presented expert testimony and a related report from Steven P. Larson of S.S. Papadopulos & Associates, Inc. critiquing Mr. McCormick's direct testimony and Groundwater Model Report. (Larson Testimony and Report filed by Water PACK on May 30, 2023.)

507. Mr. Larson's criticism of Mr. McCormick's work is limited to a single issue: "The BMcD evaluation failed to consider how groundwater recharge on irrigated land would change when the land was no longer irrigated." (Larson Prefiled Test. at 3:71.)

508. Mr. Larson claims that "soil moisture content on irrigated land would be higher than that on non-irrigated land due to the irrigation and that rainfall would have a greater capacity to reach the groundwater than it would on non-irrigated land." (Larson Direct Test. at 3:75.)

509. Mr. Larson claims that the BGW Model was "***premised***, in part, on the concept of higher recharge on irrigated land versus non-irrigated land which BMcD did not consider in their evaluation." (Larson Prefiled Test. at 3:78 (emphasis added).)

510. To quantify his claim, Mr. Larson ran a modified version of Mr. McCormick's simulations using the BGW Model Report's estimate of pre-1970 recharge, arguing that the difference in recharge between 1940 and 1970 as compared to 1970 to 2007 is attributable solely to higher recharge due to irrigation. (Larson Prefiled Test. at 3:88; 3:99–4:106.)

511. According to Larson: "By comparing the post-1970 curve to the pre-1970 curve for a given amount of groundwater recharge, the relative reduction in groundwater recharge on non-irrigated lands could be determined." (Larson Prefiled Test. at 3:99–4:106.)

512. It is important to note the difference between "irrigation return flow," and "precipitation recharge."

- Irrigation return flow is the volume of ***groundwater*** that is diverted by the irrigator, applied to the surface, that is not used by the crop, and returns to the aquifer via percolation (Ex. 2827 at Cities 0103706)."
- Precipitation recharge," is ***rainwater*** that percolates past the root zone down to the aquifer (Ex. 2827 at Cities 0103704–05).

513. Mr. Larson's claim relates to solely to precipitation recharge, not irrigation return flow (Larson Prefiled Test. at 3:99–4:106) asserting that there is a difference between precipitation recharge on irrigated land and precipitation recharge on dryland (Larson Test., Tr. Vol. 7 at 1242:1–4).

514. Mr. McCormick's calculation of irrigation return flow is not at issue in this proceeding and was addressed in the consumptive use calculations, which both the Chief Engineer, in the Master Order, and GMD5 agreed were accurate. (Ex. 1-2 at Cities 0000121–22, ¶¶ 86-91; Ex. 266 at Cities 0020383-84, ¶ 1.)

515. According to Mr. Larson, application of his alternate methodology "increases the impacts to groundwater levels by five times or more in places near the ranch boundary from those projected in the BMcD projections." (Larson Report at 7.)

516. Larson presented Figure 4 in support of his claim that groundwater level impacts results in approximately 2.4 feet of groundwater decline after 51 years of pumping at the maximum allocated quantity—five times more under his analysis as compared with Mr. McCormick's analysis:

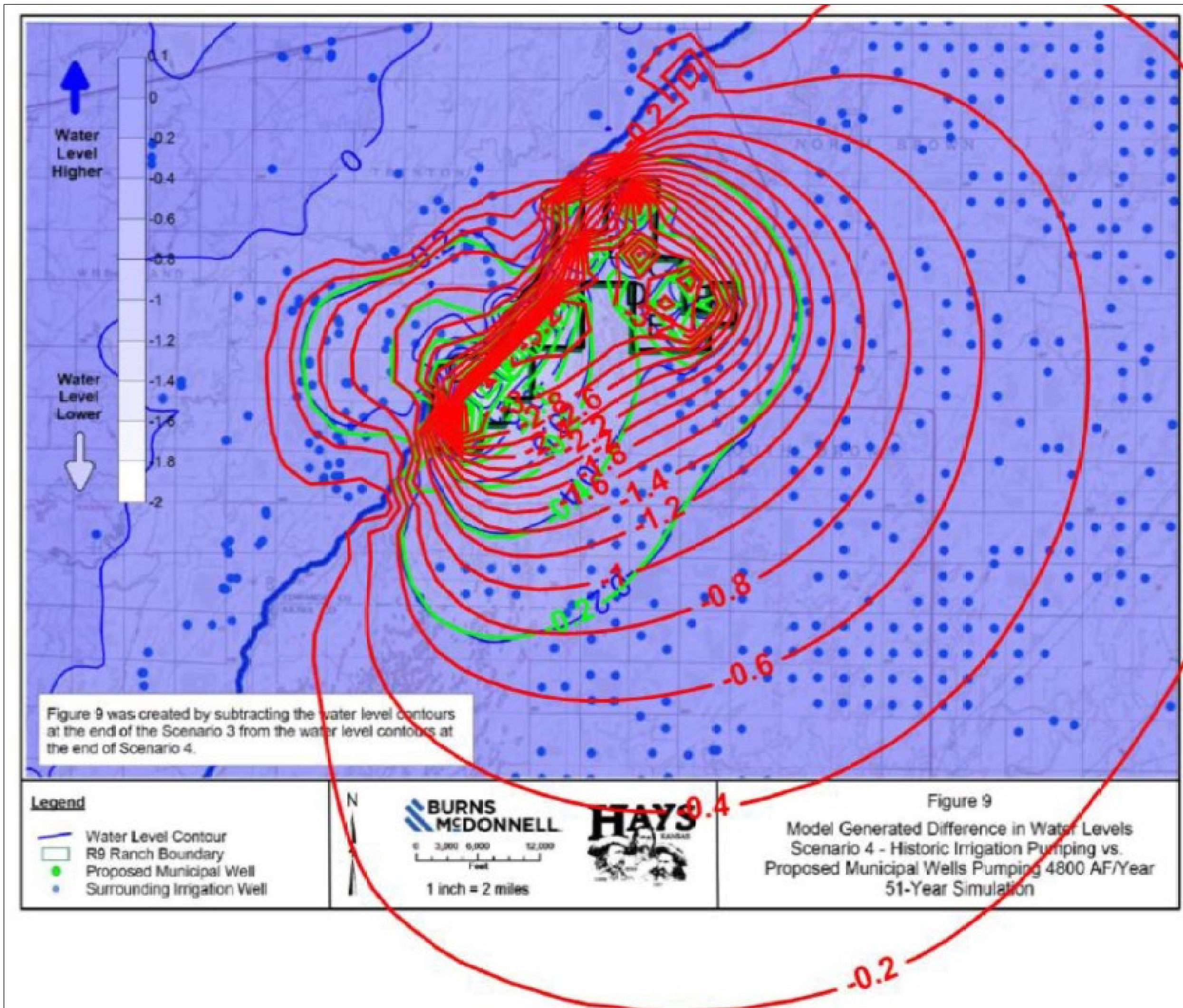


Figure 4: Comparison of SSP&A results using BMcD recharge (green contours) with SSP&A results using reduced groundwater recharge (red contours) for BMcD Scenario 4.

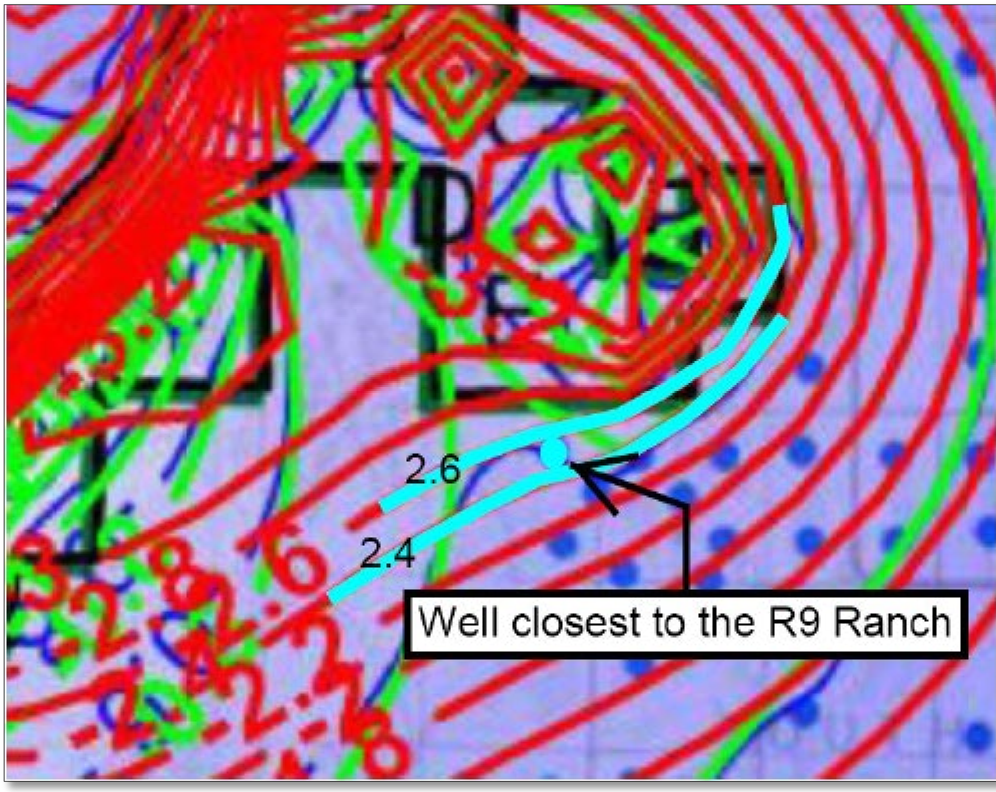
(Larson Report.)

517. Figure 4 of Mr. Larson's report is a modified version of Figure 4-6 of Mr. McCormick's Groundwater Model Report, located at Ex. 2827 at Cities 0103726.

518. A zoomed-in image of Mr. McCormick's Figure 4-6 at the southwestern corner of the Ranch showing about 0.4 feet of groundwater level decline after 51 years of municipal pumping at the maximum annual quantity of 4,800 acre-feet is shown below.

(Ex. 2827 at Cities 0103726.)

519. For comparison, a zoomed-in image of Mr. Larson's Figure 4 at the same area:



520. Figure 4 of Mr. Larson's report shows approximately 2.4 feet of decline after 51 years of maximum pumping by the Cities, which is 2.0 feet—or 5 times more—than the water-level change estimated by Mr. McCormick as shown in Figure 4-6 of his report.

521. As noted above, the saturated thickness near this portion of the R9 Ranch is approximately 140 feet. (Ex. 2666; Ex. 2827 at Cities 0103697–98.)

522. Mr. McCormick testified that "you try to avoid reducing your saturated thickness; obviously, when pumping it's going to be reduced some. But ***that's a minuscule amount***, it's covered by regular fluctuations in the water table. It is not a significant detriment to the aquifer as a whole." (McCormick Test., Tr. Vol. 3 at 704:5–10 (emphasis added).)

523. Mr. Letourneau testified that if the Cities were to divert 4,800 acre-feet per year for 51 years, a neighboring well owner would not even notice the decline. (Letourneau Test, Tr. Vol. 4, 867:1–23.)

524. Mr. Letourneau testified that with 140 feet of saturated thickness, a 2.8-foot decline after diverting 4,800 acre-feet per year for 51 years is "less than 1 percent of the total saturated thickness. I don't have my calculator here, but I think it's less than 1 percent." (Letourneau Test, Tr. Vol. 4, 867:21–868:3.) (In fact, it's a 2% decline. 2.8 ÷ 140 = 0.02)

525. Mr. Letourneau testified that "2.8 feet is not significant in 140 feet. It's -- it's not even significant in 45 feet." (Letourneau Test, Tr. Vol. 4, 868:13–15.)

526. Even if one were to accept Mr. Larson's analysis, 2.4 feet of decline after 51 years of pumping the maximum allocated quantity of water is less than 2% of the total saturated thickness in the area, which, the Presiding Officer finds, is not an unreasonable lowering of the static water level.

C. BARFIELD – The Cities presented substantial competent evidence that Mr. Larson's analysis is deeply flawed.

527. In response to Mr. Larson's direct testimony and expert report, the Cities presented rebuttal testimony and an associated expert report of Mr. David W. Barfield, P.E. (*See generally* Ex. 2867.)

528. Mr. Barfield is a licensed Professional Engineer in Kansas with a Master of Science in Water Resource Engineering from the University of Kansas; his career in

Kansas water resources exceeds 40 years, having spent 36 years with the Division of Water Resources, which included 15 years as lead of Kansas' technical team dealing with interstate water matters, working principally to resolve concerns related to the Republican River Compact and Kansas-Colorado Arkansas River Compact. (Ex. 2867 at Cities 0171946.)

529. From June 2007 until his retirement from State service in 2020, Mr. Barfield was Kansas Chief Engineer, responsible for directing the staff of the Division in fulfilling their broad responsibility over the State's water resources, including administration of four interstate water compacts, more than 30,000 active water rights, and the safety of thousands of dams and other water structures. (Ex. 2867 at Cities 0171946.)

530. The Cities engaged Mr. Barfield to "review and provide an evaluation of Mr. Larson's expert report as further supplemented by his direct testimony for this proceeding." (Ex. 2867 at 0171949.)

531. The Presiding Officer finds that Mr. Barfield is highly qualified to opine on the relative merits of Mr. Larson's expert report and testimony.

532. Mr. Barfield agreed that Mr. McCormick did not account for irrigation-enhanced precipitation recharge in his modeling work but concluded that "that omission was reasonable because the GMD5 model does not include that feature" and that Mr. McCormick's approach "is superior to the alternative method proposed by Mr. Larson for multiple reasons …." (Ex. 2867 at Cities 0171954–55.)

533. First, Mr. Barfield disagreed with Mr. Larson's claim that the BGW Model was "***premised*** on the concept of increased groundwater recharge from precipitation on irrigated lands," noting that Mr. Larson provided no citation for his claim and concluding that "Mr. Larson is mistaken." (Ex. 2867 at Cities 0171959 (emphasis added).)

534. In arriving at his conclusion, Mr. Barfield referenced the BGW Model documentation, noting that Mr. Larson's assumption "is not supported by the GMD5 model documentation; in fact, it is refuted by it." "There is no statement or suggestion in the BGW model documentation that [the] model was 'premised' on irrigation 'enhanced' recharge." (Ex. 2867 at Cities 0171959.)

535. In support of his conclusion, Mr. Barfield referenced Appendix H to the BGW Model Report, which provides an illustrative case in which a significant quantity of irrigation pumping was turned off "but recharge remains unchanged in the BGW modeling, which is precisely what [Mr. McCormick] did in [his] modeling." (Ex. 2867 at Cities 0171959.)

536. Mr. Barfield observed that if the BGW Model was "premised" on irrigation-enhanced precipitation recharge, as Mr. Larson contends, then the illustrative case addressed in Appendix H of the BGW Model Report would have accounted for a decrease in recharge caused by removal of those lands from irrigation. But it did not. (Ex. 2867 at Cities 0171959.)

537. Review of the illustrative scenario in Appendix H to the BGW Model Report, as well as the Report's discussion of the scenario, supports Mr. Barfield's conclusion.

- The illustrative scenario in the BGW Model Report describes the purpose of the scenario, which is "to display the type of information on proposed management action to be gained from the model." (Ex. 2297 at Cities 0081055)

- Nowhere does the summary of the illustrative scenario mention any change in recharge due to removal of 11,296 acre-feet per year of irrigation pumping, as would be the case if the BGW Model were "premised" on irrigation-enhanced precipitation recharge, as Mr. Larson contends. (Ex. 2867 at Cities 0171959.)

- As with the summary in the BGW Model Report, Appendix H to the Report makes no mention of any change in recharge due to removal of irrigation. In fact, Table 1, which shows the net difference in the water budget between the before and after scenarios (i.e., with and without irrigation), indicates zero change in Recharge for each of the years in the illustrative case, despite the removal of 11,296 acre-feet per year of irrigation pumping. A partial screenshot of Table 1 is below, with the recharge column highlighted:

GMD #5

MODEL

TABLE 1. NET BUDGET COMPONENT DIFFERENCE WITH POST APRIL 12, 1984 WELLS CURTAILED IN RATTLESNAKE CREEK BASIN (BASELINE B') (AFY)

Year	Stream Leakage	ET	Model Boundary	Aquifer Storage	Recharge	Well Pumping[1]
2008	533	264	0	10,490	0	-11,296
2009	1,129	603	0	9,620	0	-11,302
2010	1,439	849	0	9,006	0	-11,300
2011	1,696	1,071	0	8,532	0	-11,301
2012	1,898	1,256	0	8,148	0	-11,301
2013	2,069	1,417	0	7,820	0	-11,304
2014	2,225	1,553	0	7,524	0	-11,302
2015	2,366	1,668	0	7,269	0	-11,302
2016	2,491	1,772	0	7,039	0	-11,302
2017	2,566	1,873	0	6,860	0	-11,302
2018	2,571	1,993	0	6,732	0	-11,302
2019	2,564	2,123	0	6,609	0	-11,302
2020	2,562	2,246	0	6,485	0	-11,302
2021	2,568	2,364	0	6,361	0	-11,302
2022	2,562	2,482	0	6,249	0	-11,302
2023	2,547	2,597	0	6,142	0	-11,294
2024	2,520	2,711	0	6,053	0	-11,293
2025	2,491	2,826	0	5,966	0	-11,293
2026	2,458	2,940	0	5,885	0	-11,293
2027	2,427	3,054	0	5,803	0	-11,293
2028	2,426	3,156	0	5,704	0	-11,293
2029	2,431	3,247	0	5,610	0	-11,293
2030	2,447	3,328	0	5,513	0	-11,293
2031	2,463	3,398	0	5,426	0	-11,292

(Ex. 2298 at Cities 0080932.)

- When asked on cross examination about Table 1 in Appendix H, Mr. Larson agreed that it was showing the net differences in the water budget components and admitted that the difference in recharge in the "before" and "after" scenarios was zero; he had no explanation for why recharge would not have been reduced in the "after" scenario if, as he claims, the BGW Model was "premised" on irrigation-enhanced precipitation recharge:

> Q. Okay. But he [Peter Balleau][4] did not account for irrigation enhanced precipitation recharge in the illustrative case; is that true?
>
> A. As [Table 1] shows, there was no change in the recharge.
>
> Q. If indeed as you say the BGW model was premised on irrigation enhanced precipitation recharge, wouldn't it be the case that Mr. Balleau would account for that in his illustrative case?
>
> A. I don't know what exactly he was trying to represent in this example and whether he should or shouldn't have.

(Larson Test., Tr. Vol. 7 at 1248:16–1249:2.)

538. In 2011, Mr. Larson was engaged to perform a technical "peer" review of the BGW Model following its initial release; Mr. Larson's peer review was published in February 2011 and consisted of 69 pages of text and appendices. (Ex. 2308 beginning at Cities 0081401.)

539. Mr. Barfield notes that, in Mr. Larson's peer review, he made no mention of the concept of irrigation-enhanced precipitation recharge, much less that the entire BGW Model was "premised" on that concept as he now claims. (Ex. 2867 at Cities 0171959. *See also generally* Ex. 2308 (Larson's peer review).)

540. Mr. Larson confirmed same during his live testimony at the hearing:

> Q. [Y]ou don't state in your peer review of the [BGW] model report that the [BGW] model was premised on irrigation enhanced precipitation recharge, do you?

[4] Peter Balleau is one of the authors and architects of the BGW Model and the related report and is the individual who signed the technical memorandum that includes the illustrative case. (Exhibit 2298 at Cities 0080927.)

A. Not that I recall.

(Larson Test., Tr. Vol. 7 at 1249:14–20.)

541. Mr. Barfield concludes that it was an error for Mr. Larson to state that the difference in pre-1970 and post-1970 precipitation recharge was entirely attributable to irrigation. "A careful read of the [BGW] Model Report shows that the increase in recharge rates between pre-1970 and post-1970 was driven by a number of profound changes in land use, with irrigation being only one such factor." (Ex. 2867 at Cities 0171959–60.)

542. Mr. McCormick, who has years of experience running and working with the BGW Model and is also familiar with the BGW Model Report agrees with Mr. Barfield that that model does not state or even suggest that it is "premised" on Mr. Larson's notion of irrigation-enhanced precipitation recharge. (McCormick Test., Tr. Vol. 3 at 713:18–714:10.)

543. Mr. McCormick further agreed that the BGW Model provides no "mechanism for calculating or quantifying irrigation enhanced recharge." (McCormick Test., Tr. Vol. 3 at 714:11–15.)

544. Mr. Barfield referenced the BGW Model Report's discussion of the land use trends that contributed to the precipitation-recharge differences over time, specifically relying on a 1998 report by J.K. Koelliker. (Ex. 2867 at Cities 0181960 (quoting BGW Model Report, Ex. 2297 at Cities 0081012).)

545. Contrary to Mr. Larson's claim, the BGW Model specifically attributes the different precipitation-recharge estimate between pre-1970 and post-1970 conditions to a variety of land-use changes—not solely irrigation—stating specifically: "Recharge is treated in the Big Bend GMD No. 5 model as a monthly variable around an historical trend due to ***land-use changes***…. The historical change in recharge is based on a ***land-use trend*** as scheduled by Koelliker (1998, ***Figure 7.3***) …." (Ex. 2297 at Cities 0081013 (emphasis added).)

546. The referenced report by Koelliker is attached as Appendix B to the BGW Model Report, and Figure 7.3 shows the various land-use changes that resulted in the difference between the pre-1970 and the post-1970 precipitation recharge curves (Ex. 2297 at Cities 0081135), with irrigation making up only a small portion of the total:

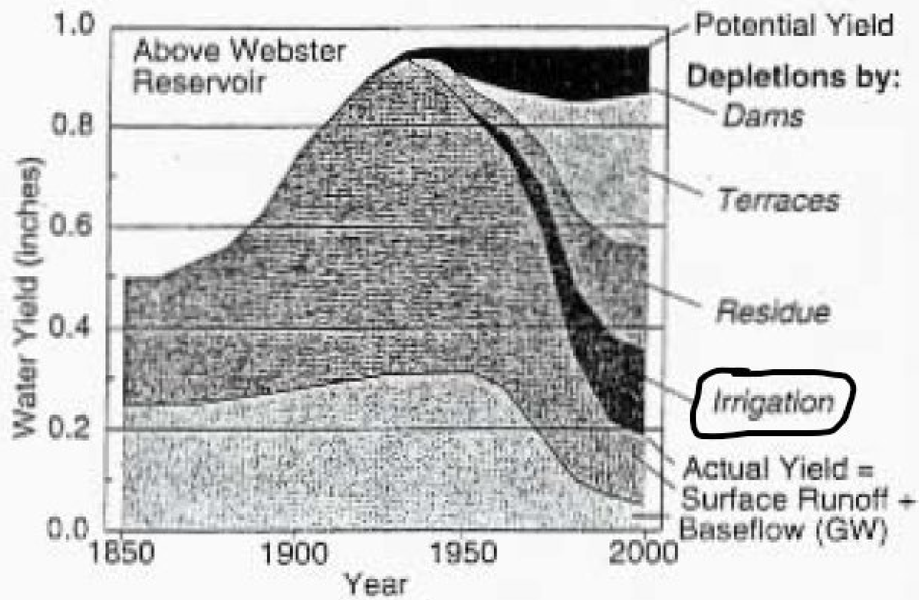


FIGURE 7.3—HISTORICAL PERSPECTIVE OF THE EFFECT OF AGRICULTURAL TECHNOLOGY ON WATER YIELD ABOVE WEBSTER RESERVOIR showing increases caused by conversion to cropland and depletions caused by various soil- and water-conservation practices and changes in agricultural technology (adapted from Koelliker, 1984).

(Ex. 2298 at Cities 0080759 (with "Irrigation"-circle markup).)

547. That a variety of land-use changes—not merely irrigation—were the reasons for different precipitation recharge estimates pre- versus post-1970, was confirmed by Larson himself in his 2011 peer review. In that document, Mr. Larson stated: "Different curves were applied to different zones within the model domain and the curves for some zones were different for periods before and after 1970 ***to reflect land-use changes***." (Ex. 2308 at Cities 0081410.)

548. This fact was confirmed by Larson during his live testimony:

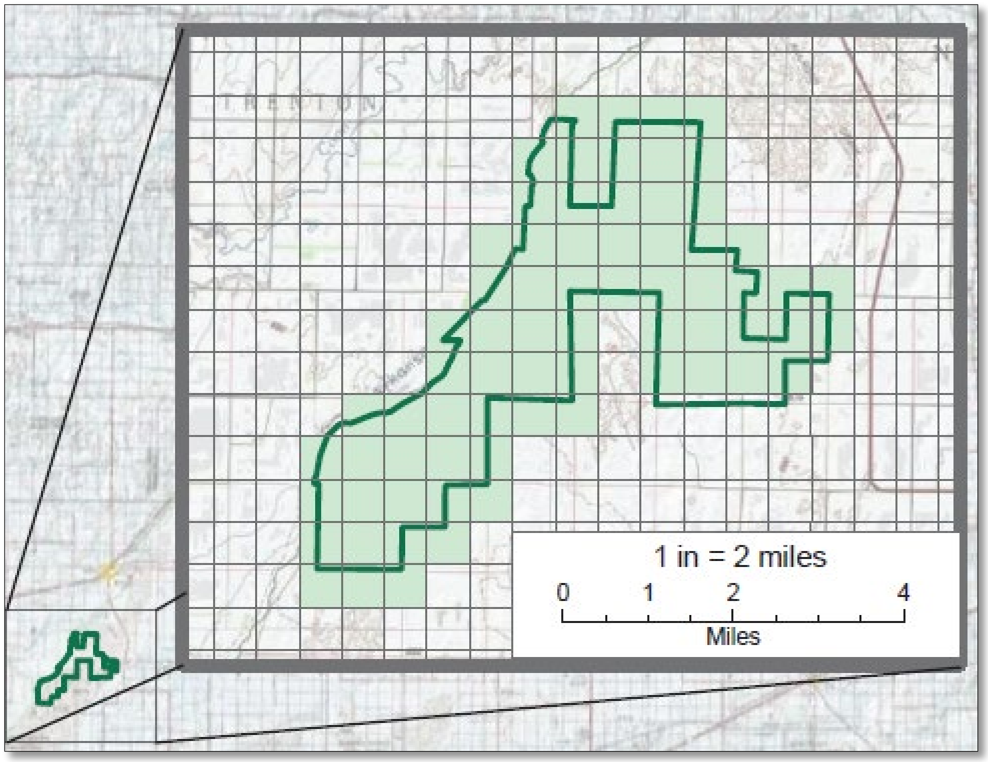
> Q. You don’t say there [in the peer review report] that the different curves were—for different zones were applied based on irrigation enhanced precipitation recharge, do you?
>
> A. No, I don’t.

(Larson Test., Tr. Vol. 7 at 1250:6–10.)

549. In addition, Mr. Barfield notes that the BGW Model covers an expansive area of land, only 18% of which is irrigated, which further undercuts Mr. Larson’s attribution of 100% of the difference in precipitation recharge between the pre-1970 curve and the post-1970 curve to irrigation. (Ex. 2867 at Cities 0171962.)

550. A similar criticism of Mr. Larson’s modeling work applies with respect to the R9 Ranch specifically. Mr. Larson’s theory, which relies on a purported enhancement to recharge from precipitation caused by irrigation should only apply to acres that were actually irrigated. (Ex. 2867 at Cities 0171962.)

551. The modeled area applicable to the R9 Ranch covers 11,100 acres, as illustrated in Figure 3-1 of Mr. McCormick’s Groundwater Model Report:



(Ex. 2827 at Cities 0103701; Ex. 2867 at Cities 0171962.)

552. But only about 5,200 acres of the approximately 11,100 total acres of the R9 Ranch modeled area were historically irrigated, which is less than 47% of the total modeled area. (*See* Ex. 2867 at Cities 0171962.)

553. Mr. Larson agreed that "when you have pivot irrigation not all of the land is saturated with irrigation water;" that "it would irrigate the ground that the irrigation system covers." (Larson Test., Tr. Vol. 7 at 1261:24–1262:2, and 1263:18–19. *See also* Ex. 1741 (aerial photograph showing the years each of the R9 Ranch circles were taken out of irrigation) and Larson Test., Tr. Vol. 7 at 1263:23–1264:17 (Mr. Larson agreed that the areas excluded from the highlighted circles in the exhibit were not irrigated during the 1991–2007 modeled period).))

554. Mr. Larson further conceded that the BGW Model "would use everything in zone 9 to compute recharge," not merely the irrigated portions. (Larson Test., Tr. Vol. 7 at 1265:14–16. *See also* Larson Test., Tr. Vol. 7 at 1266:23–1267:4 ("Q. But where there's no irrigation, there's no irrigation enhanced precipitation recharge, true? A. [by Larson]: The recharge was calculated, for those areas as well as others, based on zone 9 in both the runs that I made and the runs that Burns & McDonnell made.").)

555. And yet Mr. Larson did not adjust his analysis to account for the fact that any irrigation enhancement to precipitation recharge would apply to less than half of the R9 Ranch modeled area; rather, he applied his elevated recharge calculation to the entirety of the Ranch modeled area. (Ex. 2867 at Cities 0171962.)

556. For this and other reasons, Mr. Barfield concluded that the "GMD5 model does not provide a method to estimate enhanced recharge from precipitation on irrigated lands." (Ex. 2867 at Cities 0171963.)

557. Finally, even taking Mr. Larson's worst-case scenario that irrigation-enhanced precipitation recharge would result in declines that were "five times more" than Mr. McCormick's evaluation, Mr. Barfield, like Mr. McCormick, notes that that amount is still insignificant given the fact that there are 140 feet of saturated thickness at the location where Larson's asserts the most significant decline will occur:

> Based on my extensive experience as Chief Engineer of DWR, such use is well within acceptable and standard declines within the State of Kansas—including near and surrounding the Ranch. DWR routinely grants change applications even though planned water use will result in a reasonable

> lowering of the static water level at and surrounding the relevant place of use. This is entirely consistent with Kansas law and DWR regulations—many of which were implemented during my tenure as Chief Engineer.

(Ex. 2867 at Cities 0171967.)

558. Mr. Barfield concludes that adopting Mr. Larson's methodology to deny or curtail the Cities' use of the R9 Water Rights for municipal purposes "would ignore Kansas law and would be fundamentally unfair and would treat the Cities differently than every other water user in the State." (*Id.*)

559. The Presiding Officer finds that Mr. Larson's analysis of groundwater declines is flawed for the reasons described by Mr. Barfield and Mr. McCormick, including because it fails to consider and account for numerous facts. Mr. Laron's analysis lacks credibility and his methodology is without a reasonable scientific foundation.

D. SANDY SOILS – The extremely sandy soils on the R9 Ranch further undercut Mr. Larson's water modeling arguments.

560. In addition to the issues discussed above, Mr. Barfield further addressed the fact that any irrigation enhancement to precipitation recharge was significantly overstated due to Larson's failure to account for the extremely sandy conditions specific to the R9 Ranch. (*See* Ex. 2867 at Cities 0171963–95 at Cities 0171993–0172019.)

561. Mr. Larson's analysis assumes that the soils on the R9 Ranch are identical to all other soils in Zone 9 of the BGW Model Report, as shown on Figure 33 of that Report and Attachment 2 to Mr. Barfield's Rebuttal Report. (Ex. 2867 at Cities 0171963, 0171978.)

562. The location of the R9 Ranch is outlined in red within the BGW Model Report's Figure 33 to show the Ranch's relative location within the BGW Model Report's Zone 9 on Cities' Exhibit 1718.

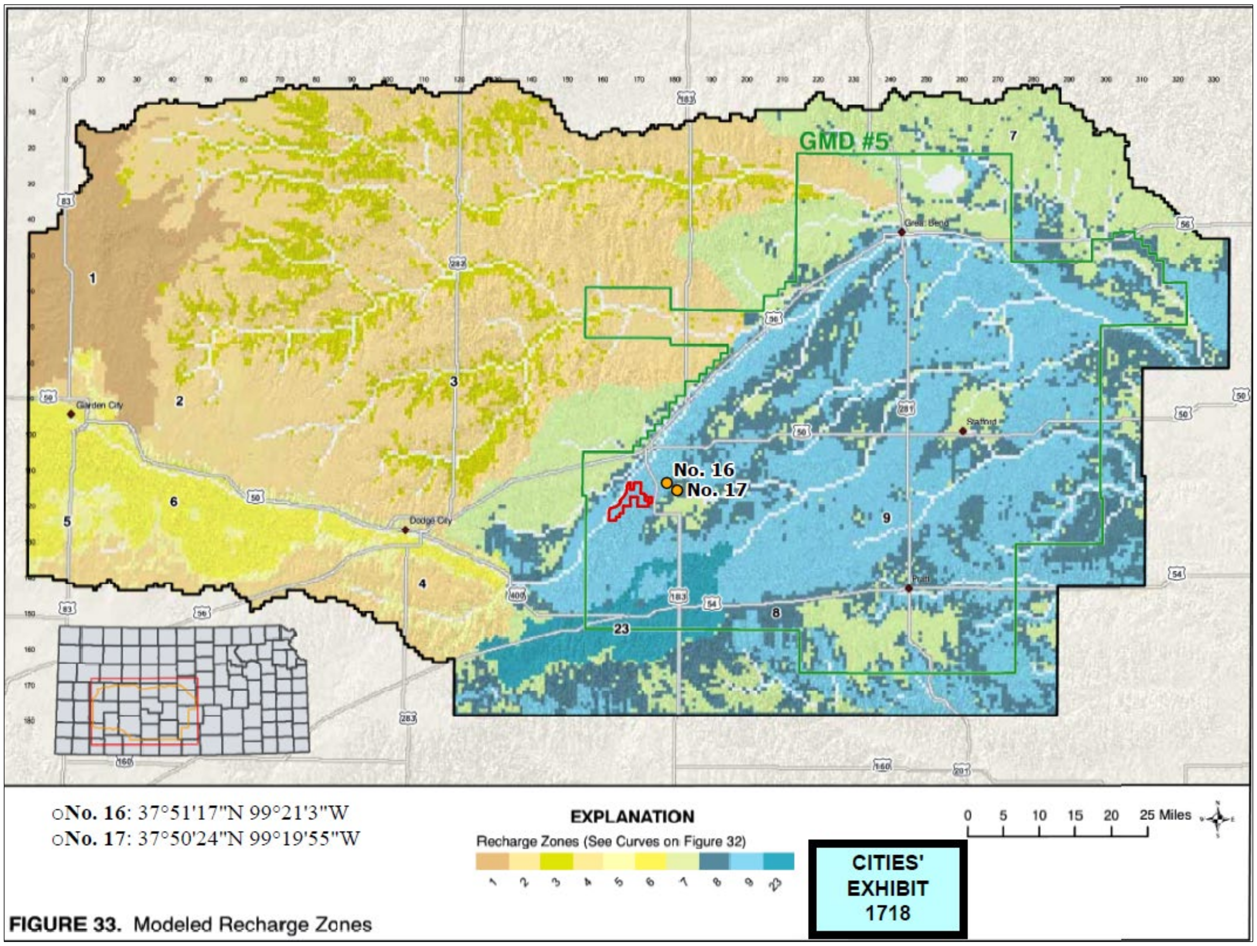


FIGURE 33. Modeled Recharge Zones

563. "Zone 9" is shown in light blue in Ex. 1718.

564. Mr. Larson's unsupported assumption relating to soil type is important because "soil type has a significant effect on precipitation recharge and the potential for its enhancement on irrigated lands." (Ex. 2867 at Cities 0171963.)

565. Mr. Barfield found that "the soils on the Ranch [are] dramatically different than Mr. Larson's assumptions with respect to any purported irrigation-enhancement for recharge." (Ex. 2867 at Cities 0171963.)

566. Mr. Barfield's detailed review of soils information for the R9 Ranch was Attachment 4 to his expert report and involved a comprehensive review of available information relating to the soil conditions on the Ranch as compared to the surrounding area and Zone 9 of the BGW Model Report. (Ex. 2867 at Cities 0171964–65, Cities 0171993–0172019.)

567. In summary, Mr. Barfield found that the soils on the R9 Ranch have "low available water capacity, and high permeability," and "it is unlikely that they will support significantly enhanced precipitation recharge during irrigation." (Ex. 2867 at Cities 0171965. *See also* Ex. 2867 at Cities 0172008–09 (NRCS map of the R9 Ranch with associated legend showing extremely low water holding capacity across the entirety of the property); Cities 0172013–14 (NRCS map of the R9 Ranch with associated legend showing high soil permeability across the entirety of the property).)

568. Mr. Barfield's conclusions relating to the low water-holding capacity and high permeability of the R9 Ranch soils was supported by testimony from other witnesses and evidence introduced during the hearing.

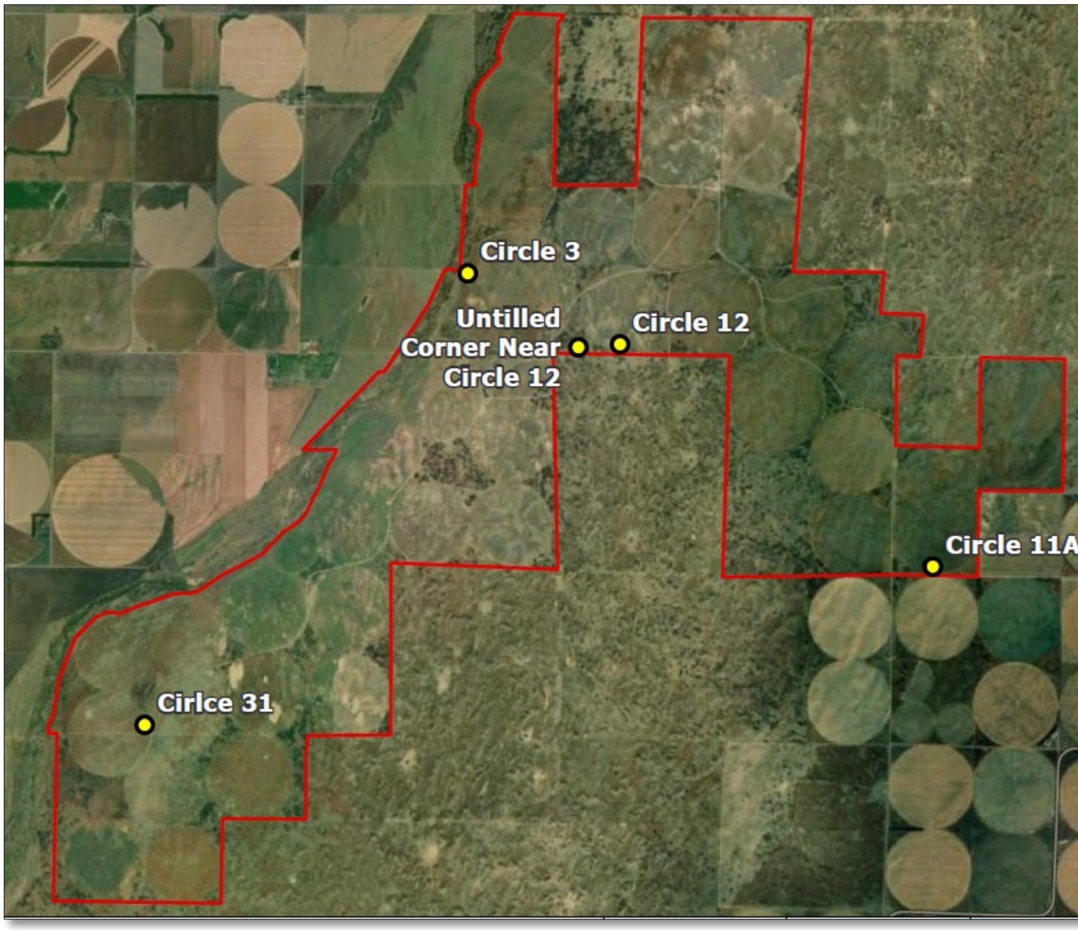
569. For example, in opposing the Cities' efforts to change the R9 Water Rights to municipal use, Richard Wenstrom wrote a letter to the Secretary of the Department of

Agriculture stating, "First of all, low water holding capacity soils on the ranch .... The [USDA/SCS Soil] Manual says this soil has 'extremely low water holding capacity, rapid permeability, and subject to blowing'." (Ex. 2462 at Cities 0087164–64.)

570. Mr. Wenstrom continued: "What happens to crops on these soils is that the irrigator keeps pumping and pumping, but most of the water returns to the aquifer through deep percolation without positive consumptive use." (*Id.*)

571. Mr. Wenstrom's characterization of the R9 Ranch soils is supported by additional photographic and physical evidence, as well as witness testimony during the hearing.

572. In late-April 2023, Jeff Crispin, Hays' Director of Water Resources, Dr. Keith Harmoney, and others, traveled to the R9 Ranch and collected soil samples from different areas of the property as indicated by the yellow points and labels on Exhibit 1705 (pasted below). (Crispin Test., Tr. Vol. 3 at 640:22–641:16; Harmoney Test., Tr. Vol. 5 at 1070:20–1071:17. *See also* Ex. 2655.)



573. Mr. Crispin, who assisted in collecting the samples, explained that he obtained both a surface sample and a second sample from approximately 18–28 inches below the surface at each location and placed them in jars. (Crispin Test., Tr. Vol. 3 at 641:11–644:7.)

574. The Cities brought these soil samples to the hearing and produced photographs of each sample from various angles, which are Exhibits 2681-01 through 2681-30, providing a general description of same. (Crispin Test., Tr. Vol. 3 at 641:21–25; 642:1–648:7.)

575. Mr. Crispin also addressed certain photographs and videos of the R9 Ranch property on the same date that the soil samples were collected, which photographs are Exhibit 2654 and videos are Exhibit 1764 and 1765. (Crispin Test., Tr. Vol. 3 at 648:8–652:20.)

576. Based on the soil samples, the photographs, and the videos addressed by Mr. Crispin, the soil on the R9 Ranch is clearly very sandy (*See, e.g.*, Ex. 2654 at Cities 0103175–78; 0103186; 0103197–99; 0103206–210; Ex. 1764), and includes sizable "blowout" areas (Ex. 2654 at Cities 0103212–13; Ex. 1765) and cut-out cross sections that indicate deep sandy conditions (Ex. 2654 at Cities 0103191–96.)

577. In addition to gathering soil samples from the R9 Ranch, in mid-June 2023, Mr. Crispin gathered two soil samples, numbers 16 and 17, from outside of the Ranch—one within the area the BGW Model Report designated as "zone 9," and another from "zone 7" for comparison purposes. The locations from which these samples were gathered are designated on Exhibits 1718 and 1738, which are versions of the same map identified as Figure 33 in the BGW Model Report, one (1718) with the boundaries of the R9 Ranch and the two soil sample locations superimposed, and another with the sample locations marked in red in a zoomed-in version of the same map. (Crispin Test., Tr. Vol. 3 at 652:21–654:23 and 656:10–657:4.)

578. The Cities brought these two samples to the hearing and also produced photographs of each sample from various angles, which are Exhibits 2681-31 through 2681-42. (Crispin Test., Tr. Vol. 3 at 641:21–25.)

579. Comparison of the photographs of the various soil samples indicate that the soils on the R9 Ranch are much sandier than the soil sample gathered from the zone 9 area outside the R9 Ranch, which is consistent with Mr. Crispin's testimony of same. (Crispin Test., Vol. 3 at 655:2–22.)

580. The Cities also presented the live testimony from Dr. Harmoney, who has personally been on the R9 Ranch multiple times and has evaluated the soils on the R9 Ranch, relating to the composition and water-holding capacity of those soils. (Harmoney

Test., Tr. Vol. 5, beginning at 1063:16; 1066:3–5 ("I'm on the ranch maybe about ten days a year.").)

581. Dr. Harmoney testified that the R9 Ranch has sandy soils with very low water-holding capacity that result in more and faster water infiltration with less runoff, than more fine-textured soils with silt and clay mixtures. (Harmoney Test., Tr. Vol. 5 at 1063:22–1063:13; 1064:2–19.)

582. Based on his personal observations (and consistent with Mr. Wenstrom's letter), Dr. Harmoney testified that there is no runoff at the R9 Ranch due to the porosity of the sandy soils present on the property. (Harmoney Test., Tr. Vol. 5 at 1065:13–1066:2.)

583. Dr. Harmoney also testified about the increased recharge associated with converting irrigated farmland to CRP land, which can result in as much as 79.19 percent more recharge. (Harmoney Test. Tr. Vol. 5 at 1068:7–1070:14; Ex. 2872.)

584. Dr. Harmoney, who was present during the gathering of the soil samples taken from the areas of the R9 Ranch marked on Exhibit 1705, has personally tested the water holding capacities of some of those samples as well as the samples taken from outside of the R9 Ranch boundaries from the areas depicted on Exhibits 1718 and 1738. (Harmoney Test., Tr. Vol. 5 at 1071:1–1073:12.)

585. Dr. Harmoney performed a water retention test, also referred to as a "ribboning test" for the samples gathered from Circle No. 3 on the R9 Ranch as well as

sample numbers 16 and 17 from outside of the Ranch. (Harmoney Test., Tr. Vol. 5 at 1073:9–1074:12.)

586. The results of Dr. Harmoney's ribboning test show that the soil sample taken from the R9 Ranch had a lower water-holding capacity than the soil samples taken from elsewhere in Zone 9, which had more silt and clay. (Harmoney Test., Tr. Vol. 5 at 1074:13–1075:7.)

587. Mr. McCormick, who has also physically been on the R9 Ranch multiple times, similarly confirmed during his live testimony that irrigation-enhanced precipitation recharge would not be a factor on that property because "the ranch is essentially dune sand, it's like being on a beach. Water that falls on the ranch immediately sinks into the ground, there are not runoff features, there's not retention features where water is ponded, there aren't streams or rills; it's sand, it's just like pouring a bucket of water out on the beach, it goes straight down into the ground." (McCormick Test., Tr. Vol. 3 at 715:3–716:11. *See also* Dougherty Test., Tr. Vol. 1 at 135:10–20 (The R9 Ranch is a "natural storage vessel for rain that falls on the property. The property is ... along the Arkansas River, it is very sandy soil. Water falls on the sand, it soaks in, and then it's there to use for future years.").)

588. Contrary to the statements in Mr. Wenstrom's letter, and the testimony of Dr. Harmoney, Mr. McCormick, Mr. Barfield, Mr. Dougherty, and Mr. Crispin, as well as the physical and photographic evidence presented during the hearing, Mr. Larson

claimed that the sandy soils support his theory that the Ranch is subject to enhanced precipitation recharge. But he failed to explain how that enhanced recharge relating to the purported delta between recharge on irrigated versus non-irrigated property applied to the R9 Ranch specifically. (Larson Test., Tr. Vol. 7 at 1235:25–1236:12.)

589. The Presiding Officer finds that Mr. Larson's conclusions relating to enhanced precipitation recharge due to irrigation are unsupported, unpersuasive, lack a reasonable scientific basis or methodology, and are not credible for the reasons addressed above. The Presiding Officer attributes no weight to Mr. Larson's conclusions..

IX. GMD5 MANAGEMENT PROGRAM – The proposed water transfer meets all of the requirements, standards, policies, and rules and regulations of the GMD5 Management Program. (K.S.A. 82a-1503(c)(9).)

590. The R9 Ranch is within the boundaries of the Big Bend Groundwater Management District No. 5. (Ex. 1-2 at Cities 0000112, ¶ 44.)

591. The GMD adopted its Revised Management Plan, dated October 11, 2018, which was approved by the former Chief Engineer on January 2, 2019. (Ex. 67b.)

592. Regulations recommended by GMD5, adopted by the Chief Engineer, and applicable within GMD5 are found at K.A.R. 5-25-1, *et seq.*

593. GMD5 Regulations applicable to the Cities' R9 change applications include several well location requirements which must be met by each of the proposed municipal wells, which were addressed in the Master Order. (Ex. 1-2 at Cities 0000111, ¶ 42; Cities 0000145, ¶ 207.)

594. Municipal wells may not be moved more than 2,640 feet from their authorized points of diversion. (K.A.R. 5-25-2a(a).)

595. All municipal wells must be completed in the aquifer or aquifers in which the currently authorized wells were authorized to be completed. (K.A.R. 5-25-2a(d).)

596. All municipal wells must be more than 1,320 feet from wells that carry an earlier priority except those wells owned by the Cities. (K.A.R. 5-25-2(a).)

597. All municipal wells must be more than 660 feet from all existing domestic wells, except those domestic wells owned by the Cities. (*Id*.)

598. The Big Bend Groundwater Management District No. 5 has been closed to new water appropriation rights by rule. (K.A.R. 5-25-4; Letourneau Test., Tr. Vol. 4, 827:13-23.)

599. The provisions of GMD5's Revised Management Plan that specifically mention water transfers do not impose obligations or requirements on transfer applicants. (Ex. 67b at Cities 0003177 and Cities 0003180.)

600. The Revised Management Plan states that new GMD5 regulations require monitoring wells near "new large capacity wells." (Ex. 67b at Cities 0003180, ¶ E.1.)

601. GMD5 Staff reviewed the Master Order and, among other items addressed elsewhere in these proposed Findings, recommended that the R9 Ranch Water Level Monitoring Plan (Ex. 2462 at Cities 0087865–68) be amended to address water quality in accord with K.A.R. 5-25-7. (Ex. 266 at Cities 0020385, ¶ 7. *See also* Staff Findings, ¶ 10.)

602. As a result of the GMD5 recommendations, the Cities voluntarily amended the monitoring plan to include a water quality component. (Ex. 1-2, Cities 0000118, ¶ 69; Cities 0000147, ¶ 218.) The amended plan is attached to the Master Order as Exhibit 34. (Ex. 1-2 at Cities 0000345–51.)

603. Mr. Letourneau reviewed the GMD5 Revised Management Program dated October 11, 2018 (Ex. 1-67b), to make sure it complied with the statutes before Mr. Barfield approved the Revised Management Program on January 2, 2019. Mr. Letourneau determined that it does comply and testified that there is nothing in the Revised Management Program that would curtail or cause any concern about approval of the transfer application. (Letourneau Test., Tr. Vol. 4 at 875:15–874:17.)

604. The Presiding Officer finds that the Cities' proposed water transfer meets all of the applicable requirements of the GMD5 Management Program.

X. Approval of the Water Transfer will not cause impairment.

A. There is no evidence of direct, well-to-well impairment of any water right outside of the R9 Ranch.

605. See generally, Section V. of the Proposed Conclusions of Law.

606. The R9 Water Rights authorizes up to 38,244 gpm. (WP14895.)

607. The Master Order reduces the combined rate from all of the R9 Water Rights to 13,950 gpm. (Ex. 1-2 at 173, Table 3.)

608. The 14 municipal wells are expected to be operated at 350 gpm for a combined total of 4,900 gpm. (Ex. 2832 at Cities 0171064 and the following table.)

Municipal Well	Municipal Well Maximum Rates	Municipal Well Operation Rates
A	945	350
B	885	350
C	1,360	350
D	1,500	350
E	1,270	350
F	1,040	350
G	1,040	350
H	765	350
I	805	350
J	700	350
K	700	350
L	950	350
M	950	350
N	1,040	350
Totals	13,950	4,900

609. The Cities proactively agreed to prohibit the location of any new municipal well within one-half mile of any then-existing irrigation well outside of the boundaries of the R9 Ranch. (Ex. 251 at 17036-38; Ex. 1-2 at 145, ¶ 208.)

610. The Chief Engineer found that "the requested changes in points of diversion are reasonable, will not impair existing rights, and relate to the same local source of supply as that to which the R9 Water Rights relate. *See* K.S.A. 82a-708b(a)." (Ex. 1-2 at 146, ¶ 212.)

611. Lane Letourneau, Program Manager of DWR's Water Appropriation Program, provided testimony at the hearing relating to DWR practices and policies as well as the agency's interpretation of its regulations, the KWAA, and the WTA.

612. Mr. Letourneau has been employed at DWR for 36 years, beginning his tenure in DWR's new-applications section. (Letourneau Test., Tr. Vol. 4 at 811:5-9.)

613. In 2007, Mr. Letourneau was promoted to his current position as Program Manager of DWR's Water Appropriation Program. Mr. Letourneau reports to the Chief Engineer who reports to the Secretary of Agriculture. (Letourneau Test., Tr. Vol. 4 at 815:20–817:3.)

614. Mr. Letourneau's duties include daily interpretation and application of the KWAA (Letourneau Test., Tr. Vol. 4 at 827:7–11); drafting and implementing statutes and DWR rules and regulations (*Id*. at 827:12-14 and 18-20); working with the Chief Engineer to develop policies and procedures (*Id*. at 827:15–17); and administering water rights, which includes reviewing, evaluating, and resolving applications for new water rights, change applications, and impairment complaints (*Id*. at 860:14–18).

615. Mr. Letourneau testified extensively about DWR's processing of applications for new appropriation rights, permitting, limitations on well locations, perfection of water rights, field inspections, certificates of appropriation, and change applications. (Letourneau Test., Tr. Vol. 4 at 814:16–815:20. *See also generally id.* at 817–35.)

616. K.S.A. 82a-711(c) permits new water appropriation rights unless they will cause an "***unreasonable*** … lowering of the static water level"—even if the quantity exceeds recharge. (Letourneau Test., Tr. Vol. 4 at 830:2–16 (emphasis added).)

617. Before it was closed to new permits, DWR and the Groundwater Management District permitted "groundwater mining" in GMD5. (Letourneau Test., Tr. Vol. 4 at 831:4–12.)

618. Mr. Letourneau testified that K.S.A. 82a-711 and K.S.A. 82a-711a "allow you to dewater the aquifer as long as you don't impact anybody." (Letourneau Test., Tr. Vol. 4 at 853:11–13.)

619. When the irrigation wells on the R9 Ranch were operating, they were contributing to the decline of the aquifer. (Letourneau Test., Tr. Vol. 4 at 854:24–855:4.)

620. Mr. Letourneau testified that Dr. Sam Perkins is a DWR employee and an "excellent modeler" who runs the GMD5 model and provides the results to Mr. Letourneau. Dr. Perkins ran the Burns & McDonnell model and confirmed that Mr. McCormick's groundwater modeling was accurate. (Letourneau Test., Tr. Vol. 4 at 856:4–863:12. *See also* Ex. 2462 at Cities 0087539–70 (DWR Staff Review of R9 Ranch Pumping and Water Levels, by Sam Perkins); Ex. 1-2 at Cities 0000108, ¶ 7; Cities 0000117, ¶ 65; Cities 0000129, ¶ 133 (referring to DWR's "independent review of the model performance"); Cities 0000131, ¶¶ 141–42; and Cities 0000134–35, ¶ 152.)

621. Mr. Letourneau testified, without prompting, that Mr. McCormick is an excellent modeler. (Letourneau Test., Tr. Vol. 4 at 863:16–21.)

622. As stated in Section X, Mr. Letourneau testified that the Cities' use of the R9 Water Rights for municipal water would cause no impact to neighboring wells, even if

the Cities continuously pumped their maximum allowed quantity for 51 consecutive years, and even assuming Mr. Larson's flawed worst-case scenario. (Letourneau Test, Tr. Vol. 4, 867:1–23; *id.* at 867:21–868:3; *id.* at 868:13–15.)

623. In areas closed to new water appropriation rights, DWR advises the purchase of an existing irrigation water right and an application to change the water right to a new use as permitted by K.S.A. 82a-708b, which is precisely what the Cities did in this instance. (Letourneau Test., Tr. Vol. 4 at 827:4–12; 889:7–22.)

624. The location of a well can be moved up to one-half mile but it must stay far enough from other wells to avoid direct well-to-well impairment. (Letourneau Test., Tr. Vol. 4 at 839:2–841:1; Tr. Vol. 4 at 843:24–844:12.)

625. Before a well begins diverting groundwater, the aquifer is saturated. When the pump is turned on, the well diverts the water in the well bore and then begins pulling water into the well and to draw the aquifer down near the wellbore, creating a cone radiating out from the wellbore. As pumping continues, the cone gets larger and larger until reaching an equilibrium. The size of the cone stops expanding when the quantity being diverted equals the quantity flowing from the aquifer into the well bore. (Letourneau Test., Tr. Vol. 4 at 837:3–838:17; Wenstrom Test, Tr. Vol. 8 at 1400:21–1403:1.)

626. The rate of diversion in gallons per minute affects the size of the cone of depression. Reducing the rate reduces the diameter of the cone of depression. (Letourneau Test., Tr. Vol. 4 at 845:16–19; Wenstrom Test, Tr. Vol. 8 at 1402:13–19.)

627. Mr. Letourneau testified:

> Q. Okay. So let's say I want to move closer to a well ... my cone of depression can't get close to his cone of depression, or how does that work?
>
> A. The cone of depressions can get closer, it's just the cone of depression cannot—cannot impact the other cone of depression to the point that it keeps water from getting to [the other well].

(Letourneau Test., Tr. Vol. 4 at 840:19–841:1.)

628. DWR regulations distinguish between "direct" and "regional" impairment. (Compare K.A.R. 5-4-1(c)(5) and K.A.R. 5-4-1a with K.A.R. 5-4-4(a) (well spacing); K.A.R. 5-5-16(a)(4) (additional wells) K.A.R. 5-13-2(b)(1) (sand and gravel pit operations); K.A.R. 5-14-1(i) (enforcement); and K.A.R. 5-19-2 (b)(10) (LEMA plans). *See also* DWR's Brief in Water PACK's KJRA proceeding referring to "direct impairment" and "direct, well-to-well impairment." Ex. 2462 at Cities 0091295, 91312, 91318. *See also* Judge Gatterman's Order. Ex 2462 at Cities 0091657 and 0091693.)

629. Mr. Wenstrom explained that his concern is about regional declines, not direct, well-to-well impairment. He worries about "how long those wells are operated, and that's where the acre-feet comes in. That's what this whole hearing is about is acre-feet…. The pumping rates are incidental." (Wenstrom Test, Tr. Vol. 8 at 1403:12–17.)

630. Mr. Wenstrom agreed that direct well-to-well impairment is driven by the distance between wells and rate.

> Q. [W]hen a cone of depression reaches equilibrium, it doesn't really matter how long you pump it, the cone of depression doesn't get bigger,

you're just concerned that—of the effect of lowering the aquifer with your correction. Is that fair?

A. That's fair.

Q. Okay. So ... the idea of interference between two wells is really focused on distance apart and rate, direct interference, well-to-well interference, correct?

A. Yes.

(Wenstrom Test, Tr. Vol. 8 at 1404:24–1405:10.)

631. Mr. Letourneau agreed that increasing the separation distance between wells and reducing the rate of diversion reduces the chances of direct well-to-well impairment. (Letourneau Test., Tr. Vol. 4 at 845:16–847:12.)

632. The Cities' consolidated municipal wells, which will operate at approximately 350 gallons per minute, will result in a dramatic decrease in the rate of extraction as compared to historical irrigation activities on the R9 Ranch—or ongoing irrigation activities by surrounding water users, such as Mr. Wenstrom. (Clement Test., Tr. Vol. 3 at 732:22–25. *See also* Ex. 2832 at Cities 0171064 (R9 Ranch Wellfield Conceptual Operation Plan stating "[t]he design production rate for each well is expected to be 350 gallons per minute.").)

633. For example, the three R9 Ranch irrigation wells nearest Mr. Wenstrom's well at the southeast corner of the R9 Ranch have a combined rate of 3,432 gpm, compared to planned municipal Well E's rate of 350 gpm—just over 10% of the former rate. And even when considering the two planned municipal wells, which are, between them,

farther away on average, the planned rate is a combined 750 gpm, which is just about 21% of the former rate of withdrawal. (Clement Test., Tr. Vol. 3 at 734:25–735:12 (discussing Ex. 1-1).)

634. Mr. Wenstrom agreed that replacing two irrigation wells with municipal Well E and reducing the rate to 350 gallons a minute make the chances of direct well-to-well interference with his well in Section 8 very small. (Wenstrom Test., Tr. Vol. 8 at 1407:2–12.)

635. As acknowledged in testimony by hydrogeologist, Daniel Clement, "because the pumping rate is less, the drawdown must be less," especially since the new municipal wells will be farther away from neighboring wells than were the previous irrigation wells and the radii of the cones of depression caused by those municipal wells will be smaller. (Clement Test., Tr. Vol. 3 at 737:10–15.)

636. Mr. Letourneau testified that he is not aware of any evidence of potential impairment of other water rights that will result from approval of the transfer. (Letourneau Test., Tr. Vol. 4 at 847:13–848:2.)

637. Mr. Letourneau testified that the Anti-Speculation Doctrine prohibits tying up ***new*** water rights that should be available to somebody else but does not apply to ***existing*** water rights, especially after the changes to the forfeiture statute, K.S.A. 82a-718. (Letourneau Test., Tr. Vol. 4 at 876:23–877:2; 879:10–24.)

638. Mr. Letourneau testified that he is not aware of any reasonably foreseeable future users of the water on the R9 Ranch other than the Cities because Hays and Russell own the R9 Water Rights, the area is closed to new appropriation so new water cannot be applied for, and the forfeiture statute, K.S.A. 82a-718, no longer allows for termination of a water right for non-use in closed areas, which includes GMD5, so "that water is locked up by Hays and Russell." (Letourneau Test., Tr. Vol. 4 at 897:19–898:9.)

639. Mr. Letourneau testified that approval of the transfer will be a benefit to the State as a whole and that he is not aware of any negative impacts of approval of the water transfer. (Letourneau Test., Tr. Vol. 4 at 903:4–904:13.)

640. On redirect, Mr. Letourneau agreed that the Cities agreed to reduce the 6,700 (actually 6756.8) acre-feet to a ten-year rolling average of 4,800 acre-feet. (Letourneau Test., Tr. Vol. 4 at 1049:9–1050:5.)

> Q. And yesterday you testified about K.S.A. 82a-744, and you testified that if the chief engineer is going to make reductions, he has to ... take voluntary reductions into account, right?
>
> A. Due consideration for past conservation.
>
> Q. And given the fact that the Cities have made a voluntary reduction and no one else has, if there were a regional impairment issue, would the Cities get credit for the fact that they have made a voluntary reduction?
>
> A. We would have to just based on the law.

(Letourneau Test., Tr. Vol. 4 at 1050:6–17.)

641. Mr. Letourneau testified that "well spacing is the first test of direct impairment, but then if direct impairment occurs, we still have the authority to curtail pumping so impairment does not occur." (Letourneau Test., Tr. Vol. 4 at 841:9–842:9.)

642. Mr. Letourneau testified that "adjustments to the pumping" can be made to make sure impairment is not occurring, i.e., wells can be rotated to prevent direct well-to-well impairment. (Letourneau Test. Tr. Vol. 4 at 841:20–842:9; Heidrick Test., Tr. Vol. 5 at 1093:21–1094:12. *See also* Heidrick Test., Tr. Vol. 5, 1093:12–1094:12; Ex. 2832 at Cities 0171064 (R9 Ranch Wellfield Conceptual Operation Plan stating that "[t]he wells will be operated in a rotating sequence.").)

643. "K.A.R. 5-4-4 allows the Chief Engineer to determine spacing necessary to prevent direct impairment of nearby wells …." (Ex. 946 at Cities 0091693. *See also,* K.S.A. 82a-711(c) and K.S.A. 82a-711a.)

644. Regional groundwater flow is to the northeast. (Ex. 1-2 at Cities 0000137, ¶ 163; Ex. 1-3 at Cities 0000359, 374, 377.

645. There are very few groundwater wells down-gradient of the R9 Ranch, with the nearest approximately 1.5 miles away. (Ex. 1-3 at Cities 0000359.)

646. The wells closest to the R9 Ranch are side-gradient. (Ex. 1-3 at Cities 0000359; Ex. 300; Ex. 1751 (showing water rights within 2 miles of the R9 Ranch).)

647. Since the R9 Water Rights were approved in the mid-1970s, irrigation use on the R9 Ranch has never caused an impairment complaint. (Letourneau Test., Tr. Vol.

4 at 868:11–12; Exs. 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, and 980.)

648. The Change Approvals for each of the R9 Water Rights comply with existing consumptive use and spacing rules that are designed to protect senior rights from impairment. (Ex. 1-2 at Cities 0000121, ¶ 86 (consumptive use and well spacing); Cities 0000137, ¶ 163 (well spacing); Cities 0000148, ¶¶ 221 and 224 (consumptive use).)

649. To further protect neighboring water rights from direct impairment, the Cities proposed and voluntarily agreed that they would not place any proposed municipal well within one-half mile of any neighboring well. (Ex. 1-1; Clement Test., Tr. Vol. 3 at 725:5–726:6; Ex. 3-2 at Cities 0008518 (June 25, 2015 Cover Letter); Ex. 1-2 at Cities 0000145-46, ¶ 208.)

650. In his Master Order, the Chief Engineer stated that approval of the change applications required that the Cities demonstrate that existing rights would not be impaired. (Ex. 1-3 at Cities 0000110, ¶ 34.)

651. Numerous individuals expressed concern about impairment during the change proceedings. (Ex. 1-3 at Cities 0000116, ¶ 63, 7th bullet.)

652. Water PACK's former expert made a PowerPoint presentation and submitted a detailed report asserting that approval of the change applications would cause impairment. (Ex. 1-3 at Cities 0000119, ¶ 79.)

653. The Chief Engineer carefully considered the public comments and concerns about impairment. (Ex. 1-2 at Cities 0000117, ¶ 66.)

654. The Chief Engineer stated that "no compelling evidence has been offered to substantiate concerns of impairment." (Ex. 1-2 at Cities 0000121, ¶ 86.)

655. In his Master Order, the Chief Engineer stated that Water PACK defines "sustainable" yield as "the maximum amount of water that … does not contribute to present and future lowering of the water table in and around the R9 Ranch." (Ex. 1-2 at Cities 0000137, ¶ 160.)

656. Water PACK's definition is at odds with GMD5 regulations that define "sustainable yield" as "the long-term yield of the source of supply, including hydraulically connected surface water or groundwater, allowing for the reasonable raising and lowering of the water table." K.A.R. 5-25-1.

657. The Chief Engineer stated that DWR "routinely approves changes to water rights in the Ogallala Aquifer and elsewhere that are not 'sustainable' by Water PACK's above definition." (Ex. 1-2 at Cities 0000137, ¶ 161.)

658. The Chief Engineer stated that the Kansas Water Appropriation Act gives water right owners the right to change their water rights if the change does not impair existing rights, citing K.S.A. 82a-708b(a). (Ex. 1-2 at Cities 0000137, ¶ 161.)

659. The Chief Engineer found that the Cities' change applications, "like any other change application, cannot be constrained under state law to recent historic use or

the sustainable yield, either as defined by Water PACK or DWR regulations." (Ex. 1-2 at Cities 0000137, ¶ 161.)

660. Mr. Wenstrom provided Ex. WP14890–95, which includes his list of the R9 Water Rights showing the authorized quantities and rates of diversion for each of the water rights. (Ex. WP14895.)

661. The Exhibit shows that the R9 Water Rights authorize a combined rate of diversion totaling 38,244 gpm and Mr. Wenstrom agreed that was "probably in the ballpark." (Ex. WP14890 at 14895; Wenstrom Test., Tr. Vol. 8, 1392:6–14.)

662. The maximum rates of diversion from the 14 municipal wells are set out in Master Order Appendix G. (Ex. 1-2, Cities 0000173.)

663. The proposed municipal wells will be designed to divert water at 350 gpm or a total of 4,900 gpm if all 14 wells are operating at the same time. (Ex. 2832 at Cities 0171064 (350 gpm x 14 proposed municipal wells = 4,900 gpm).)

664. If the transfer is approved, the rate of diversion from all 14 municipal wells combined will be reduced by 33,344 gpm. (38,244 gpm – 4,900 gpm = 33,344 gpm.)

665. Based on reduced pumping rates, the distances between the Cities' wells and the wells of nearby water rights, the groundwater modeling results, and the TYRA Limitation, the Chief Engineer found that the Cities demonstrated that none of the proposed municipal wells would impair existing water rights. (Ex. 1-2 at Cities 0000122, ¶ 88.)

666. "After careful review of the documents and information referenced" in the Master Order, the Chief Engineer found that conversion of the R9 Water Rights from irrigation to municipal use under the terms and conditions set out in the Master Order "will not impair existing rights. (Ex. 1-2 at Cities 0000118, ¶ 70.)

667. Mr. Wenstrom testified about his well in Section 8, T26S-R19W, which is directly south of the eastern side of the R9 Ranch, and the well that is closest to proposed municipal Well E. (Wenstrom Test., Tr. Vol.8 at 1386:19–1387:5; 1393:10-19.)

668. That well is authorized by File 19,522 and is one of the wells that is the subject of the Cities' prohibition on locating new municipal wells within one-half mile of any existing irrigation well outside of the boundaries of the R9 Ranch. (Ex. WP14890-95 at 91; Ex. 300; Ex. 1-2 at Cities 0000145–46, ¶ 208.)

669. Mr. Wenstrom testified that he recently moved his well in Section 8, T26S-R19W. (Wenstrom Test., Tr. Vol. 8 at 1409:2–4.)

670. DWR records indicated that in 2021, the well was located 3,876 feet north and 1,320 feet west of the southeast corner of Section 8; in 2022, the well was located 3,916 feet north and 1,326 feet west of the southeast corner of Section 8. (Ex. 3695 at Cities 0104292.) Thus, between 2021 and 2022, the well was moved 40 feet north and 6 feet west of its original location.

671. Mr. Wenstrom could have moved the well farther from the R9 Ranch, but he was not concerned about direct well-to-well impairment.

Q: Well, I can show you the well locations, and I did the math and it's 40.4 feet. Well, let's just -- the difference east and west was 6 feet and the distance north-south was 40 feet so --but it was a short move, right?

A: Correct. Correct.

Q: You could have -- you could have had a long move and moved it -- the well's in the center of the section, right? Or quarter section?

A: We moved it closer to the center pivot so we didn't have to have as much supply pipe.

Q: Sure. I take it that you could have moved it a quarter mile and it would have cost you more, but why would you do that, right, because you're not really concerned about direct well-to-well impairment, are you?

A: Well, there's no -- there's no need to even think about that because we want to have the well in the center of the quarter where the center pivot center is, and that's where it's always been, and so that's where it continues to be.

(Wenstrom Test., Tr. Vol. 8, 1409:12–1410:8.)

672. If a future Chief Engineer were to determine that direct impairment was incurring, remedies include rotating diversion of water from wells. (Heidrick Test., Tr. Vol. 5, 1093:12–1094:12; Ex. 2832 at Cities 0171064 (R9 Ranch Wellfield Conceptual Operation Plan stating that "[t]he wells will be operated in a rotating sequence.").)

673. No evidence was presented that approval of the Transfer will cause regional impairment of vested or water appropriation rights.

674. File 21,729 D-1 is the most senior R9 Water Right with a January 2, 1974 priority date. (Ex. 1-5 at Cities 0000442.)

675. File 30,084, the most junior R9 Water Right has a July 1,1977, priority date. (Ex. 1-36 at Cities 0002450.)

676. Water PACK produced no evidence that any of its members' water rights will be directly impaired by approval of the transfer.

677. The Presiding Officer finds that approval of the Cities' Water Transfer Application will not cause impairment of vested or water appropriation rights.

B. The proposed water transfer will not impair water reservation rights, vested rights, appropriation rights, or prior applications for permits to appropriate water. (K.S.A. 82a-01502(b)(1).)

678. Approval of the Transfer will not impair water reservation rights because there are no federal reservoirs in Kansas created by dams on the Arkansas River and for that reason, there are no water reservation rights that can be impaired. (The Cities request that the Presiding Officer take judicial notice that there are no federal reservoirs on the Arkansas River in Kansas.)

679. There are no water reservation rights, as defined in *Winters v. United States,* 207 U.S. 564 (1908), because there are no federal reservations in the area. (The Cities request that the Presiding Officer take judicial notice of this fact.)

680. There are no prior applications for permits in the region because GMD5 has been closed to new appropriations since December 17, 1998 (KS Register, Volume 20, Number 9, March 1, 2001) and File 30,084 is the most junior R9 Water Right with a July 1, 1977, priority date. (Ex. 1-36 at Cities 0002450.)

681. Per the discussion relating to groundwater modeling in Section VIII, the Presiding Officer finds that the proposed water transfer will not impair water reservation rights, vested rights, appropriation rights, or prior applications for permits to appropriate water.

XI. The Cities have provided all of the information required by DWR Regulations for a complete Water Transfer Application.

A. The Reasonable-Need Limitations

682. The Kansas Water Appropriation Act limits appropriation rights to the reasonable needs of appropriators. (K.S.A. 82a-707(e).)

683. DWR regulations reflect that requirement when changing irrigation water rights to municipal use. (K.A.R. 5-5-9(a)(5); K.A.R. 5-5-9(a)(6) (1994 version).)

684. Pursuant to these requirements, the Chief Engineer has imposed Reasonable-Need Limitations on each of the Cities. (Ex. 1-2 at Cities 0000149–51, ¶¶ 231-38; Appendices D and E, Cities 0000167-71.)

685. These Limitations cap the total quantity of water that can be diverted from the R9 Water Rights for municipal use by each of the Cities, when combined with all other water rights owned by each City. (Ex. 1-2 at Cities 0000115, ¶¶ 57; Cities 0000139-41, ¶¶ 171-83; Appendices D and E, Cities 0000167-71.)

B. **The current beneficial use of the water that is proposed to be transferred. (K.S.A. 82a-1502(c)(1).**

686. The R9 Water Rights are currently authorized for irrigation and will be changed to municipal use as provided in the Master Order. (Ex. 1-2 at Cities 0000148, ¶ 222.)

C. **Minimum desirable streamflow requirements.**

687. Minimum Desirable Streamflow Requirements are imposed on all water appropriation rights with priority dates after April 12, 1984. (K.S.A. 82a-703b(a).)

688. File 30,084, the most junior R9 Water Right, has a July 1, 1977, priority date. (Ex. 1-36 at Cities 0002450.)

689. The Presiding Officer finds that no Minimum Desirable Streamflow requirements are applicable to the R9 Ranch Water Rights.

D. **The location of the proposed places of use:**

690. The proposed places of municipal use are set out in the Master Order, Appendix F as follows:

- The R9 Ranch as described in the Master Order.
- The City of Hays, Kansas, and its immediate vicinity as well as related areas in the Northeast Quarter (NE/4) of Section 19 and the Northwest Quarter (NW/4) of Section 36, Township 13 South, Range 18 West, Ellis County, Kansas.
- The City of Russell, Kansas, and its immediate vicinity.

(Ex. 1-2 at Cities 0000151, ¶ 242, and Cities 0000172.)

E. The proposed use made of the water:

691. The Chief Engineer contingently approved the change from irrigation to municipal use. (Ex. 1-2 at Cities 0000148, ¶¶ 222–23.)

F. There are no other present or future users of the water proposed to be transferred.

692. The Cities own the R9 Ranch and are the only present or future users of the water proposed to be transferred and the Presiding Officer finds that there are no other reasonably foreseeable future users of the R9 Water Rights. (Letourneau Test., Tr. Vol. 4 at 897:19–899:16.)

693. The Presiding Officer further finds that the only reasonably foreseeable beneficial use of the R9 Water Rights is municipal unless this Transfer Application is denied, in which case the Cities can continue using the R9 Water Rights for irrigation.

G. The location of the proposed point or points of diversion:

694. The Cities intend to consolidate the permitted irrigation wells on the R9 Ranch into 14 new municipal wells designated as municipal wells A–N. (Ex. 1-2 at Cities 0000144, ¶¶ 203–207.)

695. Each of the 32 Approvals attached to the Master Order includes the specific location of a proposed municipal well or wells and the maximum rate and quantity to be diverted. (*See, e.g.*, Ex. 1-2 at Cities 0000185.)

696. The consolidation of the wells on the R9 Ranch is depicted in Ex. 1-1 and the specific well locations are provided in the Table in Ex. 263.

697. The quantities and rates of diversion for each of the 14 proposed municipal wells are provided in the Master Order, Appendix G, Table 2. (Ex. 1-2 at Cities 0000173.)

698. The Chief Engineer approved placement of the new municipal wells within 1,000 feet of the preliminary well locations so long as all applicable DWR and GMD5 well-location requirements and restrictions are met. (Ex. 1-2 at Cities 0000146, ¶¶ 209-212; Cities 0000152-53, ¶¶ 246-47.)

699. The new municipal wells cannot be more than one-half-mile from the original irrigation well locations as required by K.A.R. 5-25-2a(a). (Ex. 1-2 at Cities 0000152, ¶ 247.a.; Clement Test., Tr. Vol. 3 at 725:5–17).)

700. The new municipal wells must divert water from the same source of supply as the original irrigation well locations as required by K.S.A. 82a-708b(a)(3) and K.A.R. 5-25-2a(a) and (d). (Ex. 1-2 at Cities 0000152, ¶ 247.b.)

701. All municipal wells must be more than 1,320 feet from wells with an earlier priority, except those wells owned by the Cities as required by K.A.R. 5-4-4(c)(1)(C) and (d); K.A.R. 5-25-2a and K.A.R. 5-25-2(a). (Ex. 1-2 at Cities 0000152, ¶ 247.c.)

702. All municipal wells must be more than 660 feet from all existing domestic wells, except domestic wells owned by the Cities as required by K.A.R. 5-4-4(c)(2)(C) and (d); K.A.R. 5-25-2a and K.A.R. 5-25-2(a). (Ex. 1-2 at Cities 0000152, ¶ 247.d.)

703. The distance between (i) municipal wells with a source of supply in the Arkansas River alluvium and the centerline of the River and (ii) the centroid of the

irrigation wells being consolidated into that municipal well and the centerline of the River cannot decrease by more than 10 percent as required by K.A.R. 5-5-13. (Ex. 1-2 at Cities 0000153, ¶ 247.e.)

704. Maps attached to each of the Amended Change Applications show the proposed well location and the areas within 1,000 feet of each of the specific well locations where new municipal wells can be placed without violating regulatory restrictions. (*See, e.g.*, Ex. 1-7 at Cities 0000616-17 and Ex. 1-8 at Cities 0001273-74. *See also* Ex. 2880.)

705. To further protect neighboring water rights from direct impairment, the Cities proposed and voluntarily agreed that they would not place any proposed municipal well within one-half mile of any neighboring well. (Ex. 3-2 at Cities 0008518 (June 25, 2015 Cover Letter); Ex. 1-1; Clement Test., Tr. Vol.3 at 725:5–726:6; Ex. 1-2 at Cities 0000145-46, ¶ 208.)

H. The proposed plan of design and construction.

706. The WTA requires that the Presiding Officer consider the "proposed plan of design, construction and operation of any works or facilities used in conjunction with carrying the water from the point of diversion, which plan shall be in sufficient detail to enable all parties to understand the impacts of the proposed water transfer." K.S.A. 82-1502(c)(6).

707. Jeff Heidrick, P.E., is a senior project manager in the Burns & McDonnell Engineering global water projects practice. (Heidrick Test., Tr. Vol. 5 at 1087:12-23.)

708. Mr. Heidrick testified that in May of 2023, the City of Hays entered into two design contracts with Burns & McDonnell: Ex. 1766, the Hays R9 Ranch Pipeline Project agreement and Ex. 1767, the Hays R9 Ranch Wellfield Project agreement. (Tr. Vol. 5 at 1088:20–1089:22.)

709. The Hays R9 Ranch Wellfield Project agreement includes the design, bid phase, and limited construction phase services for all of infrastructure for the R9 Ranch wellfield including the wells, gathering lines, raw water storage tank, and raw water pump station. (Ex. 1767 at Cities 0072775; Heidrick Test., Tr. Vol. 5 at 1089:12–22.)

710. The R9 Ranch Pipeline Project agreement includes pipeline design, permitting, bid phase, and limited construction phase services for a raw water transmission pipeline to deliver raw water from the R9 Ranch to the existing pipeline between the Hays Smoky Hill River Well Field and the Hays water treatment facility. (Ex. 1766 at Cities 0072750.)

711. On cross-examination, Mr. Dougherty testified that Burns & McDonnell has been hired to design the wellfield and the pipeline and that "Design is being—taking place right now." (Tr. Vol. 2 at 344:15–345:7.)

712. Mr. Heidrick reviewed Exs 1-1, 1-37, 1-38, 1-39, and 1-40, which together illustrate the conceptual design and construction of the R9 Ranch wellfield at the time they were created in 2015. (Ex. 2686; Tr. Vol. 5 at 1089:23–1090:16.)

713. Ex. 1-37, dated June 16, 2015, summarizes regulatory issues and describes the process to select optimum well locations considering the physical characteristics of the R9 Ranch and the anticipated well design parameters.

714. Ex. 1-38, dated September 24, 2015, describes the project elements and the infrastructure required to develop the R9 Ranch as a municipal water supply.

715. Exhibit 1-38 sets out additional well design criteria indicating that the proposed municipal wells will comply with KDHE public water supply regulations.

716. Exhibit 1-38 also describes the well houses that will include variable frequency drives, flow meters, check valves, isolation valves, testing tees and sample ports, pressure gages, air relief valves, supervisory control and data acquisition system (SCADA) controls, and communication equipment.

- Access roads that are adequate to support heavy construction and maintenance vehicles will be required.
- Overhead power lines and transformers will supply the wells from two different electricity providers.
- A raw water collection system will convey the water from the municipal wells to a 1.0-million-gallon storage tank on the R9 Ranch or flow control. (*See, e.g.*, Ex. 1714 (Conceptual Raw Water Collection Pipeline) and Ex. 1688 (Phased well locations and proposed collection system).)
- A custom-built high service pump station with a prefabricated below-grade enclosure will include electrical control systems, multiple pumps, variable frequency drives, a telemetry system, a back-up power generator, and appropriate site security systems.
- An existing and expanded network of monitoring wells will allow tracking of static water levels and the collection of water quality data.

717. After its review of the proposed Master Order, GMD5 recommended modification of the Cities' monitoring plan to include water quality monitoring. (Ex. 1-2 at Cities 0000118, ¶68.)

718. GMD's October 11, 2018, Revised Management Program states: "New regulations requiring observation wells near all new large capacity wells will help to monitor and prevent the poor quality water at the base of the aquifer from migrating upward and degrading the fresh water zone in the upper portion of the aquifer." (Ex. 1-67b at Cities 0003180.)

719. In response to this concern, the Cities voluntarily amended their monitoring plan to include an appropriate water-quality monitoring component. (Ex. 1-2 at Cities 0000147, ¶ 218.)

720. The amended plan is attached to the Master Order as Exhibit 34. (Ex. 1-2 at Cities 0000345-51.)

721. The Chief Engineer found that the amended plan adequately addresses GMD5's water-quality monitoring concerns. (Ex. 1-2 at Cities 0000147, ¶ 218.)

722. A raw water transmission pipeline from the R9 Ranch to Schoenchen is projected to be 20 inches in diameter and approximately 65 miles in length. (Ex. 1-38 at Cities 0002468.)

723. A water transmission pipeline, projected to be 10 to 12 inches in diameter, from the Schoenchen area to Russell's Pfeifer wellfield will also be required to connect

the City of Russell to the system. (*See* Ex. 1722 (showing the existing pipelines from Pfeifer and the Big Creek pump station to Russell).)

724. Ex. 1-39 is a map showing a wide corridor between the R9 Ranch and Schoenchen within which the transmission line can be built.

725. Ex. 1-40 is a PowerPoint presentation that summarizes the design process.

726. Those exhibits accurately present the majority of the conceptual design and construction of the wellfield except that the current plan is to construct seven wells in each of the two phases instead of the three or four phases. (Ex. 2686.)

727. The location of each well and the phase in which it will be constructed will be determined using data collected during the hydrogeologic investigation and will be based on the water quality and production potential at each well site. (Ex. 2686.)

728. A list of other federal, state, and local permits necessary to complete the proposed water transfer and the projected dates they will be obtained.

729. During the planning phase, Burns & McDonnell will apply for various approvals and permits from governmental authorities with jurisdiction over the pipeline and the well field. (Ex. 1766 at Cities 0072743, ¶ 4.9; Ex. 1767 at Cities 0072768, ¶ 4.9; Heidrick Test., Tr. Vol. 5 at 1091:13–1092:4.)

730. A listing of the permits required for the R9 Well Field and Pipeline Project is provided in Ex. 2687.

731. With the exception of above-ground structural facilities, such as a pump station and well houses on the R9 Ranch, all areas disturbed during construction will be returned to their original condition. (Ex. 1 at Cities 0000042.)

732. The planning and design of the pipeline and related structures will avoid environmentally sensitive areas and minimize intrusion into the natural setting. (Ex. 1 at Cities 0000042.).

733. See Section VII.F, discussing the return of the R9 Ranch to native grass which mitigates potential environmental problems such as blowing sand.

734. The Presiding Officer finds that the Cities proposed plan of design and construction is in sufficient detail to enable all parties to understand the impacts of the water transfer.

I. The proposed plan of operation

735. In 2015, the operation of the R9 Wellfield was expected to deliver a percentage of the base-load water requirements for both Hays and Russell which would fluctuate depending on the condition of other available water resources. (Ex. 1-38 at Cities 0002469.)

736. Annual quantities were expected to increase as demand grows. (Ex. 1-38 at Cities 0002469.)

737. The wells on the R9 Ranch will be operated in a rotating sequence based on the number of operating wells required to meet the current demand, observed water

levels, mechanical considerations, and maintenance requirements to ensure that all wells are exercised and in good operating condition when needed. (Ex. 2832 at Cities 0171064; Ex. 1-38 at Cities 0002469; Heidrick Test., Tr. Vol. 5 at 1093:12–20.)

738. Wells will be designed to divert water at an expected rate of 350 gallons per minute (gpm). (Ex. 2832 at Cities 0171064.)

739. When a well is operating, water will be delivered to the raw water storage tank via the raw water collection system then through the transmission main to the Cities utilizing the high service pumps in the wellfield pump station. (Ex. 2832.)

740. The number of operating pumps will be determined by the targeted production levels. Variable Frequency Drives ("VFD") will enable the system to produce a broad operating range. (Ex. 2832.)

741. A Supervisory Control and Data Acquisition ("SCADA") system will be used to monitor and manage wellfield operations. (Ex. 2832.)

742. A minimum production rate will be established to manage water quality issues in the pipeline based on preferred flow velocities. This is currently estimated to be approximately one million gallons per day. Parameters such as tower levels and system pressures may be used to control or refine overall production levels. (Ex. 2832.)

743. A resource optimization strategy will determine production levels from the R9 Ranch, the Smoky Hill, and the Big Creek wellfields based on the existing conditions of each source of supply. (Ex. 2832.)

744. When the Smoky Hill and the Big Creek wellfields are in good condition, production from the R9 Ranch is expected to remain at the established minimum for maintaining the preferred flow velocities and water age in the pipeline. (Ex. 2832.)

745. When other sources of supply are limited or insufficient due to drought or other factors, production from the R9 wellfield will increase. (Ex. 2832.)

746. The Presiding Officer finds that the Cities proposed plan of operation is in sufficient detail to enable all parties to understand the impacts of the water transfer.

J. The estimated date for completion of the infrastructure and initial operation thereof:

747. The Cities are not presently able to predict how long it will take to complete the Project because, among other things, to begin construction, the Cities must:

- resolve Water PACK's pending appeal of the Master Order,
- obtain a final, non-appealable order approving the water transfer,
- complete the design of the wellfield and the pipeline,
- obtain pipeline rights-of-way,
- obtain all necessary permits and approvals,
- obtain financing, and
- enter into a construction contract.

748. Mr. Heidrick testified that it will take about two years to design the pipeline and the wellfield. (Tr. Vol. 5 at 1090:25–1091:5.)

749. Construction is estimated to take approximately 26 months after a contract is awarded. (Ex. 2686 at Cities 0104203; Heidrick Test., Tr. Vol. 5 at 1090:17–1091:12.)

750. The formal hearing is scheduled to conclude on November 6, 2023. In the absence of written consent of all parties or good cause shown, the Water Transfer Panel is expected to enter a Final Order on or before May 6, 2024. (OAH Docket, September 8, 2023, Joint Motion to Extend Deadline; K.S.A. 82a-1503(b) and K.S.A. 82a-1503(b) (Nov. 6, 2023 + 91 days = Monday, February 5, 2024 + 91 days = Monday, May 6, 2024).)

751. Water PACK's current appeal of the Master Order has been remanded to the District Court, which has issued an Order setting a briefing schedule that will conclude on February 1, 2024.

752. The District Court has ruled that further discovery will not be permitted so it is likely that the District Court will issue an Order on Remand within a reasonable time after February 1, 2024.

753. If the District Court determines that Water PACK does not have standing, Water PACK can be expected to appeal; if the District Court determines that Water PACK does have standing, the Cities will appeal that ruling, and the pending appeal will be decided on the merits.

XII. Water PACK's buy and dry concerns are overblown and without merit.

754. Water PACK asserts that approval of the transfer will create a "buy and dry scenario" in Kansas. (Trial Brief, at 15, 23-25; Vol. 7 at 1310:3-10.)

755. Water PACK cites Zoe Verhoeven, *Water Leasing Under the Agricultural Water Protection Water Right*, 22 U. DENV. WATER L. REV. 41, 42 (2018) which discusses concerns about buy and dry issues in Colorado. (Trial Brief at. 23–24.)

756. Buy and dry occurs when a municipality purchases farmland with water rights and permanently transfers the water right to the municipality's water portfolio. If buy and dry in Colorado continues at the current rate, the South Platte River Basin could lose up to one-third of today's irrigated land by 2050. The Arkansas River Basin could lose up to seventeen percent of its total irrigated acreage, and the main-stem of the Colorado River watershed could lose up to twenty-nine percent of its irrigated land. Verhoeven, at 43. ("[F]uture urban water demands would be so high that Colorado could lose up to 700,000 acres of irrigated farmland in order to meet those municipal growth demands.")

757. GMD5 encompasses approximately 2.5 million acres in portions of eight counties: Barton, Edwards, Kiowa, Pawnee, Pratt, Reno, Rice, and Stafford. Ex. 1-67b, at 3168.

- There are 697,829 irrigated acres in GMD5. (Ex. 1-67b at 0003169.)
- There are 5,366.4 irrigated acres on the R9 Ranch. (WP14895.)
- There are about 825,000 acre-feet of water appropriated in GMD5 annually. (Ex. 1-67b at Cities 0003174.)
- The R9 Ranch has 0.77% of the irrigated acres in GMD5.
- Transferring 4,800 acre-feet per year to Hays and Russell will result in a reduction of 0.58% of the quantity of water appropriated in GMD5.-

- The R9 Ranch has less than 1% of the irrigated acres in Colorado that Water PACK and Ms. Verhoeven are concerned about.

758. The Hearing Officer can take judicial notice of the difference in population between Colorado and Kansas.

759. Exhibit 2659 shows that all other Kansas cities with populations over 5,000 have sources of water nearby.

760. There is no evidence that the "buy and dry" rates in the South Platte, Arkansas, or Colorado River Basins in Colorado are occurring or are likely to occur in Kansas.

XIII. The Cities presented overwhelming evidence that the benefits to the State of Kansas of approval of the water transfer far outweigh the benefits to the State of Kansas of denial.

761. Based on the Facts set out herein, the Presiding Officer finds that the benefits to the State of Kansas of approving the water transfer far outweigh the any benefits to the State of denying the water transfer.

PROPOSED CONCLUSIONS OF LAW.

I. The Water Transfer Act applies.

762. The Kansas Water Transfer Act, K.S.A. 82a-1501, *et seq.*, ("WTA") applies to these proceedings.

763. The Cities' First Amended Water Transfer Application requests the transfer 6,756.8 acre-feet of water over 35 miles and therefore requests a "water transfer" as defined in K.S.A. 82a-1501.

764. Following the Chief Engineer's determination that the Cities' First Amended Water Transfer Application was "complete" under K.S.A. 82a-1501a(b), the Water Transfer Panel appointed the Presiding Officer to conduct a hearing in accordance with the provisions of the WTA.

765. The WTA provides that "[n]o person shall make a water transfer in this state unless and until the transfer is approved pursuant to the provisions of the [WTA]." K.S.A. 82a-1502(a).

766. K.S.A. 82a-1502 sets forth the conditions for approval of a water transfer application.

767. ***First***, K.S.A. 82a-1502(a) provides that no water transfer shall be approved that would "reduce the amount of water required to meet the present or any reasonably foreseeable future beneficial use of water by present or future users in the area from which the water is to be taken for transfer unless: (1) The panel determines that the benefits to the state for approving the transfer outweigh the benefits to the state for not approving the transfer…."

768. ***Second***, K.S.A. 82a-1502(b)(1) requires that the transfer not impair water reservation rights, vested rights, appropriation rights, or prior applications for permits.

769. ***Third***, and finally, K.S.A. 82a-1502(b)(2) requires that the Cities have adopted and implemented conservation plans and practices that meet the following conditions:

> (A) are consistent with the guidelines developed and maintained by the Kansas water office pursuant to K.S.A. 74-2608, and amendments thereto,
>
> (B) have been in effect for not less than 12 consecutive months immediately prior to the filing of the application on which the hearing is being held and
>
> (C) if the transfer is for use by a public water supply system, include the implementation of a rate structure which encourages the efficient use of water that is determined by the presiding officer to be effective and if designed, implemented and maintained properly, will result in wise use and responsible conservation and management of water used by the system.

770. As stated in Section VIII, below, the statewide benefits comparison is inapplicable in this case, but K.S.A. 82a-1502(c) provides the following list of specific factors to determine whether the benefits to the State of approving a water transfer outweigh the benefits to the State of denying a water transfer.

> (1) Any current beneficial use being made of the water proposed to be diverted, including minimum desirable streamflow requirements;
>
> (2) any reasonably foreseeable future beneficial use of the water;
>
> (3) the economic, environmental, public health and welfare and other impacts of approving or denying the transfer of the water;
>
> (4) alternative sources of water available to the applicant and present or future users for any beneficial use;
>
> (5) whether the applicant has taken all appropriate measures to preserve the quality and remediate any contamination of water currently available for use by the applicant;
>
> (6) the proposed plan of design, construction and operation of any works or facilities used in conjunction with carrying the water from the point of diversion, which plan shall be in sufficient detail to enable all parties to understand the impacts of the proposed water transfer;

> (7) the effectiveness of conservation plans and practices adopted and implemented by the applicant and any other entities to be supplied water by the applicant;
>
> (8) the conservation plans and practices adopted and implemented by any persons protesting or potentially affected by the proposed transfer, which plans and practices shall be consistent with the guidelines for conservation plans and practices developed and maintained by the Kansas water office pursuant to K.S.A. 74-2608, and amendments thereto; and
>
> (9) any applicable management program, standards, policies and rules and regulations of a groundwater management district.

K.S.A. 82a-1502(c).

771. In addition to these specific factors, the Presiding Officer has broad discretion to "consider all matters pertaining thereto ...." K.S.A. 82a-1502(c),

772. As set forth in detail in the Presiding Officer's Findings Of Fact, the Cities presented overwhelming evidence that the benefits to the State of Kansas of approving the water transfer far outweigh the benefits to the State of denying the transfer and the Presiding Officer concludes that the City has met its burden to make such a showing as a matter of law.

II. The Cities' burden of proof is limited to the provisions of the Water Transfer Act.

773. Water PACK argues that the Cities do not "need" as much water requested but failed to present facts that overcome the compelling evidence presented by the Cities.

774. The Cities' "need" for water may be a factor that can be considered by the Presiding Officer and the Panel, but it is noticeably missing from the statutory factors listed in K.S.A. 82a-1502.

775. The WTA does not exempt an applicant from first complying with the "Kansas water appropriation act or the state water plan storage act, whichever is applicable." K.S.A. 82a-1507(b).

776. The KWAA, DWR regulations, and the Water Plan Storage Act limit water use to reasonable needs. K.S.A. 82a-707(e); K.A.R. 5-5-9(a)(5); K.S.A. 82a-1306(a)(2); and K.S.A. 82a-1311a(c)(1).

777. Moreover, while the Cities have the burden of proof to establish each of the statutory requirements for approval of a water to provefer, there is no provision in the WTA that requires an applicant prove or even present evidence relating to each of the twenty-six factors in K.A.R. 5-50-2. Compare K.A.R. 5-50-2 (requirements for complete application) with K.S.A. 82a-1502(a)–(c) (conditions for approval of water transfer).

778. The WTA authorizes the Chief Engineer to adopt rules and regulations to "effectuate and administer the provisions of this act." K.S.A. 82a-1506. It also empowers the Chief Engineer to determine whether an application is "complete." K.S.A. 82a-1503(a).

779. However, the plain text of K.A.R. 5-50-2 does not purport to add elements of proof to the statute. K.A.R. 5-50-2 simply states that, "[t]o be complete, a water transfer application shall show the following: …."

780. Had the Chief Engineer attempted to impose such a requirement, it would not stand. As stated by the Kansas Supreme Court, "Kansas administrative agencies have no common-law powers. Any authority claimed by an agency or board must be conferred

in the authorizing statutes either expressly or by clear implication from the express powers granted." *Fort Hays State Univ. v. Fort Hays State Univ. Chapter, Am. Assoc. of Univ. Professors*, 290 Kan. 446, 455–56, 228 P.3d 403, 410 (2010) (citing *Pork Motel, Corp. v. Kansas Dept. of Health & Environment*, 234 Kan. 374, 378, 673 P.2d 1126 (1983).

781. Furthermore, "[a]n administrative rule or regulation which goes beyond that which the Legislature had authorized, or which violates the statute, is void." *Lakeview Vill., Inc. v. Bd. of Cnty. Comm'rs of Johnson Cnty.*, 232 Kan. 711, 717, 659 P.2d 187, 193 (1983).

782. "Further, the agency may not exercise its sub-legislative powers to modify, alter, or ***enlarge the provisions of the legislative act*** which is being administered." *Sunflower Racing, Inc. v. Bd. of Cnty. Comm'rs of Wyandotte Cnty.*, 256 Kan. 426, 438, 885 P.2d 1233, 1241 (1994) (emphasis added).

783. Nevertheless, the Cities have presented evidence relating to these factors because it may be helpful to the Presiding Officer and the Panel.

III. Due consideration should be given to the Cities' conservation efforts.

784. The evidence shows that Hays and Russell have implemented conservation measures that have been extremely effective. Moreover, the Cities agreed to reduce the quantity of water that they can divert from the R9 Water Rights by an additional 29% over-and-above application of DWR's consumptive-use regulations, an unprecedented reduction.

785. While not specifically applicable to the WTA, K.S.A. 82a-744 requires that the Chief Engineer give due consideration to conservation efforts.

> The chief engineer shall give due consideration to water management or conservation measures previously implemented by a water right holder when implementing any further limitations on a water right pursuant to any program established or implemented on and after July 1, 2015. The chief engineer shall take into account reductions in water use, changes in water management practices and other measures undertaken by such water right holder.

786. The Presiding Officer finds that the Cities' conservation efforts have been exemplary and should not be and are not a legitimate basis upon which to reduce the quantity of water requested.

787. In accordance with the provisions of K.S.A. 82a-1502(b)(2) the proceeding officer finds that Hays and Russell have adopted and implemented conservation plans and practices that are consistent with the guidelines developed and maintained by the Kansas Water Office pursuant to K.S.A. 74-2608, and amendments thereto. These plans have been in effect for not less than twelve (12) consecutive months immediately prior to the filing of the application for which this hearing has been held and the conservation plans include implementation of rate structures which encourages the efficient use of water and will result in wise use and responsible conservation and management of water used within each City's public water supply system.

IV. Minimum Desirable Streamflows.

788. The KWAA establishes minimum desirable streamflow (MDS) requirements at specific locations on certain rivers in the State but water rights with priority dates after April 12, 1984 are "junior" to the MDS standards. K.S.A. 82a-703b(a).

789. None of the R9 Water Rights are subject to Minimum Desirable Streamflow Requirements. The most junior R9 Water Right, File No. 30,084, has a July 1, 1977 priority date.

790. Water PACK asserted that it should be entitled to intervene in this matter asserting, in part, that the proposed transfer would violate MDS requirements. Water PACK presented no evidence to support that allegation which was clearly frivolous.

V. Water PACK's impairment arguments are frivolous.

791. The R9 Water Rights are not the most senior water rights in the area, but they are senior to numerous water rights owned by Water PACK Members. (Exs. 2873 and 2878. *See also,* Exs. 1751, 2695, 2701, 2702, 2873, 2877, 2877a, 2877b, and 2878.)

792. Kansas adopted its version of the prior appropriation doctrine in 1945. L. 1945, Ch. 390.

793. The 1945 KWAA specifically adopted the "prior appropriation doctrine" for both surface and groundwater. K.S.A. 82a-702; K.S.A. 82a-703, and K.S.A. 82a-707. And though the Kansas version of the prior appropriation doctrine has been revised by the Legislature over time, that fundamental principle remains unchanged.

794. During periods of short supply, the most senior water right has the highest and best claim to the continued use of water. A senior user is entitled to the full quantity of water reasonably needed for his or her use even if junior right holders receive nothing. K.S.A. 82a-707.

795. The prior appropriation doctrine is a central feature of the KWAA, referred to in numerous sections: K.S.A. 82a-706, 82a-706b, 82a-706e, 82a-708b, 82a-710, 82a-711, 82a-711a, 82a-716, and 82a-717a, including K.S.A. 82a-707:

> (b) The date of priority of every water right of every kind, and not the purpose of use, determines the right to divert and use water at any time when the supply is not sufficient to satisfy all water rights. Where lawful uses of water have the same date of priority, such uses shall have priority in the following order of preference: Domestic, municipal, irrigation, industrial, recreational and water power uses. The holder of a water right for an inferior beneficial use of water shall not be deprived of the use of the water either temporarily or permanently as long as such holder is making proper use of it under the terms and conditions of such holder's water right and the laws of this state, other than through condemnation.
>
> (c) As between persons with appropriation rights, the first in time is the first in right. The priority of the appropriation right to use water for any beneficial purpose except domestic purposes shall date from the time of the filing of the application therefor in the office of the chief engineer.

796. Since 1957, the KWAA has permitted approval of applications for new water appropriation rights in areas that are not being recharged.[5] L. 1957, ch. 539, § § 16–17 codified at K.S.A. 82a-711 and K.S.A. 82a-711a.

[5] See Earl B. Shurtz, *Report on the Laws of Kansas Pertaining to the Beneficial Use of Water, Bulletin Number 3,* Kansas Water Resources Board, p. 7 (Nov. 1956), at pg. 85. (Recommending enactment of K.S.A. 82a-711(c) and K.S.A. 82a-711a because any

797. K.S.A. 82a-711 provides:

> (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 …
>
> (c) With regard to whether a ***proposed use*** will impair a use under an existing water right, impairment shall include the ***unreasonable … lowering of the static water level*** … at the water user's point of diversion beyond a reasonable economic limit.

(Emphasis added.)

798. K.S.A. 82a-711a provides:

> It shall be an ***express condition*** of each appropriation of surface or ground water … that such right must allow for a reasonable … lowering of the static water level … at the appropriator's point of diversion: PROVIDED, That in determining such reasonable … lowering of the static water level in a particular area, the chief engineer shall consider the economics of diverting or pumping water for the water uses involved; and ***nothing herein shall be construed to prevent the granting of permits*** to applicants later in time on the ground that the diversions under such proposed later appropriations may cause the water level to be … lowered ***at the point of diversion of a prior appropriator,*** so long as the rights of holders of existing water rights can be satisfied under such express conditions.

(Emphasis added.)

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diversion of ground water in areas with negligible recharge—where mining operations make impairment merely a matter of time—will necessarily affect other users. Absolute protection would seriously hazard subsequent development, but development is necessary. Impairment is merely a matter of degree and must be based on a reasonable rate of depletion.)

799. The KWAA permits changes to three of the characteristics of a water appropriation right "***without losing priority of right***," the point of diversion, the place of use, and the type of use. K.S.A. 82a-708b(a) (emphasis added).

800. When determining whether to approve a change application, "[t]he 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-708b(a).

801. DWR has closed GMD5 to new appropriations. K.A.R. 5-25-4.

802. While "Garretson" [sic] was mentioned several times at the hearing, Tr. Vol. 5 at 1037:21 and 24; and 1039:3, that case involved claims of existing direct impairment; the facts in this case are substantially different. As Mr. Wenstrom testified, this case is not about direct, well-to-well impairment. Instead, it's about the Cities' right to divert water from their perfected certified water appropriation rights.

803. In *Garetson Bros. v. Am. Warrior, Inc.*, 51 Kan. App. 2d 370, 372–79, 347 P.3d 687, 689–93 (2015), the Garetson Brothers alleged that two junior water rights, File Nos. 10,467 and 25,275, were impairing their senior vested water right designated as File No. HS-03. DWR installed water level monitoring equipment and gathered data to help determine whether and the degree to which well-to-well impairment was occurring. DWR also investigated three other neighboring wells that pulled water from the same source.

804. In its preliminary report, DWR concluded that File No. HS-03 had been substantially impaired by the operation of File Nos. 10,467, 25,275, and three other junior water rights (File Nos. 10,035, 11,750, and 19,032. 56 Kan. App. 2d at 626.) but that more testing and data were needed to determine the extent of the impairment.

805. The district court directed DWR to continue to investigate, to recommend remedies, and explain why the remedies are recommended. DWR's Final Report pointed out that there has been a substantial decline in the groundwater in the area.

806. DWR concluded that HS-03 had been substantially impaired by operation of the five junior water rights and that if HS-03 is to be protected, diversion of water by the junior water right holders must be significantly curtailed.

807. There was an interlocutory appeal, a remand, a trial, and a subsequent appeal, mostly over procedural issues. Both cases were clearly about existing direct, "well-to-well" impairment of a senior vested right by five junior appropriation rights.

- DWR installed monitoring equipment and gathered data "to help determine the degree of ***well-to-well impairment***." *Garetson*, 51 Kan. App. 2d at 373 (emphasis added).
- "DWR's final report that states the impairment is principally caused by ***well-to-well interference***." *Id.* at 387 (emphasis added).
- "In 2005, the DWR installed water level monitoring equipment that over time allowed it to determine the degree of ***well-to-well interference*** between HS-003 and the five nearest water rights …." *Garetson*, 56 Kan. App. 2d at 626 (emphasis added).

808. In *Garetson*, the court used the "ordinary definition of impair," concluding that 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 the junior "diversion diminishes, weakens, or injures the prior right." 51 Kan. App. 2d at 389

809. In the subsequent appeal, *Garetson Bros. v. Am. Warrior, Inc.,* 56 Kan. App. 2d 623, 650, 435 P.3d 1153, 1171 (2019), the court also held that impairment occurs when "diversion of water by a holder of a junior water right when that diversion diminishes, weakens, or injures the prior right."

810. As the Chief Engineer[6] stated in the Master Order approving the Change Applications:

> 137. The Cities are entitled to make reasonable beneficial use of the R9 Water Rights. The GMD5 Model shows that the Cities' intended usage of the R9 Water Rights will cause the water levels of the R9 Ranch to continue to decline at varying but reasonable rates, while the neighboring water-right owners to the R9 Ranch will continue to deplete the aquifer as well but without being subject to such unique Limitations as the TYRA Limitation imposed on the Cities.

(Ex. 1-2 at Cities 0000130.)

> 161. DWR, however, routinely approves changes to water rights in the Ogallala Aquifer and elsewhere that are not "sustainable" by Water PACK's above definition. Per the Kansas Water Appropriation Act, water right owners have the right to change their water rights if the change is reasonable, does not impair, and relates to the same local source of supply. See K.S.A. 82a-708b(a). The Chief Engineer finds, therefore, that the Cities'

[6] David Barfield, Chief Engineer from June 2007 to 2020, was fully aware of the holding in *Garetson* when he issued the Master Order in March of 2019. (Ex. 2867 at Cities 0171946.) In *Garetson*, "DWR filed a second and final report on March 31, 2014." 56 Kan. App. 2d at 628. "Two witnesses testified for Garetson, ***including the chief engineer who prepared the final DWR report.***" 56 Kan. App. 2d at 629 (emphasis added).

> Change Applications, like any other change application, cannot be constrained under state law to recent historic use or the sustainable yield, either as defined by Water PACK or DWR regulations.
>
> 162. While the Cities' modeling of their proposed operations shows that area water levels will continue to decline at varying but reasonable rates as noted above, like their neighbors who are also depleting the local aquifer, the Cities are entitled to make reasonable beneficial use of their R9 Water Rights.

(Ex. 1-2 at Cities 0000137.)

811. Changes to existing water rights are permitted "without losing priority of right," unless they "impair existing rights." K.S.A. 82a-708b(a).

812. Thus, a change application cannot be approved if it will diminish, weaken, or injure an existing water right. *Garetson, supra.*

813. But *Garetson* does not abrogate the prior appropriation doctrine; instead, "Kansas law expressly provides that 'the first in time is first in right.'" 51 Kan. App. 2d at 381.

814. Thus, for example, a request to relocate an existing well cannot be approved if it would "impair" a junior water right by diminishing, weakening, or injuring the ability of the junior user to continue diverting water from the source.

815. But a change in the type of use does not negate an existing, permitted, and perfected senior water right. The senior right retains any pre-change authority to cause reasonable declines in the static water level for several reasons.

- K.S.A. 82a-708b(a) permits changes without losing priority of right.

- Every junior permit includes an "an express condition … that … must allow for a reasonable … lowering of the static water level … at the appropriator's point of diversion." K.S.A. 82a-711a.
- Every junior permit holder is the beneficiary of the provision allowing the Chief Engineer to grant permits "to applicants later in time" even though" the junior permit "may cause the water level to be … lowered at the point of diversion of a prior appropriator, so long as the rights of holders of existing water rights can be satisfied under such express conditions." K.S.A. 82a-711a.

816. Water PACK asserted that it should be entitled to intervene in this matter asserting that the proposed transfer would impair existing water rights.

817. Water PACK's assertion that any reduction in the static water level is "impairment" that precludes approval of the transfer, which is clearly frivolous.

818. In accordance with the provisions of K.S.A. 82a-1502(b)(1) the proceeding officer finds that the requested transfer does not impair water reservation rights, vested rights, appropriation rights, or prior applications for permits to appropriate water.

VI. Water PACK's opposition to the proposed water transfer is based on the incorrect notion that water belongs to the inhabitants of Edwards County.

819. Water PACK'S opposition is based on unreasonable protectionist attitudes that are not supported by Kansas law.

> The concept of protecting the area of origin has arisen in proposals involving potential interbasin transfers. This concept is based on the notion that "a region is entitled to the economic benefits which it may derive from its indigenous natural resources." Whether the concept exists in some legal form is the inquiry here, although one must at least recognize the political power of the notion. Furthermore, the notion itself probably exists in the minds of the inhabitants of any mineral-rich area when a proposal is made to deprive those inhabitants of the minerals. It is hard to imagine that the

> various downstream users on the Kansas River below Tuttle Creek Reservoir, such as cities, irrigators, power companies, and water supply districts, as well as the State of Missouri, would not put up a political as well as a legal battle on any proposals that would remove some water completely from the Kansas River Basin. Since this Article concludes that interbasin diversions may be legally possible, the political weapon may well be the more formidable.

John C. Peck, *Legal Constraints On Diverting Water From Eastern Kansas To Western Kansas*, 30 Kan L. Rev. 159, 171, 1981-1982.

VII. The anti-speculation doctrine does not apply.

820. Water PACK cites *Pagosa Area Water and Sanitation Dist. v. Trout Unlimited,* 170 P.3d 307 (2007) and *Pagosa Area Water and Sanitation Dist. v. Trout Unlimited*, 219 P.3d 774 (2009). (Trial Br. at 8 and 20 (arguing that approval of the transfer is precluded by application of the anti-speculation doctrine.)

821. The elements of the Colorado version of the anti-speculation doctrine are:

> (1) what is a reasonable water supply planning period; (2) what are the substantiated population projections based on a normal rate of growth for that period; and (3) what amount of ***available unappropriated water*** is reasonably necessary to serve the reasonably anticipated needs of the governmental agency for the planning period, above its current water supply.

Pagosa Area Water & Sanitation Dist. v. Trout Unlimited, 170 P.3d 307, 313 (Colo. 2007) (emphasis added).

822. Thus, by its own terms, the doctrine does not apply in this case because the Cities own existing water rights.

823. The *Pagosa* court relied on *City of Thornton v. Bijou Irr. Co.,* 926 P.2d 1, 47 (Colo. 1996). Colorado has a "limited governmental agency exception to the anti-speculation doctrine," which the *Pagosa* court construed "narrowly" stating that the proposed 100-year planning horizon doubles the 50-year period permitted in *Bijou.* 170 P.3d at 317 and 319.

824. The court stated that the 50-year planning period approved in *Bijou* is not a fixed upper limit, and each case depends on its own facts. 170 P.3d at 317.

825. Moreover, there are substantial differences between Colorado and Kansas water law, including, for example, that the contours of water rights in Colorado are initially adjudicated by a water court. "The adjudication of water rights in Colorado is a judicial function." Anthony Dan Tarlock and Jason Anthony Robison, L. of Water Rights and Resources § 7:5.

826. The KWAA delegates authority to "control, conserve, regulate, allot and aid in the distribution of the water resources of the state" to the Chief Engineer. K.S.A. 82a-706.

VIII. The WTA is focused on the State as a whole, not local impacts.

827. The plain text of the WTA does not require the Cities to prove, nor does it require the Presiding Officer or the Panel to determine that the benefits to the State for approving the transfer outweigh the benefits to the State for denying the transfer. K.S.A. 82a-1502(a)(1).

828. Several provisions of the WTA make it clear that the sole focus of the WTA is on the benefits to the State of Kansas for approving or denying a proposed water the transfer.

- A water transfer hearing can be held on a proposal that does not qualify as a transfer if the Chief Engineer or the Panel "***determines it to be in the best interest of the state***." K.S.A. 82a-1501a(b)(1) (emphasis added).
- The Presiding Officer can only reduce the quantity requested if doing so is "necessary for the protection of the public interest of ***the state as a whole.***" K.S.A. 82a-1504(a) (emphasis added).

829. Analysis of the factors set out in K.S.A. 82a-1502(c) is based on whether the "***benefits to the state*** for approving the transfer outweigh the ***benefits to the state*** for not approving the transfer." (Emphasis added.) K.S.A. 82a-1502(a) states, in part:

> No water transfer shall be approved which would reduce the amount of water required to meet the present or any reasonably foreseeable future beneficial use of water by present or future users in the area from which the water is to be taken for transfer ***unless:*** (1) The panel determines that the benefits to the state for approving the transfer outweigh the benefits to the state for not approving the transfer.

(Emphasis added.)

830. Because the Cities own, and therefore control the R9 Water Rights (*See* K.S.A. 82a-708a(a)), approval of this transfer will not reduce the amount of water required to meet:

- "the present … beneficial use of water by present … users," i.e., the Cities;
- "the … reasonably foreseeable future beneficial use of water by present … users," i.e., the Cities; or

- "the … reasonably foreseeable future beneficial use of water by … future users," because there are none.

831. Because balancing the benefits of approval and denial is only required if approval will reduce the quantity of water "***required***" to meet the "reasonably foreseeable future beneficial use of water by … future users," speculation about what may or may not happen is inappropriate. (Emphasis added.)

832. Because there is no evidence that approval of the transfer will reduce the quantity of water required to meet the needs of any reasonably foreseeable future users, the WTA ***does not require*** that proof, nor does it require that the Presiding Officer and the Panel balance those benefits.

833. Moreover, the benefits of approval or denial are only relevant to the extent that those benefits are realized by the State of Kansas. The benefits that accrue to one party or the other are incidental.

834. Water PACK's evidence is focused on alleged impacts on individual members. It has presented no evidence that denial of the transfer will benefit the State of Kansas, and the Presiding Officer concludes that Water PACK has failed to demonstrate any statewide benefits of denying the water transfer.

835. The Presiding Officer concludes that the Cities are under no affirmative obligation to demonstrate, as a matter of law, that the statewide benefits of approving the water transfer outweigh the statewide benefits of denying the water transfer.

836. Nevertheless, as set forth in the findings of fact herein, the Presiding Officer also concludes as a matter of law that the Cities have met their burden of demonstrating that the benefits to the State of approving the transfer far outweigh the benefits to the State of not approving the transfer.

IX. The Cities' First Amended Water Transfer Application should be granted in its entirety.

837. After careful review of the First Amended Transfer Application, careful consideration of the evidence presented by the Parties, and pursuant to K.S.A. 82a-1501, *et seq.*, and K.A.R. 5-50-1, *et seq.*, the Presiding Officer concludes that the Cities' First Amended Water Transfer Application should be approved as requested by the Cities.

838. K.S.A. 82a-1504(a) provides that the Presiding Officer may order approval of the transfer of a smaller amount of water than requested if deemed necessary for the protection of the public interest of the State as a whole. The Presiding Officer finds that the evidence shows the public interest would not be served by the approval a transfer of a smaller amount of water than requested by the Cities.

REQUEST FOR ALLOCATION OF COSTS

The Cities respectfully request that the Presiding Officer issue an order allocating the costs of the hearing among the Parties.

The WTA requires that the Panel appoint a Presiding Officer, that a public hearing be held, and that the costs associated with the hearing be allocated among the Parties as follows:

> At intervals during or at the conclusion of the hearing, the presiding officer shall fairly and equitably assess the following costs of the hearing among the applicant and other parties: The hearing facility, the court reporter, the salary of a presiding officer who is not paid for services as a hearing officer by state funds, the travel expenses of the presiding officer and other reasonable costs associated with the hearing.

K.S.A. 82a-1503(e).

GMD5, Water PACK, and Edwards County moved to intervene in the proceeding. The Cities did not oppose GMD5's Motion, and on February 20, 2023, the Presiding Officer issued an Order granting GMD5's petition for intervention. Accordingly, GMD5 should be allocated an equitable share of the costs of the hearing.

On or about September 27, 2022, Water PACK and Edwards County (collectively "Water PACK") served a *Joint Petition for Intervention* that was electronically filed with OAH on October 27, 2022. The *Joint Petition* makes numerous allegations that were clearly false when made and for which they offered no evidence—either then or at the hearing. For example, Water PACK asserted that approval of the transfer will impair existing water rights and violate minimum desirable streamflow requirements—a pair of assertions that were false on their face under Kansas law and on the existing facts, which was irrefutably established during the evidentiary hearing. Water PACK also asserted several patently frivolous claims; for example, they alleged that the Cities have failed to comply with their own KWO-approved conservation plans, and are in violation of GMD5 Rules and the GMD5 Management Program. There was no evidence then and there is none now.

Water PACK further asserted that approving the transfer would violate the WTA, the Kansas Groundwater Management Act (K.S.A. 82a-1020, *et seq*.), the Kansas Water Appropriation Act (K.S.A. 82a-1901, *et seq*.), and the Kansas Private Property Protection Act. (K.S.A. 77-701, *et seq*.), together with their enabling rules and regulations. These all have been thoroughly debunked, both legally and factually.

On October 27, 2022, the Cities served their *Response to the Joint Petition for Intervention*. The Cities response was electronically filed with OAH on October 28, 2022. The Cities responded to each of the allegations in the *Joint Petition* in detail explaining that Water PACK should not be permitted to intervene.

On December 5, 2022, Water PACK and Edwards County filed a *Motion for Leave to File their First Amended Joint Petition for Intervention* with a copy of the *First Amended Joint Petition for Intervention* attached. That same day, Water PACK and Edwards County filed a *Reply to the Cities' Response to the Original Petition For Intervention*.

The *First Amended Joint Petition for Intervention* did little more than rehash the allegations included in the original *Petition for Intervention*. It is still difficult to fathom a rational basis for Water PACK's opposition to the transfer of 4,800 of the 825,000 acre-feet of water appropriated in GMD5 to the Cities for municipal use which will provide a sustainable and drought-resistant source of water for two communities and over 25,000 Kansans and ***improve*** the aquifer at and surrounding the Ranch as compared to both historical irrigation pumping, and ongoing pumping (and overpumping) of the neighboring Water PACK members. (Ex. 1-67b at Cities 0003174. *See also* Ex. 2683 (Application of Mr. Wenstrom to withdraw water in excess of his permitted quantities from the Water Bank and 2023 Notice of Overpumping).

On December 23, 2022, the Cities filed a *Response to the Motion for Leave to file the First Amended Petition to Intervene*, again objecting to Water PACK's intervention because its bases for doing so were spurious.

On January 30, 2023, Water PACK and Edwards County filed a *Reply to the Cities' Response to the Motion for Leave to File the First Amended Joint Petition For Intervention*, which provided no additional clarity about the claims they were asserting.

On February 14, 2023, the Presiding Officer issued a Prehearing Order granting Intervenor status to Water PACK and Edwards County with the following limitation:

> Sufficient information has been provided to establish Water PACK and Edwards County **<u>may</u>** have an interest in the outcome of the proceeding. Without making judgment on the facts as set forth in the respective briefings, it would be premature to determine that Water Pack and

> Edwards County do not have relevant interest in this matter. Therefore, in the interest of justice, the petition for intervention is granted. However, the ALJ reserves the right to issue further order(s) in the future limiting the intervention of Water PACK and Edwards County, or any intervenors, should the ALJ deem it necessary to do so.

During Discovery Water PACK refused to provide any substantive evidence substantiating their legal or factual theories. They refused, for example, to respond to any of the Cities' 23 Interrogatories asserting that, with subparts, the Cities had violated the 30-Interrogatory limit in Supreme Court Rule 135, which by its plain terms, applies to "the number of interrogatories in a damage action under K.S.A. Chapter 60," not to a proceeding filed pursuant to the WTA and governed by the Kansas Administrative Procedures Act. When counsel for the Cities pointed this language out to Water PACK, they ignored it and doggedly insisted the rule applied to this proceeding, notwithstanding the plain language of the rule.

Then Water PACK refused to even ask its members to produce requested documents asserting that they were not within Water PACK's possession, custody or control and arguing that it had no authority to demand production of the requested documents.

Water PACK's intransigence during discovery caused delay at the hearing as the documents Mr. Wenstrom brought with him to reference while on the stand—and which he doggedly refused to turn over to counsel to the City of Hays, requiring a recess in the proceedings as counsel for the Parties addressed the issue between and amongst themselves and Mr. Wenstrom—clearly fell within the scope of the Cities' discovery requests. (*See* Wenstrom Test., Tr. Vol. 8 beginning at 1379:11.)

As demonstrated in the Findings of Fact, Water PACK presented no evidence on any of the issues asserted in their Petitions for Intervention. Moreover, they wholly failed to present evidence to even suggest that the Cities' requested transfer should be denied or that the quantity requested should be reduced. Instead, most of their case was a collateral attack on the Chief Engineer's Master Order Contingently Approving the Cities' Change Applications. The rest was based on inapplicable or pretended legal theories.

The Cities acknowledge that a hearing would have been required, even if Water PACK and the County had not intervened. However, their ***participation*** in this proceeding, before and during the hearing, has caused the Cities to incur substantial additional costs, including both lay and substantial expert witness expenses, travel expenses, and attorney fees that are not among the expenses that can be allocated. Ultimately, Water PACK and the County caused what could have been and, in fairness and equity, ***should have been*** a two-day hearing to stretch over a period of 9 days; in other words, Water PACK caused the hearing to be 78% longer than it reasonably should have been.

The Cities respectfully request that the Presiding Officer allocate 78% of the costs to Water PACK and the County and divide the balance equally among the other parties.

CONCLUSION

The Cities respectfully request that the Presiding Officer allocate costs as set forth herein and issue an Initial Order recommending the transfer be approved as requested in the First Amended Water Transfer Application. The Cities request that the hearing Panel issue a Final Order approving the transfer.

Respectfully submitted,

FOULSTON SIEFKIN LLP
David M. Traster, KS #11062
1551 N. Waterfront Parkway, Suite 100
Wichita, KS 67206-4466
T: 316-291-9725 | F: 316-267-6345
dtraster@foulston.com

and

Daniel J. Buller, KS #25002
7500 College Boulevard, Suite 1400
Overland Park, KS 66210-4041
T: 913-253-2179 | F: 866-347-9613
dbuller@foulston.com

and

Donald F. Hoffman, KS #09502
donhoff@eaglecom.net
Melvin J. Sauer, Jr., KS #14638
melsauer@eaglecom.net
DREILING, BIEKER & HOFFMAN, LLP
111 W. 13th Street
P.O. Box 579
Hays, KS 67601-0579
T: 785-625-3537 | F: 785-625-8129

By: */s/ David M. Traster*
David M. Traster, KS #11062

Attorneys for the City of Hays, Kansas

WOELK & COLE
4 S. Kansas
P.O. Box 431
Russell, KS 67665-0431
T: 785- 483-3711|F: 785-483-2983
cole_ken@hotmail.com

By: /s/Kenneth L. Cole
Kenneth L. Cole, KS #11003

Attorneys for City Russell, Kansas

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the above and foregoing Amended Final Exhibit List and exhibits was served this 29th day of September, 2023, by uploading it to OAH Case No. 23AG0003 and by electronic mail to the following:

Lynn D. Preheim
lynn.preheim@stinson.com
Christina J. Hansen
christina.hansen@stinson.com
STINSON LLP
1625 N. Waterfront Parkway, Suite 300
Wichita, KS 67206

Attorneys for the Big Bend Groundwater Management District No. 5

Stephanie A. Kramer, Chief Counsel
Stephanie.Kramer@ks.gov
Kate S. Langworthy, Staff Attorney
Kate.Langworthy@ks.gov
Kansas Department of Agriculture
1320 Research Park Drive
Manhattan, KS 66502

Attorneys for the Kansas Department of Agriculture

Charles D. Lee
clee@leeschwalb.com
Myndee M. Lee

mlee@leeschwalb.com
Post Office Box 26054
Overland Park, KS 66225

and

Micah Schwalb
mschwalb@leeschwalb.com
Lee Schwalb
4450 Arapahoe Ave., Ste. 100
Boulder, CO 80303

Attorneys for Water PACK

Mark Frame
framelaw@yahoo.com
P.O. Box 37
Kinsley, KS 67547

Attorney for Edwards County

/s/David M. Traster
David M. Traster, KS #11062

Appendix A –
City of Hays' Water Rights

I. Hays' Big Creek water rights.

DWR File No. EL-02

Priority date:	Vested Right - Not Applicable.
Authorized use:	Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W
Source:	Groundwater in the Big Creek alluvium in the City of Hays
Point of Diversion:	Well C-17: NC W½ NE¼, 3,971 feet north and 2,002 feet west of the southeast corner of Section 33, T13S-R18W Well C-19: SE¼ SW¼ SW¼, 44 feet north and 4,443 feet west of the southeast corner of Section 3, T14S-R18W Well C-20 (Suspended): SE¼ SE¼ SE¼, 573 feet north and 20 feet west of the southeast corner of Section 33, T13S-R18W. Well C-21 (Emergency Well): SE¼ NE¼ NE¼, 4,554 feet north and 58 feet west of the southeast corner of Section 32, T13S-R18W, Well C-24 (Emergency Well): NE¼ SW¼ NW¼, 3,572 feet north and 4,503 feet west of the southeast corner of Section 4, T14S-R18W Well C-27: SE¼ NE¼ SE¼, 1,803 feet north and 642 feet west of the southeast corner of Section 4, T14S-R18W Well C-28A: SW¼ NW¼ SW¼, 1,868 feet north and 5,154 feet west of the southeast corner of Section 3, T14S-R18W Well C-29 (Emergency Well): NE¼ SW¼ NE¼, 3,382 feet north and 1,641 feet west of the southeast corner of Section 33, T13S-R18W (This well is limited to a rate of 150 gpm and 102.99 acre-feet per year.) Well C-30 (Emergency Well): SW¼ SW¼ SW¼, 544 feet north and 5,136 feet west of the southeast corner of Section 28, T13S-R18W (This well is limited to 150 gpm and 102.99 acre-feet per year.) Well C-31: SE¼ SE¼ SW¼, 267 feet north and 2,975 feet west of the southeast corner of Section 3, T14S-R18W
Quantity:	1,227.55 acre-feet per year, subject to the following limitations: Well C-30 is limited to 102.99 acre-feet per year Well C-29 is limited to 102.99 acre-feet per year The remaining wells are reduced to 1,021.57 acre-feet per year. Authority to divert from Well C-20 has been suspended until further order of the Chief Engineer.

Rate: 1.8 million gallons per day, which is an average of 1,250 gpm
(Ex. 987 at Cities 0053293–94, 0053407, and 0053473–76)

DWR File No. 18,857

Priority date:	February 7, 1972.
Authorized use:	Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W
Source:	Groundwater in the Big Creek alluvium in the City of Hays
Point of Diversion:	SE¼ SW¼ SW¼, 44 feet north and 4,443 feet west of the southeast corner Section 3, T14S-R18W.
Quantity:	10.74 acre-feet per year
Rate:	50 gpm

(Ex. 948 at Cities 0032783–84, 003295–55)

DWR File No. 18,858

Date of Priority:	February 7, 1972.
Authorized use:	Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W
Source of Supply:	Groundwater in the Big Creek alluvium in the City of Hays
Point of Diversion:	SE¼ SW¼ SW¼, 44 feet north and 4,443 feet west of the southeast corner of Section 3, T14S-18W
Annual Quantity:	10.74 acre-feet per year
Rate of Diversion:	50 gpm (0.11 cfs).

(Ex. 948 at Cities 0032666, 0032793, 0032812)

DWR File No. 33,548

Date of Priority:	October 30, 1979.
Source of Supply:	Groundwater in the Big Creek alluvium in the City of Hays.
Authorized use:	Municipal use in the City of Hays and the immediate vicinity
Point of Diversion:	Well YE-1: SW¼ SW¼, 200 feet north and 5,000 feet west of the southeast Corner of Section 19, T13S-R18W, Well YE-2: SW¼ SW¼, 20 feet north and 4,100 feet west of the southeast Corner of Section 19, T13S-R18W.
Annual Quantity:	Well YE-1: 61 acre-feet per year Well YE-2: 72 acre-feet per year Limited to 3,675 acre-feet per year when combined with File Nos. EL 002, 1,248, 5,757, 33,296, 40,367, 40,368, 40,702, 40,704, 40,705, 40,706 and 40,707.

Rate of Diversion:	Well YE-1: 75 gpm Well YE-2: 110 gpm The simultaneous operation of the authorized wells is prohibited when the static water elevation drops below 1,991.5 feet mean sea level as determined in the monitoring well located approximately 600 feet north and 2,680 feet west of the southeast Corner of Section 19, T13S-R18W. The operation of the authorized wells must cease altogether if the static water level in the above referenced monitoring well drops below 1,989 feet mean sea level.

(Ex. 982 at Cities 0049287–89, 0049614–15, 0049661–63

DWR File No. 36,519.

Date of Priority:	March 7, 1983.
Authorized use:	Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W
Source of Supply:	Groundwater in the Big Creek alluvium in the City of Hays.
Point of Diversion:	SE¼ SW¼ SW¼, 44 feet north and 4,443 feet west of the southeast corner of Section 3, T14S-18W
Annual Quantity:	34.4 acre-feet per year
Rate of Diversion:	60 gpm (0.13 cfs). The rate of diversion is further limited to 60 gpm when combined with File 18,857

(Ex. 941 at Cities 0029831–32)

DWR File No. 36,520.

Date of Priority:	March 7, 1983.
Source of Supply:	Groundwater in the Big Creek alluvium in the City of Hays.
Authorized use:	Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W
Point of Diversion:	SE¼ SW¼ SW¼, 44 feet north and 4,443 feet west of the southeast corner of Section 3, T14S-18W,
Annual Quantity:	9.2 acre-feet per year
Rate of Diversion:	70 gpm. The rate of diversion is limited to 70 gpm when combined with File 18,858

(Ex. 942 at Cities 0030323–24)

DWR File No. 36,804.

Date of Priority: October 5, 1983.

Source of Supply: Groundwater in the Big Creek alluvium in the City of Hays

Authorized use: Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W

Point of Diversion: Well C-19: SE¼ SW¼ SW¼, 44 feet north and 4,443 feet west of the southeast corner of Section 3, T14S-18W

Annual Quantity: 3.81 acre-feet per year

Rate of Diversion: 70 gpm (0.13 cfs).

The rate of diversion is further limited to 70 gpm when combined with File EL 002, 18,857, 18,858, 36,519, and 36,520, 18,857

(Ex. 983 at Cities 0051067–68, 0051079, 0051204–05, 0051014–15)

DWR File No. 40,367.

Date of Priority: July 9, 1991.

Source of Supply: Groundwater in the Big Creek alluvium in the City of Hays Authorized use: Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W

Point of Diversion: Well C-33: NC E½ NW¼, 3,945 feet north and 3,440 feet west of the southeast corner of Section 29, T13S-R18W

Annual Quantity: 104.53 acre-feet per year.

When combined with File No. EL 002, the total cannot exceed 1,227.55 acre-feet per calendar year.

Rate of Diversion: 95 gpm

(Ex. 984 at Cities 0051703)

DWR File No. 40,368.

Date of Priority: July 9, 1991.

Source of Supply: Groundwater in the Big Creek alluvium in the City of Hays

Authorized use: Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W

Point of Diversion: Well C-32: NW¼ NE¼ NW¼, 5,000 feet north and 3,750 feet west of the southeast corner of Section 29, T13S-R 18W,

Annual Quantity: 170.54 acre-feet per year.

When combined with File 40,367, the total cannot exceed 194.824 acre-feet per year.

In addition, when this quantity is combined with File No. EL 002, the total cannot exceed 1,227.55 acre-feet per year.

Rate of Diversion: 125 gpm.

When combined with File 40,367, the rate cannot exceed 215 gpm

(Ex. 985 at Cities 0052412–14)

II. The Hays' Smoky Hill River water rights.

DWR File No. 1,248.

Date of Priority: March 4, 1953.

Source of Supply: Groundwater in the Smoky Hill River alluvium.

Authorized use: Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W

Point of Diversion: Well S-8: SE¼ SE¼ SE¼, 290 feet north and 240 feet west of the southeast corner of Section 29, T15S-R18W,

Well S-10: SE¼ NE¼ SW¼, 1,780 feet north and 3,280 feet west of the southeast corner of Section 28, T15S-R18W,

Well S-11: SW¼ NE¼ SE¼) 1,780 feet north and 1,030 feet west of the southeast corner of Section 28, T15S-R18W,

Well S-13: NW¼ SW¼ SW¼, 1,250 feet north and 4,780 feet west of the southeast corner of Section 27, T15S-R18W,

Well S-14: SW¼ NE¼ SW¼, 1,373 feet north and 3,308 feet west of the southeast corner of Section 27, T15S-R18W,

Well S-16: SW¼ NE¼ SE¼, 1,520 feet north and 1,190 feet west of the southeast corner of Section 27, T15S-R18W

Well S-18: SW¼ NE¼ SW¼, 1,583 feet north and 3,888 feet west of the southeast corner of Section 28, T15S-R18W

Well S-19 (formerly S-6a): SW¼ NE¼ NE¼) 4,599 feet north and 1,090 feet west of the southeast corner of Section 32, T15S-R18W (actually located 4,877 feet north and 1,056 feet west)

Well S-20 (formerly S-7a): NE¼ SE¼ SE¼) 970 feet north and 110 feet west of the southeast corner of Section 29, T15S-R18W (Actually located 926 feet north and 130 feet west)

Well S-21 (15a): SE¼ SW¼ SW¼) 647 feet north and 4,131 feet west of the southeast corner of Section 26, T15S-R18W (actually located 641 feet north and 4209 feet west).

Annual Quantity: 1,600 acre-feet per year, except that the combined quantities from Wells S-19 and S-20 cannot exceed 968 acre-feet per year.

	Until further Order by the Chief Engineer, the Quantity is further limited by the IGUCA Order to 90% of the maximum quantity used in 1981, 1982, or 1983. The IGUCA limits the total quantity for these two files to 2,085.58 acre-feet per year. When combined with File No. 33,296, the total quantity is limited to 2,285.83 acre-feet per year.
Rate of Diversion:	Well S-8: 635 gpm (1.41 cfs). Well S-10: 615 gpm (1.37 cfs). Well S-11: 530 gpm (1.18 cfs). Well S-13: 295 gpm (0.66 cfs). Well S-14: 280 gpm (0.62 cfs). Well S-16: 675 gpm (1.41 cfs). Well S-18: 570 gpm (1.41 cfs). Well S-19: 576 gpm (1.41 cfs). Well S-20: 700 gpm (1.41 cfs). Well S-21: 530 gpm (1.41 cfs).

(Ex. 935 at Cities 0025152–54, Cities 0026045–94 Cities 0025248, Cities 0026050–51)

DWR File No. 5,757.

Date of Priority:	July 3, 1956.
Source of Supply:	Groundwater in the Smoky Hill River alluvium.
Authorized use:	Municipal use in the City of Hays and the immediate vicinity as well as related areas in the NE¼ of Section 19 and the NW¼ of Section 36, T13S-R18W
Point of Diversion:	*See* list under File 1,248.
Annual Quantity:	900 acre-feet per year. Until further Order by the Chief Engineer, the quantity is further limited by the IGUCA Order discussed under File No. 1,248 to 90% of the maximum quantity used in 1981, 1982, or 1983. Since the wells for this file and File No. 1,248 overlap, there is no way to allocate the quantities between these two files. The IGUCA limits the total quantity for these two files to 2,085.58 acre-feet per year. When combined with File No. 33,296, the total quantity is limited to 2,285.83 acre-feet per year.
Rate of Diversion:	*See* list under File No. 1,248. When combined with File 1,248, the rate cannot exceed 2,900 gpm.

(Ex. 938 at Cities 0027615–17, 0028379–420, 0028384–85, 0027854–55)

DWR File No. 33,296.

Date of Priority:	July 19, 1979.
Source of Supply:	Groundwater in the Smoky Hill River alluvium

Authorized use: Municipal use in the City of Hays and the immediate vicinity

Point of Diversion: Well S-22 (formerly Well S-16a): NE¼ SE¼ SW¼, 674 feet north and 2,787 feet west of the southeast corner of Section 26, T15S-R18W (actually located 579 feet north and 2,859 feet west).

Well S-23 (formerly Well S-17a): SW¼ SW¼ SW¼, 304 feet north and 5,053 feet west of the southeast corner of Section 25, T15S-R18W (actually located 209 feet north and 5,087 feet west)

Annual Quantity: Well S-22: 155.2 acre-feet per year

Well S-23: 176.96 acre-feet per year.

The total quantity of the two wells cannot exceed 300 acre-feet per year.

Until further Order by the Chief Engineer, the quantity is further limited by the IGUCA Order discussed under File No. 1,248 to 90% of the maximum quantity used in 1981, 1982, or 1983, or 102.74 acre-feet per year. When combined with File Nos. 1,248 and 5,757, the total quantity is limited to 2,285.83 acre-feet per year.

Rate of Diversion: Well S-22: 315 gpm (0.71 cfs).

Well S-23: 300 gpm (0.67 cfs)

(Ex. 981 at Cities 0048181–82, Cities 0048690–731, Cities 0048697.)

III. Hays' Dakota water rights

DWR File No. 40,702

Date of Priority: May 15, 1992.

Authorized use: Municipal use in the City of Hays and the immediate vicinity

Source of Supply: Groundwater in the Lower Cretaceous (Dakota) Formation

Point of Diversion: Well D-6: SW¼ SW¼ SE¼, 395 feet north and 2,241 feet west of the southeast corner of Section 14, T14S-R19W

Annual Quantity: 120 acre-feet per year.

The quantity cannot exceed 4,097.27 acre-feet per year when combined with File Nos. EL 002, 1,248, 5,757, 18,857, 18,858, 33,296, 36,519, 36,520, 36,804, 40,367, and 40,368.

Rate of Diversion: 155 gpm

(Ex. 1-112; Ex. 1749 at Cities 0072129)

DWR File No. 40,703

Date of Priority: May 15, 1992.

Authorized use: Municipal use in the City of Hays and the immediate vicinity

Source of Supply: Groundwater in the Lower Cretaceous (Dakota) Formation

Point of Diversion: Well D-3: NW¼ NW¼ SE¼, 2,239 feet north and 2,432 feet west of the southeast corner of Section 18, T14S-R18W,
Annual Quantity: 123.98 acre-feet per year
The quantity cannot exceed 4,097.27 acre-feet per year when combined with File Nos. EL 002, 1,248, 5,757, 18,857, 18,858, 33,296, 36,519, 36,520, 36,804, 40,367, 40,368, and 40,702.
Rate of Diversion: 135 gpm
(Ex. 1-113, Ex. 1061 at Cities 0062555)

DWR File No. 40,704
Date of Priority: May 15, 1992.
Authorized use: Municipal use in the City of Hays and the immediate vicinity
Source of Supply: Groundwater in the Lower Cretaceous (Dakota) Formation
Point of Diversion: Well D-5: NE¼ NW¼ SW¼, 2,212 feet north and 4,519 feet west of the southeast corner of Section 13, T14S-R19W,
Annual Quantity: 128.98 acre-feet per year.
The quantity cannot exceed 4,097.27 acre-feet per year when combined with File Nos. EL 002, 1,248, 5,757, 18,857, 18,858, 33,296, 36,519, 36,520, 36,804, 40,367, 40,368, 40,702 and 40,703.
Rate of Diversion: 155 gpm
(Ex. 1-114, Ex. 1060 at Cities 0062024–26)

DWR File No. 40,705
Date of Priority: May 15, 1992.
Authorized use: Municipal use in the City of Hays and the immediate vicinity
Source of Supply: Groundwater in the Lower Cretaceous (Dakota) Formation
Point of Diversion: Well D-4: SE¼ NW¼ NW¼, 4,250 feet north and 4,000 feet west of the southeast corner of Section 20, T14S-R18W,
Annual Quantity: 125.82 acre-feet per year
The quantity cannot exceed 4,097.27 acre-feet per year when combined with File Nos. EL 002, 1,248, 5,757, 18,857, 18,858, 33,296, 36,519, 36,520, 36,804, 40,367, 40,368, 40,702, 40,703, and 40,704.
Rate of Diversion: 130 gpm
(Ex. 1-115, Ex. 1062 at Cities 0063088–90)

DWR File No. 40,706
Date of Priority: May 15, 1992.
Authorized use: Municipal use in the City of Hays and the immediate vicinity
Source of Supply: Groundwater in the Lower Cretaceous (Dakota) Formation

Point of Diversion: Well D-1: SE¼ SE¼ NE¼, 2,837 feet north and 776 feet west of the southeast corner of Section 13, T14S-R19W,
Annual Quantity: 118 acre-feet per year
The quantity cannot exceed 4,097.27 acre-feet per year when combined with File Nos. EL 002, 1,248, 5,757, 18,857, 18,858, 33,296, 36,519, 36,520, 36,804, 40,367, 40,368, 40,702, 40,703, 40,704, and 40,705.
Rate of Diversion: 135 gpm
(Ex. 1-116, Ex. 1059 at Cities 0061625-27)

DWR File No. 40,707
Date of Priority: May 15, 1992.
Authorized use: Municipal use in the City of Hays and the immediate vicinity
Source of Supply: Groundwater in the Lower Cretaceous (Dakota) Formation
Point of Diversion: Well D-2: SE¼ SW¼ SE¼, 6 feet north and 1,444 feet west of the southeast corner of Section 18, T14S-R18W,
Annual Quantity: 150.99 acre-feet per year
The quantity cannot exceed 4,097.27 acre-feet per year when combined with File Nos. EL 002, 1,248, 5,757, 18,857, 18,858, 33,296, 36,519, 36,520, 36,804, 40,367, 40,368, 40,702, 40,703, 40,704, 40,705 and 40,706.
Rate of Diversion: 150 gpm
(Ex. 1-117; Ex. 1063 at Cities 0063667–69)

Appendix B –
City of Russell's Water Rights

I. Russell's Big Creek surface water rights

DWR File No. RS-08

Priority date:	
Authorized use:	Municipal use in the City of Russell and its immediate vicinity
Source:	Surface water in Big Creek southwest of the City.
Point of Diversion:	NW¼ NE¼ SW¼, 2,340 feet north and 3,550 feet west of the southeast corner of Section 23, T14S-R15W, Russell County.
Quantity	767 acre-feet per calendar year.
Rate:	1158.56 GPM (3.10 cubic feet per second)

(Ex. 945 at Cities 0031550)

DWR File No. 206

Priority date:	April 29, 1947
Authorized use:	Municipal use in the City of Russell and its immediate vicinity
Source:	Surface water in Big Creek southwest of the City.
Point of Diversion:	NW¼ NE¼ SW¼, 2,340 feet north and 3,550 feet west of the southeast corner of Section 23, T14S-R15W, Russell County.
Quantity	1,000 acre-feet per calendar year
Rate:	1,725 GPM

(Ex. 940 at Cities 0029470, Cities 0029550)

DWR File No. 1,267

Priority date:	Marth 11, 1953
Authorized use:	Municipal use in the City of Russell and its immediate vicinity
Source:	Surface water in the Smoky Hill River.
Point of Diversion:	SE¼ NE¼ SW¼, 1,290 north and 3,150 feet west of the southeast corner of Section 25, T15S-R17W, Ellis County
Quantity:	1,086 acre-feet, but when combined with RS-08 and File 206, the quantity cannot exceed 1840 acre-feet. The Lower Smoky Hill River IGUCA limits Russell's diversion from the Smoky Hill River and its alluvium to a total 1,435.5 acre-feet per calendar year from Files 1,267, 1,861, 7,628, 17,586, and 17,587. (Ex. 937 at Cities 0027257.)
Rate:	4,200 GPM

(Ex. 936 at Cities 0026851)

II. Russell's Smoky Hill groundwater rights

DWR File No. 1,861

Priority date:	September 26, 1953
Authorized use:	Municipal use in the City of Russell and its immediate vicinity
Source:	Groundwater in the Smoky Hill alluvium near Pfeifer
Point of Diversion:	SE¼ NE¼ SW¼, 1,460 feet north and 3,200 feet west of the southeast corner of Section 25, T15S-R17W, Ellis County
Quantity	315 acre-feet per year, but when combined with RS-08 and Files 206 and 1,267, the quantity cannot exceed 1,840 acre-feet per year. The Lower Smoky Hill River IGUCA limits Russell's diversion from the Smoky Hill River and its alluvium to a total 1,435.5 acre-feet per calendar year from Files 1,267, 1,861, 7,628, 17,586, and 17,587. (Ex. 937 at Cities 0027257.)
	Rate: 1,200 GPM

(Ex. 937 at Cities 0027267)

DWR File No. 17,586

Priority date:	November 13, 1970
Authorized use:	Municipal use in the City of Russell and its immediate vicinity
Source:	Groundwater in the Smoky Hill alluvium near Pfeifer
Point of Diversion:	Well #5, NC N½ SW¼, 1,899 feet north and 4,012 west of the southeast corner of Section 25, T15S-R17W, Ellis County
	Well #6, SE¼ NE¼ SE¼, 1,507 feet north and 74 west of the southeast corner of Section 26, T15S-R17W, Ellis County
	Well #7, SW¼ NE¼ SE¼, 1,507 feet north and 1,132 west of the southeast corner of Section 26, T15S-R17W, Ellis County
	Well #8, NE¼ SE¼ SW¼, 1,060 feet north and 2,783 west of the southeast corner of Section 26, T15S-R17W, Ellis County
	Well #9, NW¼ SE¼ SW¼, 1,314 feet north and 3,855 west of the southeast corner of Section 26, T15S-R17W, Ellis County
	Well #10, NW¼ SW¼ SW¼, 1,238 feet north and 5,373 west of the southeast corner of Section 26, T15S-R17W, Ellis County
Quantity:	Well #5 26.54 acre-feet
	Well #6 103.00 acre-feet
	Well #7 101.75 acre-feet
	Well #8 109.90 acre-feet
	Well #9 114.19 acre-feet
	Well #10 101.19 acre-feet
	The combined quantity cannot exceed 456 acre-feet per year.

	When combined with RS-08 and Files 206, 1,267, 1,861, and 7,628 the quantity cannot exceed 1,840 acre-feet per year. The Lower Smoky Hill River IGUCA limits Russell's diversion from the Smoky Hill River and its alluvium to a total 1,435.5 acre-feet per calendar year from Files 1,267, 1,861, 7,628, 17,586, and 17,587. (Ex. 937 at Cities 0027257.)	
Rate:	Well #5	340 GPM
	Well #6	505 GPM
	Well #7	400 GPM
	Well #8	490 GPM
	Well #9	610 GPM
	Well #10	465 GPM
	When the wells operate simultaneously the diversion cannot exceed 2,000 gallons per minute.	

(Ex. 946 at Cities 0031594–96, Cities 0031985-88)

DWR File No. 17,587

Priority date:	November 13, 1970	
Authorized use:	Municipal use in the City of Russell and its immediate vicinity	
Source:	Groundwater in the Smoky Hill alluvium near Pfeifer	
Point of Diversion:	Well #2, SW¼ SW¼ SW¼, 482 feet north and 5046 west of the southeast corner of Section 30, T15S-R16W, Ellis County Well #3, NE¼ SW¼ SE¼, 941 feet north and 1372 west of the southeast corner of Section 25, T15S-R17W, Ellis County Well #4, NW¼ SW¼ SE¼, 1236 feet north and 2521 west of the southeast corner of Section 25, T15S-R17W, Ellis County	
Quantity:	Well #2	32.29 acre-feet
	Well #3	82.44 acre-feet
	Well #4	98.70 acre-feet)
	The combined quantity cannot exceed 189.9 acre-feet per year. When combined with RS-08 and Files 206, 1,267, 1,861, 7,628, and 17,586 the quantity cannot exceed 1,840 acre-feet per year. The Lower Smoky Hill River IGUCA limits Russell's diversion from the Smoky Hill River and its alluvium to a total 1,435.5 acre-feet per calendar year from Files 1,267, 1,861, 7,628, 17,586, and 17,587. (Ex. 937 at Cities 0027257.)	
Rate:	Well #2	285 GPM
	Well #3	455 GPM
	Well #4	310 GPM

	When the wells operate simultaneously diversion cannot exceed 1,000 gallons per minute.

(Ex. 947 at Cities 0032200-02, Cities 0032533–35)

DWR File No. 34,505 (Owned by Loran C. Zimmerman)

Priority date:	September 2, 1980
Authorized use:	Irrigation use on 77 acres in the NE¼ of Section 33, T15S-R17W, Ellis County or for Municipal use in the City of Russell and its immediate vicinity.
Source:	Groundwater in Smoky Hill River alluvium
Point of Diversion:	SW¼ SW¼ NE¼, 2,686 feet north and 2,300 feet west of the southeast corner of Section 33, T15S-R17W, Ellis County
Quantity:	62 acre-feet per year The Lower Smoky Hill River IGUCA limits diversion from irrigation rights to 15 acre-inches per acre on the maximum number of authorized acres irrigated in 1977 through 1982. (Ex. 2440 at Cities 0082529.) 76 acres were irrigated in 1981 resulting in an allocation of 95 acre-feet but the quantity is further limited to the 62 acre-feet set out in the Certificate. (Ex. 1055 at Cities 0060720.)
Rate:	740 GPM

(Ex. 1055 at Cities 0060684–85, Cities 0060578–80)

III. Russell's storage water right in Cedar Bluff Reservoir

DWR File No. 7,628

Priority date:	October 18, 1957
Authorized use:	Municipal use in the City of Russell and its immediate vicinity
Source:	Surface flow in the Smoky Hill River
Point of Diversion:	NC N½ SW¼, 1,980 feet north and 3,900 feet west of the southeast corner of Section 36, T14S-R22W, Trego County
Quantity:	2,700 acre-feet per year of storage in Cedar Bluff Reservoir and 2,000 acre-feet per year for direct municipal use. The Lower Smoky Hill IGUCA does not restrict releases from Cedar Bluff Reservoir under File No. 7,628 but diversions from the Smoky Hill River and its alluvium are restricted to 1,435.5 acre-feet per calendar year. (Exs. 937 at Cities 0027257; 2440 at Cities 0082529.)
Rate:	0

(Ex. 939 at Cities 0028892)

IV. Russell's recreational water right in Fossil Lake

DWR File No. 36,680

Priority date:	July 11, 1983
Authorized use:	Recreation use in Fossil Lake
Source:	Surface flow in Fossil Creek
Point of Diversion:	NW¼ SE¼ SW¼, 858 north and 3,498 west of the southeast corner of Section 2, T14-R14W, Russell County
Quantity:	286.65 acre-feet per year of storage in Fossil Lake
Rate:	0

Appendix C – Citations to the original and amended Change Applications

		Original Change Applications		Amended Change Applications		Second Amened Change Applications	
File No.	Circle Nos.	Date	Citation	Date	Citation	Date	Citation
21,729	Circles 7, 8, 9, & 10	June 26, 2015	Ex. 1-5, Cities 0000432-510	November 28, 2016	Ex. 1-5, Cities 0000422-430	March 25, 2019	Ex. 1-5, Cities 0000404-421
21729-D2		June 26, 2015	Ex. 1-6, Cities 0000523-532	No Amended Change App		March 25, 2019	Ex. 1-6, Cities 0000511-522
21,730	Circle 1	June 28, 2015	Ex. 1-7, Cities 0000619-656	November 28, 2016	Ex. 1-7, Cities 0000611-617	March 25, 2019	Ex. 1-7, Cities 0000602-610
21,731	Circles 2, 3, 4, & 5	June 26, 2015	Ex. 1-8, Cities 0000687-782	November 28, 2016	Ex. 1-8, Cities 0000674-685	March 26, 2019	Ex. 1-8, Cities 0000657-673
21,732	Circles 6, 11, & 12	June 26, 2015	Ex. 1-9, Cities 0000805-861	November 28, 2016	Ex. 1-9, Cities 0000797-803	March 25, 2019	Ex. 1-9, Cities 0000783-796
21,732-D2		April 27, 2018	Ex. 1-10, Cities 0000878-927	No Amended Change App		March 25, 2019	Ex., 1-10, Cities 0000862-877
21,733	Circle 13	June 26, 2015	Ex. 1-11, Cities 0000944-986	November 28, 2016	Ex. 1-11, Cities 0000936-942	NO DATE	Ex. 1-11, Cities 0000928-935
21,734	Circles 14, 15, 16, 17, & 18	June 26, 2015	Ex. 1-12, Cities 0001015-1085	November 28, 2016	Ex. 1-12, Cities 0000999-0001011	March 25, 2019	Ex. 1-12, Cities 0000987-0000998
21,841	Circle 8A	June 26, 2015	Ex. 1-13, Cities 0001102-1135	November 28, 2016	Ex. 1-13, Cities 0001094-1100	March 25, 2019	Ex. 1-13, Cities 0001086-1093
21,842	Circle 11A	June 26, 2015	Ex. 1-14, Cities 0001151-1187	November 28, 2016	Ex. 1-14, Cities 0001143-1149	March 25, 2019	Ex. 1-14, Cities 0001136-1142
22,325	Circle 19	June 26, 2015	Ex. 1-15, Cities 0001205-1258	November 28, 2016	Ex. 1-15, Cities 0001197-1203	March 25, 2019	Ex. 1-15, Cities 0001188-1196
22,326	Circle 20	June 26, 2015	Ex. 1-16, Cities 0001276-1337	November 28, 2016	Ex. 1-16, Cities 0001268-1274	March 25, 2019	Ex. 1-16, Cities 0001259-1267
22,327	Circle 21	June 26, 2015	Ex. 1-17, Cities 0001355-1398	November 28, 2016	Ex. 1-17, Cities 0001347-1353	March 25, 2019	Ex. 1-17, Cities 0001338-1346

	Quantity and Rate Converted To Municipal Use				Proposed Municipal Well (Change Approval)					Well Location (Amended Change Application)	
File No.	Well Site	Acre-Feet	Maximum GPM	Citation	Quarter Calls	S-T-R	Feet North	Feet West	Citation	Well Site	Citation
21,729	A	376	945	Ex. 1, Cities 0000007-10	NE/4, NE/4, SW/4	29-T25S-R19W	2,259	2,705	Ex. 1-2, Cities 0000185	A	Ex. 1-5, Cities 0000429-30
21729-D2	A	376	945	Ex. 1, Cities 0000007-10	NE/4, NE/4, SW/4	29-T25S-R19W	2,259	2,705	Ex. 1-2, Cities 0000190	No Amended Change App	
21,730	G	176	1,040	Ex. 1, Cities 0000007-10	NW/4, NE/4, SW/4	30-T25S-R19W	2,282	3,870	Ex. 1-2, Cities 0000195	G	Ex. 1-7, Cities 0000616-617
21,731	G & H	800	1,040/765	Ex. 1, Cities 0000007-10	NW/4, NE/4, SW/4 & SW/4, SW/4, NE/4	30-T25S-R19W	2282 & 3142	3870 & 2099	Ex. 1-2, Cities 0000200	G & H	Ex. 1-8, Cities 0000682-685
21,732	B	353	885	Ex. 1, Cities 0000007-10	SE/4, SW/4, NE/4	32-T25S-R19W	2,724	1,916	Ex. 1-2, Cities 0000205	B	Ex. 1-9, Cities 0000802-803
21,732-D2	B	240	885	Ex. 1, Cities 0000007-10	SE/4, SW/4, NE/4	32-T25S-R19W	2,724	1,916	Ex. 1-2, Cities 0000209	No Amended Change App	
21,733	C	189	1,360	Ex. 1, Cities 0000007-10	NE/4, SE/4, SW/4	33-T25S-R19W	824	3,036	Ex. 1-2, Cities 0000214	C	Ex. 1-11, Cities 0000941-942
21,734	C, D, E	889.1	1,360/1,500/1,270	Ex. 1, Cities 0000007-10	NE/4, SE/4, SW/4	33-T25S-R19W	824	3,036	Ex. 1-2, Cities 0000219	C, D, E	Ex. 1-12, Cities 0001006-1011
21,841	F	195	1,040	Ex. 1, Cities 0000007-10	NW/4, SE/4, NE/4	4-T26S-R19W	4,545	1,311	Ex. 1-2, Cities 0000224	F	Ex. 1-13, Cities 0001099-1100
21,842	E	195	1,270	Ex. 1, Cities 0000007-10	NW/4, SE/4, SE/4	5-T26S-R19W	1,577	901	Ex. 1-2, Cities 000229	E	Ex. 1-14, Cities 0001148-1149
22,325	I	186	805	Ex. 1, Cities 0000007-10	SE/4, NE/4, NW/4	1-T26S-R20W	5,034	2,790	Ex. 1-2, Cities 0000234	I	Ex. 1-15, Cities 0001202-1203
22,326	I	188	805	Ex. 1, Cities 0000007-10	SE/4, NE/4, NW/4	1-T26S-R20W	5,034	2,790	Ex. 1-2, Cities 0000239	I	Ex. 1-16, Cities 0001273-1274
22,327	I	145.8	805	Ex. 1, Cities 0000007-10	SE/4, NE/4, NW/4	1-T26S-R20W	5,034	2,790	Ex. 1-2, Cities 0000244	I	Ex. 1-17, Cities 0001352-1353

		Original Change Applications		Amended Change Applications		Second Amened Change Applications	
File No.	Circle Nos.	Date	Citation	Date	Citation	Date	Citation
22,329	Circle 24	June 29, 2015	Ex. 1-18, Cities 0001415-1453	November 28, 2016	Ex. 1-18, Cities 0001407-1413	March 26, 2019	Ex. 1-18, Cities 0001399-1406
22,330	Circle 25	June 26, 2015	Ex. 1-19, Cities 0001471-1509	November 28, 2016	Ex. 1-19, Cities 0001461-1467	March 26, 2019	Ex. 1-19, Cities 0001454-1460
22,331	Circle 22	June 26, 2015	Ex. 1-20, Cities 0001528-1575	November 28, 2016	Ex. 1-20, Cities 0001520-1526	March 26, 2019	Ex. 1-20, Cities 0001510-1519
22,332	Circle 23	June 26, 2015	Ex. 1-21, Cities 0001592-1634	November 28, 2016	Ex. 1-21, Cities 0001584-1590	March 25, 2019	Ex. 1-21, Cities 0001576-1583
22,333	Circle 39	June 26, 2015	Ex. 1-22, Cities 0001651-1702	November 28, 2016	Ex.1-22, Cities 0001643-1649	March 25, 2019	Ex. 1-22, Cities 0001635-1642
22,334	Circle 27	June 26, 2015	Ex. 1-23, Cities 0001720-1763	November 28, 2016	Ex. 1-23, Cities 0001712-1718	March 25, 2019	Ex. 1-23, Cities 0001703-1711
22,335	Circle 26	June 26, 2015	Ex. 1-24, Cities 0001782-1824	November 28, 2016	Ex. 1-24, Cities 0001774-1870	March 26, 2019	Ex. 1-24, Cities 0001764-1773
22,338	Circle 28	June 26, 2015	Ex. 1-25, Cities 0001843-1880	November 28, 2016	Ex. 1-25, Cities 0001835-1841	March 26, 2019	Ex. 1-25, Cities 0001825-1834
22,339	Circle 29	June 26, 2015	Ex. 1-26, Cities 0001897-1929	November 28, 2016	Ex. 1-26, Cities 0001889-1895	March 26, 2019	Ex. 1-26, Cities 0001881-1888
22,340	Circle 31	June 26, 2015	Ex. 1-27, Cities 0001945-1980	November 28, 2016	Ex. 1-27, Cities 0001937-1943	March 25, 2019	Ex. 1-27, Cities 0001930-1936
22,341	Circle 30	June 26, 2015	Ex. 1-28, Cities 0001997-2046	November 28, 2016	Ex. 1-28, Cities 0001989-1995	March 25, 2019	Ex. 1-28, Cities 0001981-1988
22,342	Circle 36	June 26, 2015	Ex. 1-29, Cities 0002062-2095	November 28, 2016	Ex. 1-29, Cities 0002054-2060	March 25, 2019	Ex. 1-29, Cities 0002047-2053
22,343	Circle 35	June 26, 2015	Ex. 1-30, Cities 0002111-2146	November 28, 2016	Ex. 1-30, Cities 0002103-2109	March 25, 2019	Ex. 1-30, Cities 0002096-2102

	Quantity and Rate Converted To Municipal Use				Proposed Municipal Well (Change Approval)					Well Location (Amended Change Application)	
File No.	Well Site	Acre-Feet	Maximum GPM	Citation	Quarter Calls	S-T-R	Feet North	Feet West	Citation	Well Site	Citation
22,329	J	75	700	Ex. 1, Cities 0000007-10	NE/4, SW/4, SW/4	1-T26S-R20W	1,634	4,078	Ex. 1-2, Cities 0000249	J	Ex. 1-18, Cities 0001412-1413
22,330	J	75	700	Ex. 1, Cities 0000007-10	NE/4, SW/4, SW/4	1-T26S-R20W	1,634	4,078	Ex. 1-2, Cities 0000254	J	Ex. 1-19, Cities 0001466-1467
22,331	J	180	700	Ex. 1, Cities 0000007-10	NE/4, SW/4, SW/4	1-T26S-R20W	1,634	4,078	Ex. 1-2, Cities 0000259	J	Ex. 1-20, Cities 0001525-1526
22,332	J	135	700	Ex. 1, Cities 0000007-10	NE/4, SW/4, SW/4	1-T26S-R20W	1,634	4,078	Ex. 1-2, Cities 0000264	J	Ex. 1-21, Cities 0001589-1590
22,333	K	50	700	Ex. 1, Cities 0000007-10	NW/4, SW/4, NE/4	11-T26S-R20W	3,646	2,143	Ex. 1-2, Cities 0000269	K	Ex. 1-22, Cities 0001648-1649
22,334	K	136.1	700	Ex. 1, Cities 0000007-10	NW/4, SW/4, NE/4	11-T26S-R20W	3,646	2,143	Ex. 1-2, Cities 0000274	K	Ex. 1-23, Cities 0001717-1718
22,335	K	142.6	700	Ex. 1, Cities 0000007-10	NW/4, SW/4, NE/4	11-T26S-R20W	3,646	2,143	Ex. 1-2, Cities 0000279	K	Ex. 1-24, Cities 0001779-1780
22,338	L	116.6	950	Ex. 1, Cities 0000007-10	SW/4, NE/4, SE/4	10-T26S-R20W	1,863	883	Ex. 1-2, Cities 0000284	L	Ex. 1-25, Cities 0001840-1841
22,339	L	118.8	950	Ex. 1, Cities 0000007-10	SW/4, NE/4, SE/4	10-T26S-R20W	1,863	883	Ex. 1-2, Cities 0000289	L	Ex. 1-26, Cities 0001894-1895
22,340	M	116.6	950	Ex. 1, Cities 0000007-10	SW/4, NE/4, NE/4	15-T26S-R20W	4,367	1,228	Ex. 1-2, Cities 0000294	M	Ex. 1-27, Cities 0001942-1943
22,341	M	188	950	Ex. 1, Cities 0000007-10	SW/4, NE/4, NE/4	15-T26S-R20W	4,367	1,228	Ex. 1-2, Cities 0000299	M	Ex. 1-28, Cities 0001994-1995
22,342	M	75	950	Ex. 1, Cities 0000007-10	SW/4, NE/4, NE/4	15-T26S-R20W	4,367	1,228	Ex. 1-2, Cities 0000304	M	Ex. 1-29, Cities 0002059-2060
22,343	N	122	1,040	Ex. 1, Cities 0000007-10	SW/4, NW/4, SE/4	15-T26S-R20W	1,714	2,450	Ex. 1-2, Cities 0000309	N	Ex. 1-30, Cities 0002108-2109

		Original Change Applications		Amended Change Applications		Second Amened Change Applications	
File No.	Circle Nos.	Date	Citation	Date	Citation	Date	Citation
22,345	Circle 38	June 26, 2015	Ex. 1-31, Cities 0002163-2197	November 28, 2016	Ex. 1-31, Cities 0002155-2161	March 25, 2019	Ex. 1-31, Cities 0002147-2154
22,346	Circle 37	June 26, 2015	Ex. 1-32, Cities 0002214-2245	November 28, 2016	Ex. 1-32, Cities 0002206-2212	March 25, 2019	Ex. 1-32, Cities 0002198-2205
27,760	Circles 32 & 33	June 26, 2015	Ex. 1-33, Cities 0002265-2326	November 28, 2016	Ex. 1-33, Cities 0002255-2263	March 25, 2019	Ex. 1-33, Cities 0002246-2254
29,816	Circles 9A & 10A	June 26, 2015	Ex. 1-34, Cities 0002346-2382	November 28, 2016	Ex. 1-34, Cities 0002336-2344	March 25, 2019	Ex. 1-34, Cities 0002327-2335
30,083	Circle 36	June 26, 2015	Ex. 1-35, Cities 0002398-2425	November 28, 2016	Ex. 1-35, Cities 0002390-2396	March 25, 2019	Ex. 1-35, Cities 0002383-2389
30,084	Circle 24	June 26, 2015	Ex. 1-36, Cities 0002442-2459	November 28, 2016	Ex. 1-36, Cities 0002433-2438	March 26, 2019	Ex. 1-36, Cities 0002426-2432

	Quantity and Rate Converted To Municipal Use				Proposed Municipal Well (Change Approval)					Well Location (Amended Change Application)	
File No.	Well Site	Acre-Feet	Maximum GPM	Citation	Quarter Calls	S-T-R	Feet North	Feet West	Citation	Well Site	Citation
22,345	N	159	1,040	Ex. 1, Cities 0000007-10	SW/4, NW/4, SE/4	15-T26S-R20W	1,714	2,450	Ex. 1-2, Cities 0000314	N	Ex. 1-31, Cities 0002160-2161
22,346	N	140.4	1,040	Ex. 1, Cities 0000007-10	SW/4, NW/4, SE/4	15-T26S-R20W	1,714	2,450	Ex. 1-2, Cities 0000319	N	Ex. 1-32, Cities 0002211-2212
27,760	K & L	285.1	1	Ex. 1, Cities 0000007-10	NW/4, SW/4, NE/4 & SW/4, NE/4, SE/4	11-T26S-R20W & 10-T26S-R20W	3,646 / 1,863	2,143/883	Ex. 1-2, Cities 0000324-325	K & L	Ex. 1-33, Cities 0002260-2263
29,816	E & F	188	1,270/1,040	Ex. 1, Cities 0000007-10	NW/4, SE/4, SE/4 & NW/4, SE/4, NE/4	5-T26S-R19W & 4-T26S-R19W	1,577 / 4,545	901/1,311	Ex. 1-2, Cities 0000329-330	E & F	Ex. 1-34, Cities 0002341-2344
30,083	M	69.7	950	Ex. 1, Cities 0000007-10	SW/4, NE/4, NE/4	15-T26S-R20W	4,367	1,228	Ex. 1-2, Cities 0000334	M	Ex. 1-35, Cities 0002395-2396
30,084	J	75	700	Ex. 1, Cities 0000007-10	NE/4, SW/4, SW/4	1-T26S-R20W	1,634	4,078	Ex. 1-2, Cities 0000339	J	Ex. 1-36, Cities 0002437-2438

Appendix D –
Summary of the Cities' efforts to find additional sources of water.

This Appendix summarizes the Cities' efforts to find alternative sources of water to resolve their longstanding water-supply deficits. It is not a complete statement of their joint or separate efforts, nor does it detail all the Cities' efforts to evaluate each alternative.

The R9 Ranch was not selected over or in lieu of any other source because there are no alternative sources that will meet the Cities' long-term needs. The Cities' existing water rights are not adequate to meet present municipal needs during periods of normal precipitation. During droughts, the Cities' municipal needs are more acute and even drastic. New water rights are not available in the region for several reasons and the diversion of groundwater in the basin west of the Cedar Bluff Reservoir, and the Reservoir itself, have impaired the Cities' water rights in the Smoky Hill River alluvium.

After years of searching for alternative sources of water, it is clear that the R9 Ranch is the only source that will realistically meet the Cities' long-term water needs. There are no other sustainable, environmentally, economically, or technologically feasible water-supply alternatives available.

I. The R9 Ranch.

839. The R9 Water Rights were "existing water rights, they were perfected and purchased on the open market in an arm's length transaction." (Dougherty Test., Tr. Vol. 2 at 102:25–103:2).

840. In 1995, the R9 Ranch, "was the largest contiguous tract of water rights for sale in the state." (Ex. 762 at Cities 0020716; Dougherty Test., Tr. Vol. 2 at 275:8–12).

841. Because the R9 Water Rights are clustered in a contiguous area, construction of a raw water gathering system is not only more economical than many of the other options discussed below, easements and rights of way between and among the water rights are not needed.

842. Because the land and water rights were purchased on the open market, the Cities' condemnation powers are not needed, at least for acquisition of the water rights or the land required for a raw water gathering system.

843. And, unlike many of the other alternatives reviewed by the Cities, the R9 Water Rights are resilient to drought; saturated thickness is ample; and the R9 Water Rights are not subject to high evaporation rates like surface water in lakes such as Wilson, Kanopolis, Cedar Bluff, and Waconda; and they are in a portion of the aquifer that regularly receives recharge from precipitation. (Dougherty Test., Tr. Vol. 1 at 86:19–87:20. *See also* Ex. 2659. *See also* Ex. 1-54 at Cities 0002902–03.)

844. Unlike other alternatives, the Cities' projected use of the R9 Water Rights will ***improve*** the water level of the local and surrounding aquifer. (Ex. 2827 at Cities 0103727–31. *See also id.* at Cities 0103730 (Figure 4-7).)

845. Converting the R9 Ranch from irrigated farmland back to native grasses will greatly benefit the local and regional environment by reducing erosion and water loss, and provide critical habitat to native grassland birds and other wildlife. (Ex. 2824 at Cities 0103561.)

846. The Ranch is not subject to price hikes for water purchased from utilities or the Kansas Water Office; is not brackish or of extremely poor quality like Wilson Lake, the Saline River, and Dakota water ; does not require negotiating with federal agencies or obtaining approval from same; and avoids the political and public relations quagmire of acquiring lake water enjoyed by Kansas citizens and the Department of Wildlife and Parks for recreational or other purposes. The Cities own the R9 Water Rights, which are real property rights; there are no present or reasonably foreseeable users of the R9 water besides the Cities themselves.

II. The Smoky Hill River Wellfields

847. Both Hays and Russell have wellfields in the Smoky Hill River alluvium that depend almost entirely on river flow for recharge. (Ex. 2828 at Cities 0103761.) Without significant recharge from the River, the water supply is insufficient to meet the

Cities' current and future needs. (*Id*. at Cities 0103762–64; Quinday Test., Tr. Vol. 2 at 484:1–5; Crispin Test., Tr. Vol. 3 at 628:1–5.)

848. The Smoky will yield the full 2,285.8 acre-feet available under Hays' water rights, but only when there is flow in the river. (Ex. 2828 at Cities 0103762) The 2011–2013 drought illustrates the vulnerability that even relatively brief and moderate periods without river flow can have on the aquifer. During a moderate 2-year drought water levels in the Smoky Hill wellfield will decline at a linear rate. "Based on the modeling and historical water level and production data, the SHRWF [Smoky Hill River Well Field] will yield 1,000 AF/y during a 2-year drought." (Ex. 2828 at Cities 0103763.)

849. As discussed in the Findings of Fact above, the City of Hays' Smoky Hill River wellfield authorizes withdrawal of up to 2,800 acre-feet of water from the alluvium pursuant to three certified water appropriation rights, File Nos. 1,248, 5,757, and 33,296. The quantity has been reduced by a 1984 IGUCA. (Ex. 1-94 (1984-05-31 Lower Smoky Hill IGUCA Order).)

850. Russell's Smoky Hill water rights are downstream from Hays' well field, at Pfeifer, File Nos. 1,267, 1,861, 17,586 and 17,587, and permit the diversion of up to 1,086 acre-feet of surface water and 961 acre-feet of groundwater and are also limited by the 1984 IGUCA.

851. Russell also has 2,700 acre-feet of storage in the Cedar Bluff Reservoir, File 7,628, which has a potential maximum yield of 2,000 acre-feet of water that Russell can

have released each year. However, releases from Cedar Bluff must travel many stream miles to reach the Pfeiffer wells. (*See* discussion under the Cedar Bluff heading below.)

852. For decades, Hays has explored the idea of expanding and optimizing its Smoky Hill River wellfield near Schoenchen to improve the reliability and quantity of water available from that limited water source.

853. In July of 1977, Black and Veatch submitted a *Water Supply Memorandum* to Hays that examined existing and anticipated water requirements and recommended a plan to expand the City's total water supply to meet current and immediate future water requirements including adding additional wells in the Smoky Hill River alluvium both east and west of then-existing wells. (Ex. 1-92)

854. On July 19, 1979, the City filed five applications for new water rights in the Smoky Hill wellfield designated as DWR File Nos. 33,292, 33,293, 33,294, 33,295, and 33,296 requesting permits to drill 18 new wells to divert an additional 1,400 acre-feet to increase the total diversion from the Smoky Hill wellfield to 3,900 acre-feet per year. (Exs. 1-93, 981, and 1051–54.)

855. The Chief Engineer agreed to consider approval of File 33,296 if the City would withdraw the other applications. (Ex. 981 at Cities 0048337–38.) File 33,296 was the same as the previous application designated as File No. 31,953. (Ex. 981 at Cities 0048383.)

856. On October 10, 1980, Hays agreed to withdraw File Nos. 33,292, 33,293, 33,294, 33,295 (Ex. 981 at Cities 0048327.) which were the same as previous applications designated as File Nos. 30,514, 30,515, 30,518, and 31,952. (Ex. 981 at Cities 0048383.)

857. On January 30, 1981, the Chief Engineer issued a single permit, File 33,296, for two new wells with a combined capacity of up to 300 acre-feet per year. (Ex. 1-93.)

858. As discussed in the Findings of Fact above, on May 21, 1984, the Chief Engineer issued the order establishing the Lower Smoky Hill River IGUCA that reduces the combined capacity of File Nos. 1,248, 5,757, and 33,296 to 2,285.8 acre-feet per year. (Ex. 1-94).

859. In 1989, Hays obtained authorization from the Corps for the "one-time construction of three temporary instream dams to hold water in an attempt to recharge the aquifer." (Ex. 1-95 at Cities 0004511).

860. The one-time construction was limited to "emergency water storage," and the City was required to remove the dams "immediately following the recharge of the city of Hays well field or the elimination of an emergency water situation." (Ex. 1-94 at Cities 0004518.)

861. The dams were not constructed, most likely because they were not intended to provide a long-term, sustainable water supply and could have impaired downstream water rights.

862. As discussed in the Findings of Fact, the Cities experienced a significant drought during 1988–1991 with little or no flow in the Smoky Hill during portions of 1990–1992. (Exs. 2679 and 2680.)

863. In 1995, Burns & McDonnell investigated the Smoky Hill River wellfield and recommended that Hays rehabilitate, relocate, and replace certain wells. The investigation included drilling 32 test holes, installing five test wells, and conducting aquifer tests. The report proposed locations for two wells southwest of the wellfield as it existed at the time, which would expand the field one-half mile upstream. (Ex. 1-96 at Cities 0004529.)

864. A 2002 report by Tom Brikowski, Ph.D., Geology, of the University of Texas, evaluated the sustainable yield of the Hays Smoky Hill River wellfield concluding that the wellfield will routinely require groundwater overdrafting during the summers and that dry periods "may deplete the aquifer sufficiently that limited extraction (e.g., 1,000 acre-feet per year) is possible until the drought ends." (Ex. 1-97 at Cities 0004621.)

865. Dr. Brikowski concluded that the wellfield has "minimal storage capability to rely on in times of limited stream flow" and recommended expanding the wellfield to help "drought proof" it. (Ex. 1-97 at Cities 0004621.)

866. Later, Burns & McDonnell concluded that adopting Dr. Brikowski's recommendations would only extend the wellfield's sustainable yield to meet Hays' water needs "until about 2011." (Ex. 1-98 at Cities 0004648.)

867. In 2003, Burns & McDonnell submitted an evaluation of the options to improve the Smoky Hill River wellfield to allow Hays to pump its full water right without significant interfering with third-party wells and to expand the wellfield's ability to produce during droughts. (*See generally* Ex. 1-99.)

868. Burns & McDonnell concluded that Hays should be able to pump its full water right as long as there is sufficient flow in the River; during very low river flow, water will be removed from aquifer storage and thus lower the water table; during extended dry periods, even more water will be removed from storage. (Ex. 1-99 at Cities 0004651.) Water removed from storage would be replaced during the next period of river flow. (Ex. 1-99 at Cities 0004651.)

869. Burns & McDonnell cautioned against overpumping the wellfield, noting that doing so may result in "accelerated deterioration of the wells, well screens, surrounding gravel pack and aquifer materials, and potential water quality deterioration because of aeration of the aquifer materials." (Ex. 1-99 at Cities 0004669.)

870. In an April 28, 2003 letter from the Hays City Attorney to Gov. Sebelius, Hays threatened to file an impairment lawsuit against the State if something was not done about the impact Cedar Bluff has on the downstream alluvium. (Exs. 1-162 and 232 (letter to Assistant Attorney General Camille Nohe, with Petition attached).) That letter resulted in an Artificial Recharge Pool Operations Agreement, which acknowledges the

hydraulic connection between streamflow in the Smoky Hill River and the adjoining alluvium. (Ex. 1-163.)

871. While the Artificial Recharge Pool Operations Agreement improved management of flows in the River during normal conditions, the 2011–2013 drought demonstrated that it is insufficient to address the Cities' water needs.

872. After a contested public hearing in 2006, former Chief Engineer, David Pope, issued an Order partially approving applications to change well locations and imposing terms and conditions. (Ex. 1-100 at Cities 0004758–59.)

873. The project was completed in 2009. (Dougherty Test. Tr. Vol. 1 at 138:15–140:15.)

874. During the 2011–2013 drought the wellfield performed better than in the early 1990s, but the expansion "didn't provide the benefit that everybody thought it would." Even with the improvements Hays is unable to withdraw its full allocation from the Smoky Hill wellfield during periods of low streamflow. (Dougherty Test. Tr. Vol. 1 at 140:16–141:17.)

875. There are other challenges as well. Russell's wellfield is downstream from the Hays wellfield and recharge at Pfeifer is largely dependent on streamflow in the river. Flow in the Smoky Hill River, including releases from Russell's storage right in Cedar Bluff, must make it past the Hays wellfield to replenish the Russell wellfield. (Quinday Test., Tr. Vol. 2 at 468:24–469:11.)

876. A December 2014 Bartlett & West, Inc. study concluded that the Smoky Hill River alluvium is not a viable source for additional water for Russell, noting the existence of the IGUCA, minimum desirable streamflow requirements, and the need for treatment. (Ex. 1-54 at pp. 23–24.)

877. Groundwater from the Smoky Hill River alluvium is not an economically or technologically feasible alternative source of supply available to the Cities. The R9 Ranch was selected over this alternative for a number of reasons but mainly because the Smoky Hill River is being utilized at its full capacity and often beyond. It is not a reliable source of additional water for either Hays or Russell. In fact, approval of the transfer will reduce the draw on the river especially during droughts and will increase the health of the Smoky Hill River between Cedar Bluff and the Kanopolis Reservoir in Ellsworth County. (Letourneau Test., Tr. Vol. 4 at 899:17–900:19.) Mr. Letourneau agreed that the Cities' use of the R9 Water Rights as opposed to using water from the Smoky Hill River during times of drought would improve conditions for downstream users on the Smoky and would be "a benefit to the State larger than just a local benefit." (*Id.*, at 900:20–22.)

878. There is a Minimum Desirable Streamflow requirement at Ellsworth. (K.S.A. 82a-703c.)

III. Cedar Bluff Reservoir

879. The headwaters of the Smoky Hill River are located in eastern Colorado. (Ex. 1-155 at Cities 0007275.) The drainage basin above the Cedar Bluff Reservoir covers 5,530 square miles. (Ex. 1-156.)

880. Construction of the Cedar Bluff Reservoir in Trego County was completed in 1951. (*Id.*) It is operated by the U.S. Bureau of Reclamation. (Ex. 1-155 at Cities 0007278.) The elevation at the top of the conservation pool is 2,144.0 above mean sea level, but the surface is often below that elevation because of reduced inflow. (*Id.*)

881. It was originally authorized for irrigation, flood control, and water supply, with incidental benefits for recreation, fish and wildlife, and water quality. (Ex. 1-156.)

882. In 1992, Congress reformulated the project as an operating pool for fish, wildlife, and recreation, eliminating irrigation. (Ex. 1-102 at Cities 0004927.)

883. The construction of the Reservoir cut off the flow of water from the west into Ellis and Russell Counties, impairing water rights held by both Cities in the Smoky Hill River alluvium. (*See* Exs. 1-162 and 232 referenced above.)

884. Numerous proposals and studies about Cedar Bluff serving as a potential water supply for the Cities were undertaken over the years, but none of them have resulted in viable projects. (*See, e.g.,* Exs. 1-54, 1-102, 1-127, 1-128, 1-134, 1-139, 1-157, 1-158, and 2130)

885. A 1984 report prepared by the U.S. Department of Interior titled, *Cedar Bluff Reservoir Water Supply & Operations Study*, assessed inflow to the reservoir to determine what water was available for irrigation and other uses. (Ex. 1-157 at Cities 0007329–30.) The study found that inflow was significantly less than when the reservoir was constructed and concluded that Cedar Bluff should no longer be used for irrigation. (*Id.*)

886. In a January 30, 2003 letter states that the "Kansas Water Office has completed an analysis that indicates that Cedar Bluff Lake is not a viable option for a sustainable, significant, long-term public water supply." (Ex. 1-158.)

887. A 2003 report by the Kansas Water Office and the Corps outlined potential water supplies for the Eastern Smoky Hill-Saline Basin, which includes Hays and Russell. (Ex. 1-134 at Cities 0006191.) Cedar Bluff was eliminated as a potential water source because of its dismal "historical record." "A 1999 yield analysis indicated a very low yield." (*Id.*)

888. According to a 2003 report by the Kansas Water an analysis of the hydrology of the lake demonstrated that inflow to the Reservoir "cannot keep up with evaporation from the surface of the lake during extended periods of time." (Ex. 1-182 at Cities 0007819.)

889. That Cedar Bluff is not a reliable long-term water supply for the Cities is further supported by the fact that DWR has established two IGUCAs along the Smoky

Hill River, one downstream from the Cedar Bluff Reservoir (Exs. 159–60) and a second upstream from the Reservoir (Ex. 161).

890. And as noted in a 2010 Draft Environmental Report by the Corps and the Kansas Water Office:

> Results of an analysis by [the Kansas Water Office] to determine the water supply yield that can be expected during a two percent chance drought . . . indicated Cedar Bluff is not suitable for storage of water under the Water Marketing Program … In addition, all of the streams and alluvial corridors in the Basin are closed or restricted for new water appropriations.

(Ex. 1-102 at Cities 0004927.)

891. A recent Bartlett & West, Inc. report reviewed numerous previous studies and concluded that Cedar Bluff is not a viable option for additional water for Russell. (Ex. 1-54 at Cities 0002902–03.)

892. Water is not always available in Cedar Bluff Lake to be released and to benefit, Russell the conditions must be "just right." Otherwise, releases would be wasteful. (Quinday Test., Tr. Vol. 2 at 470:19–471:12. *See, e.g.*, Exs. 352, 878, 1407, 1573, 1574, 1627, 1649, and 2603.)

893. The nonviability of Cedar Bluff as a long-term municipal water source is further demonstrated by problems with the use of Russell's storage right in Cedar Bluff Reservoir, DWR File 7,628. Russell relies on the Smoky Hill River to deliver this water to Pfeifer via the streambed. Significant losses have generally occurred during requested releases because of infiltration, evaporation, and direct pumping by others along the river

upstream of the Russell wellfield. (*Id*.) Moreover, releases must make it past the Hays wellfield to reach Pfeifer. This has not been possible during prolonged droughts. (Quinday Test., Tr. Vol. 2 at 470:19–471:12. *See also* Exs. 352, 878, 1407, 1573, 1574, 1627, 1649, and 2603.)

894. Cedar Bluff Lake is not an economically or technologically feasible alternative source of supply that is available to the Cities. The R9 Ranch was selected over this alternative for all of the reasons discussed above.

IV. South Russell Project.

895. The South Russell Project was developed by the PWWSD No. 15 in the late 1990s. The District filed applications for new water appropriation rights that would authorize diversion of up to 8,300 acre-feet per year from the Smoky Hill River and the alluvium in southeast Russell County. (Ex. 176 at Cities 0016489; Exs. 1064–1072 and 1074–1084.)

896. A "Raney Collector well"[7] would capture surface water and several wells diverting groundwater would be drilled along the Smoky Hill River starting near the confluence of the Smoky and Big Creek and moving to the east. (Ex. 1-56 at Cities 0010253-54; Ex. 327 at Cities 0017987.)

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[7] A Raney collector is a large diameter well with a series of screens radiating out below the riverbed like spokes in a wheel, giving the well a larger surface area in which to collect water. (Ex. 1458 at Cities 0069498.)

897. A pipeline would carry raw water to a reverse osmosis treatment facility southeast of Russell and then to Hays and Russell. Brine would be disposed of in a Class I underground injection well. (Ex. 1-56 at Cities 0010253-54; Cities 0017987.)

898. Ground Water Associates reviewed the project and concluded that the yield was not as high as originally thought and questioned the ability of the area to provide water during a drought because the alluvium would be subject to the same drought factors as Hays' and Russell's current wellfields. (Ex. 1-122.)

899. A 2001 report from the Kansas Geological survey supported the Ground Water Associates conclusion, noting that the bulk of the water would come from the Smoky Hill River, that the discharge from that source "varies substantially" in the area of the planned wellfield, and that the flow of the river would be insufficient to meet previously projected production values during dry periods. (Ex. 1-124 at Cities 0012878.)

900. This option was not desirable as water would only be readily available when Hays and Russell's existing sources were also viable. Moreover, the Smoky Hill River is subject to minimum desirable streamflow requirements, and the water rights from the proposed project would be junior to other water rights on the River. (Ex. 1-124 at Cities 0012878; K.S.A. 82a-703a–K.S.A. 82a-703c.)

V. The Hays IGUCA

901. Hays requested that the Chief Engineer create an IGUCA in the city in order to conserve water and to protect, preserve, and conserve the Big Creek aquifer.

902. Over the years, numerous domestic wells had been drilled in the Big Creek alluvium in Hays competing with the City's wells. (Ex. 2828 at Cities 0103794.)

903. A February 15, 1985 letter from former Hays City Manager, Ken Carter, informed then-Chief Engineer, David Pope, of Hays' request that DWR initiate proceedings to designate an Intensive Groundwater Use Control Area (an "IGUCA") in the City of Hays and surrounding area. (Ex. 1-53 at Cities 0002876, ¶ 1.)

904. At a May 30, 1985 hearing, Hays City officials testified that during the previous 8–10 years, the City had difficulty meeting water demands with its available supply during hot dry weather. The problem worsened in 1984 after DWR reduced the quantity of water the City can divert from its Smoky Hill River Wellfield in a separate IGUCA proceeding designed to protect water levels in Cedar Bluff. (Ex. 1-53 at Cities 0002878, ¶ 8.)

905. The Chief Engineer concluded that there was no reliable information on the number of private domestic wells within the proposed IGUCA area. (Ex. 1-53 at Cities 0002881, ¶ 1.)

906. Because some City residents with private wells were permitting water to run off their lawns and into the streets, the Chief Engineer found that preventable waste of water was occurring or may occur within the area and other conditions existed that required regulation in the public interest. (*Id.*, ¶ 2.)

907. On July 3, 1985, the Chief Engineer entered an Order establishing an IGUCA within the corporate boundaries of the City of Hays and the immediate area. (Ex. 1-53 at Cities 0002882, ¶ 1.)

908. To prevent the waste of water, the Order established the Chief Engineer's authority to ban, or to allow the City to ban, the use of domestic wells to water lawns, gardens, trees, shrubs, and other outdoor vegetation from noon through 7:00 p.m. from June 1 through September 30 each year. (Ex. 1-53 at Cities 0002883, ¶ 4.)

909. The Order required that all domestic wells within the area be registered with DWR before August 5, 1985, and all domestic wells constructed within the IGUCA after the date of the Order to be registered with DWR within 30 days of the date of completion. (Ex. 1-53 at Cities 0002882, ¶ 2.)

910. Except for the restrictions on watering during certain hours, registered wells are not subject to the other mandatory provisions of the City's water conservation plans. (Ex. 1-53 at Cities 0002883, ¶ 3.)

911. Unregistered private wells are subject to the mandatory provisions until they are registered. (*Id.*)

912. The order was challenged in the District Court. Rather than litigate, the Chief Engineer amended the Order on August 29, 1985, removing the provision allowing the Chief Engineer to delegate enforcement of the IGUCA limitations to the City but preserved the Chief Engineer's right to ban the use of any water well in the IGUCA to

water outdoor vegetation as set out in the original order "should information show that well users are not voluntarily avoiding the watering of such vegetation during times of high temperature, strong winds and solar radiation which results in the occurrence of preventable waste of water." (Ex. 769 at ¶¶ 3-6.)

VI. The Dakota Aquifer

913. Hays developed six water appropriation rights in the Dakota Aquifer designated as DWR File Nos. 40,702; 40,703; 40,704; 40,705; 40,706 and 40,707. (Exs. 1-106–1-117.)

914. Additional water from the Dakota aquifer does not provide the City with a source of sufficient water for municipal use because the formation is a non-renewable source. (Ex. 2667 (quantities actually produced from the Dakota wells.)

915. Excessive pumping would deplete the aquifer and/or degrade the water quality. The water rights are only capable of producing 120 acre-feet per year on a consistent basis and because of quality issues, must be blended with water from other sources. (Dougherty Test., Tr. Vol. 1 at 88:12–89:8; 121:1–122:25; 218:4–219:13. *See also* Exs. 1-103, 1-120, 1-121, 720, 944, 986, 1061, 1060, 1062, 1059, 1063, 1106, 1107, 1112, and 1253.)

VII. Wilson Lake

916. There are at least three major problems with the Cities' use of Wilson Lake as a municipal water source: (1) water quality, (2) the cost to acquire storage from the

Army Corps of Engineers or the Kansas Water Marketing Program, and (3) the fact that Wilson is not authorized for municipal and industrial storage.

917. Wilson Lake was authorized by the Flood Control Act of 1944 (P.L. 78-534) for "flood control, irrigation, navigation, recreation, fish and wildlife, and water quality purposes." (Ex. 1-102 at Cities 0011986; Ex. 1-132 at Cities 0005983–84.)

918. Wilson Lake was completed in 1964 and is managed by the Corps. (Ex. 1-155 at Cities 0007282; 1-102 at Cities 0011986.)

919. Wilson Lake was not authorized as a municipal and industrial water supply. (Ex. 1-102 at Cities 0011986.)

920. A March 1967 Water Supply Study for the City of Russell states that storage would be available in Wilson Lake but concludes that the water has "excessive amounts of chlorides" that are "too high to merit consideration of the source for a municipal water supply." (Ex. 1-128 at Cities 0005912–13.)

921. Chloride concentrations from 1964 to 1970 varied but were as high as 2,030 mg/L and averaged over 1,000 mg/L. (Ex. 1-135 at Cities 0006477–78.)

922. In July of 1976, chlorides in the Conservation Pool at various depths ranged from 550 to 590 mg/L. (Ex. 1161.)

923. The National Secondary Drinking Water Standard, which provides guidelines relating to contaminants that may cause taste, odor, or color issues in drinking water, for Chloride is 250 mg/L. (Ex. 1-135 at Cities 0006487.)

924. The Finished Water Quality Secondary Standard in Hays is <160 mg/L. (Ex. 1-135 at Cities 0006401.)

925. In spite of known quality issues, on August 22, 1991, Hays and Russell filed an application for a water appropriation right to divert up to 8,000 acre-feet of water annually from Wilson Lake for municipal purposes. (Ex. 1-129.)

926. The application remained viable until December 31, 2016. (Ex. 1-130.)

927. In an August 26, 1993 report, Black and Veatch reviewed the feasibility of developing a water supply from Wilson Reservoir to serve both Hays and Russell, stating that "desalination" would be required because of high concentrations of Total Dissolved Solids, Nitrates, Chlorides, and Sulfates. (Ex. 1-131 at Cities 0005942.)

928. Desalination would require a brine disposal well. (Ex. 1-131 at Cities 0005943–45.)

929. In order to utilize water from Wilson Lake, the Corps must complete a reallocation study. The Water Supply Act of 1958 (P.L. 85-500), gives the Corps of Engineers authority to reallocate existing storage in a reservoir from its present use to municipal and industrial water supply use. (Ex. 1-132 at Cities 0005957.)

930. In a September 2, 1993, letter to Lavern Squier with the Ellis County Coalition for Economic Development, James L. Goering, Chief of the Planning Division of the Special Studies Branch of the Department of the Army, documented a meeting in

which Hays and Russell expressed interest in the purchase of water supply storage in Wilson Lake. (Ex. 1267.)

931. Mr. Goering indicated that if funds and manpower became available, the Corps would begin to assess the potential for reallocation of water in Wilson Lake using existing reservoir yield information in fiscal year 1994. (Ex. 1267.)

932. Mr. Goering went on to state that time periods can vary but a formal water supply storage allocation study can generally be completed in about one year, but it could not begin until October of 1995, and only if funds become available. Review, approval, and negotiation of a contract could take an additional year. (Ex. 1267.)

933. In September of 1997, the Corps issued a Reconnaissance Study For Water Supply Storage Reallocation (Ex. 1-132 at Cities 0005952–6141) and an Environmental Assessment. (Ex. 1-132 at Cities 0005977–6001.)

934. On July 11, 1997, in response to requests for comments on reallocation, Larry Zuckerman with the Kansas Department of Wildlife and Parks wrote to the Corps stating:

> We consider this project to be an Impact Level 3, meaning the project as it is currently designed should not be implemented and some alternate approach should be considered. The project sponsor should consider the "no action" alternative as well as alternatives that address water conservation by the two cities and possible reallocation of existing Kansas water rights through conservation measures by the rural and urban water users and transfer via purchase from willing sellers.

(Ex. 1-132 at Cities 0006018.)

935. Mr. Zuckerman went on to list 19 reasons that reallocating 30,400 acre-feet of water stored in Wilson Reservoir is a bad idea for "anglers, hunters, trappers, boaters, water skiers, wind surfers, swimmers, campers, hikers, [and] wildlife enthusiasts." (Ex. 1-132 at Cities 0006018–21.)

936. In a July 1997 35-page study, the U.S. Fish and Wildlife Service recommended the "No Action" alternative, stating that "[r]eservoir operations should not be appreciably changed from the current base operation condition." (Ex. 1-132 at Cities 0006024–59.)

937. During the Water Transfer Hearing, Mr. Dougherty testified that the Corps "pulled the plug on the reallocation study". He went to Washington D.C. in 2011 to lobby the Corps to continue the reallocation study "and was flat out told our efforts are on flood control right now, not -- not water supply…. I was in a conference room with several members of the Corps of Engineers headquarters advocating for them to put funds available for the study and was turned down." (Dougherty Test., Tr. Vol. 2 at 242:9–20; *see also id.* at 276:5–282:6 describing multiple issues with Wilson as a source.)

938. As stated above, if the Corps were to reallocate storage in Wilson, or any of the other federal reservoirs, the Cities would incur the cost to acquire storage from the Corps or would have to purchase water from Kansas Water Marketing Program. (*See, e.g.*, Ex. 734, ("Feds up price on Kanopolis water for thirsting Kansans).) The Cities already own the R9 Water Rights.

939. Federal law requires municipalities to pay for water supplies. Congress has established a national policy, making states and local interests responsible for developing municipal water supplies. 43 U.S.C. 390b(a).

940. Between 1958 and 1979, the price for reallocated storage was based on the original cost of construction of the federal reservoir. (Ex. 1-201 at Cities 0008031.)

941. In 1979, the Corps began charging municipalities the highest of (1) the benefits or revenues foregone, (2) replacement cost, or (3) the "updated cost of storage." (Ex. 1-201 at Cities 0008035.)

942. The cost to be repaid is:

> (1) 100% of the new construction costs and new operational costs including the cost of revising the water control plan;
>
> (2) A share of the joint use operation, maintenance, rehabilitation, and replacement cost based on the use-of-facilities cost allocation;
>
> (3) The value of benefits foregone;
>
> (4) the value of damages or losses incurred by others as a result of the changed operations (may be the same as (3) above); and
>
> 5) A partial reimbursement of the existing Federal investment in the project in the form of a payment in an amount equal to one-half of the savings to the benefited non-Federal interest (the cost of the least cost alternative minus the specific costs of the modifications listed in (1) thought (4) above.)

(Ex. 1-201 at Cities 0008058.)

943. The "updated cost of storage" is an attempt to "duplicate the cost of the project, as originally constructed, at today's prices." (Ex. 1-201 at Cities 0008054.)

944. The KWO operates the Kansas Water Marketing and the Kansas Water Assurance programs. The State owns storage space in several federal reservoirs and obtains "water reservation rights" pursuant to the Kansas Water Plan Storage Act, K.S.A. 82a-1301, *et seq*.

945. The KWO is authorized to enter into contracts for the sale of that water under certain terms and conditions. K.S.A. 82a-1305–K.S.A. 82a-1315a.

946. A contract with the KWO must include the terms set out in K.S.A. 82a-1306. The contracts require a minimum annual payment of 50% of the amount of water under contract times the rate per 1,000 gallons. K.S.A. 82a-1308a(a)(2). The Kansas Water Office sets the rate per thousand gallons of water subject to the approval of the Kansas Water Authority. K.S.A. 82a-1306(a). The rate is subject to annual review. K.S.A. 82a-1306(a)(3). Rates are to be based on the amortized capital costs; interest expense; administration and enforcement costs; operation, maintenance, and repair costs; and payments to a depreciation reserve account in the amount of 2½¢ per thousand gallons. K.S.A. 82a-1306(a).

947. The computation of the rate is based on the total supply in the State's conservation water supply capacity. In other words, rates are computed as if all the water was in a single reservoir with all purchasers across the State paying the same rate K.S.A. 82a-1306(b), and, beginning in the sixth year, the amount of water contracted for can be reduced, or must be paid for in full, whether it is taken or not. K.S.A. 82a-1306(a)(4).

948. When there are insufficient quantities of water available to the parties, the Kansas Water Office determines who receives water based on health, safety, and welfare—not priority. If there is a shortfall, the purchasers have no remedy. K.S.A. 82a-1306(a)(7).

949. Finally, once negotiated, the contracts must be approved by the Water Authority using a number of broad-based factors. K.S.A. 82a-1311a.

950. In addition to the lack of delivery assurances and high costs, the Cities have expressed concern about being forced to purchase water from the KWO, especially because of the uncertainty about rates. (Ex. 242 at Cities 0016949; Ex. 243.)

VIII. Ogallala Aquifer in Trego, Gove, and Graham Counties.

951. There are three principal aquifers in western and southcentral Kansas that, together, make up the portion of the High Plains aquifer in Kansas. The Ogallala is in the western third of the state; the Equus Beds aquifer is in McPherson, Reno, Harvey, and Sedgwick Counties; and the Great Bend Prairie aquifer is in Stafford, Edwards, Pratt, Kiowa, and portions of other counties). (Ex. 1-136 at Cities 0006502.)

952. The Ogallala aquifer is severely depleted within GMD1 and GMD4 where the Ogallala is closest to the Cities, and both GMDs are closed to new water appropriations. (K.A.R. 5-21-4(a), K.A.R. 5-24-2(a))

953. Based on the Cities' independent investigation of the Ogallala and the Kansas Geological Survey's study (Ex. 1-136 at Cities 0006503), it is not a viable water

supply for the Cities. Saturated thicknesses and recharge are minimal, and its useable lifetime is already "below minimum threshold" in most of Rooks, Graham, Gove, Trego, and Lane Counties—the counties closest to Hays and Russell that overlay the aquifer. (*Id*.)

954. An April 18, 1985 letter from Bob Vincent, then with Layne-Western, to Ken Carter, then-Hays City Manager, suggested that Hays look at the Ogallala formation in northeast Trego County. This suggestion was based on a review of published material rather than actual field work. (Ex. 1-137.)

955. Following up on this suggestion, in January 1987, the City engaged Black & Veatch and hired Clarke Well & Equip to drill test wells in the northern portion of Township 12 South Range 21 West, northwest of Ellis near the Trego-Ellis County line. The wells were approximately 22 miles from Hays. Two of the wells had saturated thicknesses of 34 feet and an estimated potential yield of 250 gpm. The report concluded a dependable source of water might be available in this area. (Ex. 1-138.)

956. Consistent with the 1987 testing, a September 1989 report included a potential option for two 250 gpm wells, 25 miles of 16-inch pipeline, and a 1,000 gpm pump station at an initial cost of $11,000,000 or about $14,000 per acre-foot. (Ex. 1-139 at Cities 0006562.) If additional sources could be located in the area, the cost per acre-foot would come down as the wellfield expanded. (Ex. 139 at Cities 0006562.)

957. This option was not pursued for a number of reasons, including the high cost per acre-foot, other sources that would reduce the per-acre-foot cost were never located, new water rights would be needed, the Transfer Act[8] would be triggered, the total quantity was limited, and the aquifer is not recharged. (*Id*.)

958. In August of 1989, Bob Vincent, then with Ground Water Associates, Inc., wrote to Les Lampe, the Director of Water Resources Engineering for Black and Veatch, informing him of the availability of about 2,000 acre-feet of irrigation water from the Ogallala formation in Graham County. (Ex. 1-140.)

959. A September 1989 Report ranked this near the bottom of several options studied. (Ex. 1-139 at Cities 0006557.) While there were water rights available for sale in north-central Graham County, total hardness levels were considered borderline and would likely require treatment. (*Id.* at Cities 0006559.)

960. The 1989 report estimated costs at $21,000,000 for 70 miles of 20-inch pipe, $600,000 for 11 new municipal wells, $400,000 for three new booster stations, and approximately $4,000,000 for treatment plant expansions for a total cost of $26,000,000. (*Id.* at Cities 0006561.) The costs to acquire water rights and rights-of-way, legal fees, and

[8] In 1989, the Water Transfer Act, K.S.A. 82a-1501, *et seq*., defined a "water transfer" as the diversion and transportation of 1,000 acre-feet or more per year for beneficial use outside of a ten-mile radius from the point of diversion. L. 1983, Ch. 341, §1(a). The definition was expanded to 2,000 acre-feet and 35 miles in 1993. L. 1993, Ch. 219, §1(a)(1).

engineering costs were not included for any of the options considered in that study. (*Id.* at Cities 0006558.)

961. In a May 13, 1997 letter report, Black and Veatch concluded that the option did not appear to be cost-effective because of the cost to purchase 5,500 acre-feet of existing water rights, coupled with the cost of the infrastructure to bring the water to Hays. (Ex. 1-141 at Cities 0006575.)

962. Ogallala water is not an economically or technologically feasible alternative source of supply available to the Cities. The R9 Ranch was selected over this alternative for a number of reasons, including the following:

- Quantities in the Ogallala are limited and not being replenished.
- Saturated thickness is minimal in areas closest to Hays and Russell.
- The aquifer's usable lifetime is already below minimum thresholds.
- Obtaining water from the Ogallala to the west would require the Cities to acquire additional existing water appropriation rights from irrigators already using this source as well as numerous easements and rights-of-way for the gathering system, even though the Cities already own the R9 Water Rights in Edwards County.
- There are no contiguous concentrations of senior appropriation rights comparable to the R9 Ranch so water rights from multiple owners would have to be acquired.
- Acquiring enough non-contiguous irrigation rights would be prohibitively expensive, entailing construction of a sprawling raw water gathering system and acquisition of numerous easements and right-of-way.
- To obtain a source comparable to the Ranch, the Cities would likely be forced to use their condemnation powers, making the cost to acquire the necessary water rights even more unpredictable.

963. The distances to significant quantities of Ogallala water approach, and in most cases, exceed the distance to the Ranch. The distances are even greater for Russell than for Hays.

IX. Kanopolis Reservoir and Post Rock Rural Water District.

964. Operated by the Corps, Kanopolis Lake was completed in 1948 on the Smoky Hill River downstream of Ellsworth and about 75 miles east of Hays and 45 miles east of Russell. Kanopolis Reservoir was initially authorized for flood control, irrigation, and recreation purposes. Some storage was later allocated to include water supply. (Ex. 1-102 at Cities 0004928.)

965. In 1997, the Cities asked Black & Veatch to study the feasibility of developing Kanopolis Reservoir as a water supply. (Ex. 1-141.) The Black & Veatch report compared the R9 Ranch, Wilson Reservoir, Kanopolis Reservoir, and groundwater rights in Graham County as potential water sources for the Cities. (*Id.* at Cities 0006575.) Kanopolis Reservoir was the most distant alternative considered and would have required the greatest capital investment. (Ex. 1-127 at Cities 0005847.)

966. A 2003 report by the Kansas Water Office and the Corps proposed piping raw water from Kanopolis Reservoir to a treatment plant operated by Hays, Russell, or a Public Wholesale Water Supply District, as well as other potential alternatives for providing water to the eastern Smoky Hill and Saline basins. (Ex. 1-134 at Cities 0006186.)

967. This proposed solution was a regional system, dependent upon numerous potential participants intended to achieve the "operational economies of scale over multiple small systems." (Ex. 1-134 at Cities 0006194.)

968. The report listed 34 cities and 22 rural watershed districts as potential participants. (*Id.* at Cities 0006189.) It recommended that potential participants form a regional public wholesale water supply district and limit the water-supply contracts to "20-year increments." (*Id.* at Cities 0006195.) Under the plan, the Cities would need new transmission lines for both raw and treated water and additional treatment plants.

969. At the outset of the study, the Kansas Water Office made it clear that it would "NOT be responsible for pipeline and treatment construction or costs." (Ex. 1-142.) Moreover, it noted that Kanopolis Lake is not drought proof and that its reliability has worsened because of storage loss from sedimentation and reduced inflow from the Smoky Hill River since 1950. (*Id.*)

970. More recent droughts brought added attention to the lake's water supply issues, as noted by the Kansas Water office and the Corps:

> Specifically of concern are the water releases and lake levels during times of little or no inflow, such as in 2006, and the needs of downstream water users. This concern is reinforced by data on water appropriations and water uses. In the 101 miles of river below Kanopolis Dam to the New Cambria gage, which is located east of the confluence of the Smoky Hill and Saline rivers, there are nearly 300 water rights for an authorized quantity totaling 41,123 acre-feet per year (38.5 MGD) from surface and alluvial groundwater sources. The larger portions of this quantity are appropriations for irrigation, and municipal and industrial use, including the city of Salina.

(Ex. 1-102 at Cities 0004929.)

971. Even though Post Rock serves customers in the Russell area, it has very limited capacity to provide supplemental water to the area without significant infrastructure investment. (Ex. 1-127 at Cities 0005847.)

972. In March of 1998, Black & Veatch estimated the cost to acquire Post Rock and pipe water up from Kanopolis in 1998. The Memorandum concluded that only 645 acre-feet of water was available, and at a high cost. (Ex. 1-143.)

973. In 2005, Hays asked Ranson Financial and Burns & McDonnell to evaluate the possible acquisition of Post Rock Rural Water District. (Ex. 851.) Post Rock was having financial difficulties and was not making payments on its U.S.D.A. loans raising "a substantial doubt about the Company's ability to continue as a going concern." (Ex. 851 at Cities 0022881.)

974. A 2006 Burns & McDonnel report noted that Post Rock has easements and infrastructure in Ellis and Russell Counties, including around Wilson and Kanopolis Lakes. However, its treatment facility was under an abatement order from KDHE. (Ex. 1-144 at Cities 0006635.)

975. "[S]ignificant distribution system improvements would be required" because Post Rock's distribution system "commonly experiences pipeline breaks and booster pump station failure" due to use of improper construction materials and high-pressure differentials throughout the system. (Ex. 1-144 at Cities 0006634.)

976. While Post Rock's existing "pipeline easements could be used for a Kanopolis to Hays pipeline[,] . . . the easements may not be in the most favorable alignment and thus may increase pipeline cost, so they offer little value." (*Id.*) Moreover, "a significant capital investment will be required in order to achieve compliance with KDHE regulations." (*Id.* at Cities 0006635.)

977. The report concludes that it would not be in Hays' best interest to acquire Post Rock, even if the U.S.D.A. loans were forgiven. (*Id.*)

X. Big Creek Water Banking

978. In the late 1980s–early 1990s, Black & Veatch developed a plan to use treated effluent from the Hays wastewater treatment plant as part of a recharge and withdrawal program in the Big Creek alluvial aquifer. (Ex. 1-145 at Cities 0006660.)

979. A portion of the wastewater would be used to irrigate golf courses, parks, and ballfields with the remaining effluent used to recharge the Big Creek alluvium. (Ex. 1-146 at Cities 0006694.)

980. The plan involved several miles of 10- to 16-inch pipe through which effluent would travel before discharging into Big Creek. (Ex. 1-145 at Cities 0006661.) Effluent would also be discharged to a new "recharge basin." (Ex. 1-146 at Cities 0006679.) Water would be stored in the alluvium for later withdrawal by new wells that would also induce recharge. (Ex. 1-146 at Cities 0006711.)

981. "The City's initiatives . . . yielded the State's first formal consideration of the concept of Water Banking." (Ex. 1-147 at Cities 0006718.)

982. In May 1991, the City presented its operation plan for the water-banking project to DWR (Ex. 1-148), and in 2006, the City retained Bartlett & West to revisit the plan. (Ex. 1-147 at Cities 0006721.).

983. The 2006 report expressed several concerns. DWR and KDHE were at odds about how to monitor and measure the quantity and quality of water that would be diverted for reuse. DWR preferred recharge basins that would provide more "calculable accounting"; KDHE preferred discharging the effluent into Big Creek because of "water quality concerns." (*Id.*) "This difference in institutional preference was not resolved." (*Id.*)

984. Due to a relatively small net quantity of water (*Id.* at Cities 0006718 (approximately 500 acre-feet, Ex. 1-145 at Cities 0006662)); poor aquifer recharge (Ex. 1-149 at Cities 0006842–48); water quality concerns including for example the existence of "Emerging Pollutants of Concern" like pharmaceuticals, personal care products, and endocrine disruptors (Ex. 1-147 at Cities 0006726–28); and more economical alternatives (*Id.* at Cities 0006718, 0006730–33), the City abandoned the water-banking plan. As noted by Midwest Contractor, "[t]he plans will only bring Hays enough water to match levels the city was deriving [in 1981]. And as with any progressive City, Hays is looking to grow." (Ex. 1-145 at Cities 0006663).

985. It should be noted that as part of its conservation efforts beginning in the early 1990's, Hays began using treated effluent from its municipal sewage treatment plant for irrigation of recreational areas. (Dougherty Test., Tr. Vol. 1 at 129:14–130:9.) Hays uses 35% of it treated effluent to irrigate ball fields and a sports complex. (*Id*.)

986. Because of consumptive use limitations on reuse of water diverted from its Big Creek wells, Hays must discharge most of its treated effluent to Big Creek. (Dougherty Test., Tr. Vol. 1 at 130:12–133:2.)

XI. Saline River

987. The Saline River flows from west to east along the north sides of Trego and Ellis Counties, enters Russell County, and flows into Wilson Lake. (Ex. 823 at Cities 0022172.) The river alluvium is narrower than the Smoky Hill River in Ellis and Russell Counties. (Ex. 2659.)

988. In 1967, Wilson and Company prepared a Report for the City of Russell analyzing a number of alternative sources, including water from the Saline River Valley. (Ex. 1-128.) As discussed under the Wilson Reservoir heading, water quality is a major issue. The Saline River cuts down into the Dakota formation causing water quality issues in both surface and groundwater. (*Id.* at Cities 0005864.) The report's opening paragraph of the section discussing the Saline River Valley states:

> Very little precise data are available regarding groundwater in the alluvial deposits of the Saline River, but enough is known in a general form to guide a judgment as to the potential supply value of the valley's aquifers. The wells in the river alluvium that have been tested indicate a satisfactory

> quality of water available at some locations. However, the existing wells are low production, shallow wells used only for domestic or stock use on farms, and their operation does not appreciably affect the normal groundwater migration toward the river channel. The sustained large draft that would be necessary for a municipal supply would almost certainly draw the brackish river water into the aquifer, even if an aquifer could be located that would supply the required demand. Considerations of the quantity and quality of groundwater supplies likely to be found in the Saline River Valley do not indicate that a feasible municipal supply could be developed.

(*Id.* at Cities 0005911.)

989. In 1974, Hays asked Layne-Western Co., Inc. to provide a hydrology report on the Saline River Valley area north of Hays for potential additional water supplies. (Ex. 1-150.) Layne-Western did not find sufficient water quantities of acceptable quality to meet the Cities' needs and concluded that "even the best quality test location will deteriorate from the infiltration of water from the Saline River" as the aquifer recharges from that source. (*Id.* at Cities 0007213–14.) The report concluded that "[d]ue to the excessive distance to this valley area from the City of Hays, it does not appear to warrant additional groundwater investigation at this point in time." (*Id.* at Cities 0007214.)

990. Additional water quality testing was conducted in the mid-1980s. (Ex. 1-151.) It appears that some consideration may have been given to obtaining water from the Saline River or its alluvium as late as 2001 because Scott Ross, the DWR Water Commissioner at Stockton Field Office, faxed a list of water rights to Lavern Squire, Manager of PWWSD #15. (Ex. 1-152.)

991. A recent Bartlett & West, Inc. report recommended further study of this source as an alternative for Russell. The report indicates that Russell could obtain an additional 1,075 acre-feet of water from new water rights in the Saline River alluvium and the Salt Creek alluvium at a projected cost of $7.6 million, or just over $7,000 per acre-foot. (Ex. 1-54 at Cities 0002904–05, 0002919–20.) The report states that "water quality shouldn't be a significant issue for the City of Russell because the newly constructed EDR WTP has the technology to treat the water from this aquifer." (*Id.* at Cities 0002903.)

992. In addition to the quality issues, all evidence indicates that there is insufficient quantity from this source to meet the Cities' long-term water needs. DWR's July 1, 1993 administrative policy limits new appropriation rights from the Saline River and its alluvium to 50% of the "percent of calculated recharge available" for appropriation. (Ex. 1-153.) DWR increased the limitation to 75% when it adopted this policy as a regulation in 1994. (Ex. 1-154 at Cities 0007274.)

993. Groundwater from the Saline River alluvium is not an economically or technologically feasible alternative source of supply for the Cities. The R9 Ranch was selected over this alternative for a number of reasons but mainly because of significant concerns with water quality, insufficient water quantity, and the need for immediate treatment.

- This source may provide Russell with an alternative but does not address critical needs in Hays. Moreover, the Bartlett & West study is preliminary and does not address limitations on new water rights that could affect the viability of this project.

- There is no contiguous concentration of senior appropriation rights comparable to the R9 Ranch in the Saline River alluvium; water rights from multiple owners would have to be acquired.

- Acquiring all of the existing irrigation rights would require in excess of 50 miles of collection piping and 15 to 20 miles of raw water transmission in an area with mostly bedrock and as many as 20 well houses because of the one-half mile limitation on moving points of diversion.

- Obtaining water from this source would require the Cities to acquire existing water appropriation rights from irrigators already using this source as well as numerous easements and rights-of-way for a gathering system even though the Cities already own the R9 Water Rights in Edwards County.

- To obtain a source comparable to the Ranch, the Cities would likely be forced to use their condemnation powers, making the cost to acquire the necessary water rights unpredictable.

- New water rights would be subject to minimum desirable streamflow requirements and could affect baseflow into Wilson Lake.

- The operation of K.A.R. 5-3-11 would require the acquisition of additional quantities of water beyond "sustainable yield."

- Acquiring all of the existing irrigation water rights in the Saline River alluvium in Ellis and Russell counties would, at most, yield only approximately 1,400 acre-feet of water after conversion to Municipal use. The cost of a gathering system, treatment, and conveyance to Hays and Russell would be cost prohibitive.

994. Much like the Cities' water rights in the Smoky Hill River and its alluvium, water rights in the Saline River alluvium are vulnerable to drought. (Ex. 823 at Cities 0022176.)

XII. Cedar Bluff Cattle Feeders Water Rights

995. In 2008, Burns & McDonnell evaluated water rights owned by Cedar Bluff Cattle Feeders ("CBCF"), which had expressed an interest in selling land and facilities,

including 904 acre-feet of water rights. (Ex. 1-164 at Cities 0007388.) In 2005, the Kansas Department of Agriculture, DWR, KWO, and the City of Hays jointly agreed, in a memorandum of understanding, to evaluate potential purchase and retirement of water rights with the goal of reducing water use impacts in the Smoky Hill IGUCA. (*Id.*) By purchasing the CBCF water rights, the Cities hoped to lessen the impact that evapotranspiration and upstream water use had on their wellfields. (*Id.* at Cities 0007389–90.)

996. Burns & McDonnell's report concluded that retiring the CBCF water rights would have a "positive yet limited benefit to the City of Hays." (*Id.* at Cities 0007393–94.) Moreover, CBCF's asking price for the property was excessive. A state appraisal valued the property at approximately $1 million and the Burns & McDonnell Report valued the water rights alone between $400,000–$468,000, with the caveat that these prices were "somewhat inflated . . . considering that a portion of the water right is for stock watering and because a high percentage of the property is uncultivated and thus not irrigated." (*Id.*) The owners were asking $6,000,000. (Ex. 1-165 at Cities 0007413 (City of Hays City Commission Work Session Agenda). *See also* Dougherty Test., Tr. Vol. 2 at 259:2–261:8.)

997. Acquisition of water rights from Cedar Bluff Cattle Feeders is not an economically or technologically feasible alternative source of supply that is available to the Cities. The R9 Ranch was selected over this alternative because of the high price, small quantity, and limited benefit of acquiring these water rights.

XIII. Walnut Creek, Pawnee River, and the Middle Arkansas River

998. In a 1967 Report prepared for Russell, Wilson and Company discussed the potential development of a wellfield in the Arkansas River Valley approximately five miles northwest of Great Bend, Kansas, along Walnut Creek. (Ex. 1-128.) The report concluded that this source should not be pursued unless other options were not feasible. (*Id.* at Cities 0005927.)

999. In the late 1980s and early 1990s, Black and Veatch studied the "Big Bend" area of the Arkansas River looking for potential wellfield sites for Hays. (Ex. 1-166 at Cities 0007427.) At the time, Hays was looking for about 3,000 acre-feet. (*Id.*) Black and Veatch proposed development of wellfields at three alternate locations: the Walnut Creek basin, the Pawnee River basin, and an area southwest of Great Bend. That project was slated to cost $27 million. (*Id.* at Cities 0007433.)

1000. In 1993 and early 1994, the City was contacted by Central Kansas Utilities from Great Bend with an offer to sell water to Hays at $2.65 per 1,000 gallons or approximately $864 per acre-foot. (Ex. 1-167 at Cities 0007442.) This option was not pursued because the water would be subject to price increases. (*Id.*)

A. Walnut Creek

1001. The Walnut Creek alluvium, the productive area closest to Hays, is closed to further development. And the Creek discharges into the Cheyenne Bottoms Wildlife Refuge, an environmentally sensitive area and important migratory bird stopover. (Ex.

1-166. *See also* John C. Peck, *Property Rights in Groundwater—Some Lessons from the Kansas Experience,* 12 KAN. J. L. & PUB. POL'Y 493, 499 (2003).)

1002. In September 1989, the Chief Engineer adopted Administrative Policy No. 89-10, entitled, Availability of surface water and groundwater from Walnut Creek, its tributaries and their valley alluviums and other hydraulically connected aquifers. (Ex. 1-168.) The Policy stated that applications for new permits to appropriate surface water from Walnut Creek or its tributaries or groundwater from aquifers that are hydraulically connected to Walnut Creek or its tributaries received on or after that date would be accepted for filing and given a file number but would be denied because approval would prejudicially and unreasonably affect the public interest or impair use under existing water rights. (*Id.*)

1003. Water is unavailable in the Walnut Creek area. DWR held public hearings in December of 1990 that resulted in an IGUCA Order issued on January 29, 1992. (*Id.*) The Walnut Creek IGUCA has been amended but remains in place. (Ex. 1-170 (Supplemental Order to Walnut Creek IGUCA); Ex. 1-171 (Am. Order); Ex. 1-172 (Summary Supplemental Amended Order (III).)

B. Pawnee River

1004. Black and Veatch reported that the next closest area, the Pawnee River alluvium, is also closed to new appropriations, but that does not appear to have been the case, at least not technically. (Ex. 1-166 at Cities 0007426. *See also* Exs. 1-173 and 1-175.)

New permits were possible in GMD5 until March 16, 2001, if the ever-changing regulatory criteria could be met. However, the GMD indicated that new water rights would be difficult to obtain in the Pawnee River Basin. (Ex. 1-166 at Cities 0007427.)

1005. Even though the area was not technically closed to new appropriations at the time of the Black and Veatch Report, the area was likely over appropriated. And if it was not over appropriated then, it is now. On July 8, 1981, the Chief Engineer issued an IGUCA order for the Pawnee River Basin from Larned, Kansas, west to the Pawnee County line making the requirements for obtaining a new water right more onerous. (Ex. 1-173.) On September 13, 1985, the Chief Engineer issued another IGUCA Order further tightening the restrictions. (Ex. 1-174.)

1006. On March 16, 2001, the Chief Engineer closed all of GMD5 to new appropriations. Vol. 20, No. 09 Kan. Reg. 294–95 (Mar. 1, 2001) (amending K.A.R. 5-24-4). This regulation closed the Pawnee basin in Pawnee County. On October 25, 2002, the Pawnee and Buckner drainage basins outside of the GMD were closed to new appropriations of water by regulation. K.A.R. 5-3-26.

1007. On June 18, 2007, the Chief Engineer issued a third Order expanding the IGUCA into Hodgeman and Ness Counties to include the Pawnee River, Buckner Creek, and Sawlog Creek basins. (Ex. 1-175.) That IGUCA proceeding had been bifurcated with Phase I to focus on whether an IGUCA was needed and, if so, Phase II would determine the appropriate controls. The 2007 Order concluded that controls were needed and ordered that a prehearing conference be held to establish the Phase II process. While Phase II has not begun, and the Chief Engineer who issued that Order has retired, the possibility of an IGUCA similar to the Walnut Creek Order remains.

C. Middle Arkansas River Basin near Great Bend

1008. As noted above there have been several proposals to purchase water near Great Bend, Kansas. While there are no IGUCAs in place, most of the other reasons this area is not a feasible source of supply for the Cities apply in this basin with equal force.

1009. The Walnut Creek, Pawnee River, and Middle Arkansas River basins are not economically or technologically feasible alternative sources of supply available to the Cities. The R9 Ranch was selected over these alternatives for a number of reasons, including:

- The Walnut Creek IGUCA Order, and its progeny, reduces the quantity of water available from valid water rights in a manner that is inconsistent with the prior appropriation doctrine and therefore in violation of Kansas law. However, the time limit for challenging the Order has long since expired. Acquisition of such water rights carries an unacceptable level of risk.

- The open-ended IGUCA Order in the Pawnee Buckner basin places a cloud over the water rights in this basin. The Cities do not know whether, how, or when these proceedings will resume and the outcome of those proceedings is unpredictable.

- Even if priority was respected, the Kansas Department of Wildlife, Parks and Tourism holds large and very senior water appropriation rights that are supplied from all three basins. The Cities would have to acquire vested rights and very senior appropriation rights to be assured that sufficient water would be available to meet their long-term needs—an unrealistic prospect.

- The areas are now closed to new appropriations so the Cities would have to acquire existing water rights in the basin from irrigators already using these sources as well as numerous easements and rights-of-way for the gathering system even when the Cities already own the R9 Water Rights in Edwards County.
- Even if it was reasonable to acquire water rights in these basins, there is no contiguous concentration of senior appropriation rights comparable to the R9 Ranch; water rights from multiple owners would need to be acquired.
- Because of the one-half mile limitation on moving points of diversion, acquiring existing irrigation rights would require many miles of collection pipe as well as raw water transmission pipelines.
- To obtain a source comparable to the Ranch, the Cities would likely be forced to use their condemnation powers making the cost to acquire existing water rights unpredictable.
- Taking water from any of these basins could harm Cheyenne Bottoms, which would be politically untenable in Hays, Russell, and the surrounding areas.[9]
- While there are no recent estimates of infrastructure costs, they are not likely to be substantially lower than going to the Ranch. Even if they were lower, there is no reason to believe that they would offset the costs to acquire the water rights.

XIV. Waconda Lake

1010. Waconda Lake, also known as the Glen Elder Reservoir, is a Bureau of Reclamation facility located in the Solomon River Basin in Mitchell and Osborne Counties approximately 63 miles northeast of Hays and 45 miles northeast of Russell. Waconda

[9] Obtaining water from any source is generally unpopular with residents in the source area. The Cities understand that they would likely encounter opposition from area residents at any new source. However, taking water that is needed at Cheyenne Bottoms would likely result in opposition from Hays and Russell residents.

Lake is a key flood control structure in the Kansas River Basin and "provides a high degree of protection to the lower Solomon River Valley." (Ex. 1-102 at Cities 0004929–30.)

1011. In 1991, Hays filed an application to appropriate 15,000 acre-feet of water from Waconda Lake, File 40,406. (Ex. 1-176.) DWR dismissed the application on August 12, 2004. (*Id.*)

1012. In 2001, the Corps performed a high-level feasibility analysis of several potential water supply alternatives for the Cities including Waconda Lake. (Ex. 1-102 at Cities 0004931–32.) It noted a significant decrease in inflow to Waconda Lake since the mid-1950s and a corresponding significant decrease in water supply that Waconda has provided to the Solomon River in the subsequent decades. (*Id.* at Cities 0004930–31.) The Corps concluded that "Waconda Lake water from the Solomon River Basin is considered to have limited potential to address the municipal water supply needs of the Smoky Hill River Basin." (*Id.*)

1013. This problem is exacerbated by the highly sought-after status of Waconda Lake water. For example, already in 1997, the Kansas Department of Wildlife and Parks pressed to "be at the front of the line if water storage becomes available at Waconda Lake. Their purpose: to protect recreation interests at the north-central Kansas Lake from other users and a possible lowering of water levels." (Ex. 1-177. *See* the discussion of Wildlife and Parks' opposition to reallocation of Wilson Lake above.)

1014. The Kansas Water Office and the Corps concluded as follows:

> Since the mid-1950s, the surface water supply in the Solomon River has decreased significantly. For example, the 10-year moving average inflow to Webster Reservoir has decreased from 81,800 acre-feet in 1955 to 11,700 acre-feet in 1992 (KWO 2009). Reduced stream flow and runoff into streams in the Solomon River Basin have been reflected in lower water levels in Webster Reservoir and Kirwin Reservoir. Both of these reservoirs discharge water into Waconda. Waconda Reservoir is currently used for municipal water supply (2,000 acre-feet), and 15,170 acre-feet is currently allocated to the Glen Elder Irrigation District (KWO 2009). If access to the water could be obtained through a reallocation from irrigation uses, it would then have to be transported long distances to a treatment plant in Russell or Hays. In addition, river inflow to the reservoir is declining over time. As a result, Waconda Lake water from the Solomon River Basin is considered to have limited potential to address the municipal water supply needs of the Smoky Hill River Basin.

(Ex. 1-102 at Cities 0004930–31.)

1015. As a practical matter, diverting water to the Cities from Waconda Lake is not economically feasible. Because Waconda Lake is a federal body of water, DWR requires a contract with the federal government before acting on any application proposing storage or use of water from the reservoir. (Ex. 1-178.) Acquisition of storage in Waconda from the Bureau of Reclamation would face some of the same obstacles and challenges discussed under the Wilson Lake heading above.

1016. In 1993, the Hays Water Group Subcommittee concluded that Waconda "is a very high cost option due to the fact that no intermediate options are available. Thus, to access any of this water the entire pipeline must be laid with very little opportunity to add to the City's water supplies in the interim. Phasing this option would be rather difficult." (Ex. 1-167 at Cities 0007443.)

1017. Even though Waconda was not considered to be a viable source, the application remained on file with DWR. In 2002, the PWWSD No. 15 recommended that the Cities release their application for a water appropriation right from Waconda and the Cities concurred. (Ex. 1-179.)

1018. Waconda is not an economically or technologically feasible alternative source of supply that is available to the Cities. The R9 Ranch was selected over this alternative for all of the reasons discussed above.

XV. Pikitanoi Water Project

1019. In the late 1990s, the Kickapoo Tribe of Kansas sought to develop a relationship between the Kickapoo Indian Reservation in northeast Kansas and PWWSD No. 15, among other public agencies. (Ex. 1-180 at Cities 0007634.) The Kickapoo Tribe proposed an ambitious water-supply plan called the Pikitanoi Water Project and proposed extending the Pikitanoi "core pipeline from the western boundary of the Kickapoo Reservation to western Kansas." (*Id.* at Cities 0007635.) It was anticipated that a majority of the project would be financed by federal sources. (*Id.* at Cities 0007680.) This "core pipeline," was never constructed.

1020. The plan called for the construction of 304 miles of transmission pipeline to divert water from the Missouri River under Tribal reserved water rights[10] to serve the Reservation and other interested parties. (Ex. 1-180 at Cities 0007635; 0007689.)

1021. Exploratory discussions were held between PWWSD # 15 and the Kickapoo Tribe relating to potentially supplying Ellis and Russell Counties with water. Numerous studies were proposed. (*See, e.g.*, Ex. 1-180 at Cities 0007679.) The Kansas Water Office issued a report discussing the project in February 1999, which noted that the project would produce 5,086 acre-feet per year, but the KWO's study did not include Hays or Russell, extending only as far east as Riley County. (Ex. 1-181 at Cities 0007798–99.)

1022. The Kickapoo Tribe asked their congressional delegation to include $500,000 in the U.S. Army Corps of Engineers' FY 2000 budget for a "Pikitanoi Special Study." (Ex. 1-180 at Cities 0007764–74.) It appears that Congress declined to allocate the requested funds. (*Id.* at Cities 0007776–77.)

1023. The project was apparently abandoned. In early 2000, PWWSD No. 15 advised the Pikitanoi Executive Committee that the Cities were withdrawing from the project in favor of "regionalized opportunities." (Ex. 1-180 at Cities 0007791–92.) In a 2003

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[10] When the United States reserves land for an Indian Reservation, and other uses, it reserves enough water to carry out the reservations purpose by implication. *Winters v. United States*, 207 U.S. 564 (1908); *Arizona v. California*, 373 U.S. 546 (1963). Federal reserved water rights are distinguished from water reservation rights held by the Kansas Water Office pursuant to K.S.A. 82a-1303.

letter to the Office of the Governor, the Director of the Kansas Water Office noted that the Pikitanoi project was "too expensive." (Ex. 1-182 at Cities 0007816.)

XVI. Southside Ditch Association (1997)

1024. In 1997, Hays and Russell were contacted by a real estate broker representing a group of landowners called the Southside Ditch Association. They owned vested surface-water rights in the Arkansas River west of Lakin, Kansas, and were willing to sell 20,000 acre-feet for $2,000.00 per acre-foot. (Ex. 183.) The Cities did not pursue this option because of the high price and the distance. It is approximately 120 miles from Lakin to Hays and 166 miles by road. The distance from Lakin to Russell is greater.

1025. In addition to the prohibitive cost, surface water in the Arkansas River is an unreliable source and high in chlorides. (Ex. 184 Cities 0007849.) A cursory investigation revealed that water from the Arkansas River in Southwest Kansas is neither economically nor technologically feasible as an alternative long-term source of supply for the Cities.