Kansas Department of Agriculture Division of Water Resources PERMIT OF NEW APPLICATION WORKSHEET

1. File Number:	2. Status Change Date: 3/3/2022	3. Field Office:	4. GMD:					
50,462	0.0.2022	01	0					
5. Status: ☐ Approved ☐ Denied b	by DWR/GMD	Dismiss by Request/Fa	illure to Return					
6. Enclosures: ⊠ Check Valve ⊠ N of C Form	m	☐ Driller Copy	⊠ Meter					
7a. Applicant(s) Person ID New to system Add Seq#		ner(s) system	Person IDAdd Seq#					
CITY OF TOPEKA WATER DEPARTMENT Attn: OPERATIONS MANAGER 3245 WATERWORKS DR TOPEKA, KS 66606		See below for additional PU owners						
7b. Landowner(s) Person ID New to system ☐ Add Seq#		ystem 🗌	Person ID Add Seq#					
7a.	Bla 840	e Rasmussen ck & Veatch 00 Ward Parkway nsas City, MO 64114	4					
	*PC on	ly on this set of a	pprovals.					
8. WUR Correspondent Person ID New to system	1	☐ Groundwater	□ Yes ☑ No □ Surface Water □ DEW					
	□sтк	☐ SED	□ DOM □ CON					
7a.	☐ HYD DRG	G □ WTR PWR	ART RECHRG					
	☐ IND SIC:	ОТ	HER:					
10. Completion Date: 12/31/2023 11. P	Perfection Date:12/31/	2042 12. Ex	κρ Date:					
13. Conservation Plan Required? ☐ Yes ☒ No Date R	Required: Da	te Approved:	Date to Comply:					
14. Water Level Measuring Device? ☐ Yes ☒ No ☐	Date to Comply:	Date WLMD	Installed:					
NOTE: WAIVERS INCLUDED			/21/2021 By: LHH / 9/2022 By: Moody					

File No.	50,462	2	15	5. Format	ion Code	e: 113		Draina	age Ba	sin: KANS	SAS RIV	ER	County	r: SN	5	Special (Jse:		Stream:	
16. Poin T MOD	ts of Dive	rsion										1	17. Rate and Quantity Authorized					Additiona	al	
DEL ENT	PDIV	Qualifi	er	S	Т	R	ID	'N		'W			Rate gpm		Quantity mgy		Rate gpm		Quantity mgy	Overlap PD Files
ENT	78959	Lot 3		26	118	15E	9	4:	375	3070			800		34.56		800		34.56	*SEE BELOW
DEL	78967																			
													PD C	OVERI			50462	2; 50463	; 50464;	50465 ; 50466; &
NOTE	NOTE: WRIS contains the incorrect PD											5	0467							
18. Stora	18. Storage: Rate NF Quantity ac/ft Additio										ditional R	ate			N	F Ado	litional Qua	antity	ac/ft	
	9. Limitation:atgpm (cfs) when combined with																			
20. Mete	r Required	d? ⊠ Yes	□ No	0	To b	e installe	ed by		12/	/31/202	3	!	Date Ad	cceptable	e Meter In	stalled _				
21. Plac	e of Use					NE¼			NW1	1/4		SW1/4	V1/4 SE1/4			Total	Owner	Chg?	NO Overlap Files	
MOD DEL ENT	PUSE	S T	R	ID	NE ½	NW S	W SE 1/4	NE 1⁄4	NW 1/4	SW SE 1/4	NE 1⁄4	NW 5W 1/4	SE 1⁄4	NE ¼	NW 5W 1/4	SE 1⁄4				
СНК		26 11S	15E	1	CITY	OF TO	PEKA	& IMN	/IEDI	ATE VIC	INITY	•	•		•	•		7c.	No	See below
СНК	14968	26 11S	15E	7	WITH	IN THE	BOU	NDAR	IES C	F DOU	GLAS	RWD 0	3					7c.	No	See below
CHK 1	5280	26 11S	15E	6	CITY	OF HO	YT & I	MMED	IATE	VICINIT	Υ							7c.	No	See below
MOD*	19001	26 11S	15E	3	WITHI	N THE	BOU	NDARI	ES O	F SHAW	VNEE F	RWD 08	& 09)				7c.	No	See below
CHK 2	2159	26 11S	15E	2		REAS OF SOLDIER,MENOKEN,MISSION,WILLIAMSPORT,TOPEKA & 7c. No See below														
CHK 3	4539	26 11S	15E	8	POTT	AWAT	OMIE	INDIA	N RES	SERVAT	ION							7c.	No	See below
CHK 3	7674	26 11S	15E	5	SHER	WOOD	IMPR	OVEN	IENT	DISTRIC	CT							7c.	No	See below
CHK 3	7674	26 11S	15E	4	WITHI	N THE	THE BOUNDARIES OF JACKSON RWD 01 & 03 7c. No See below													

FILE NO. 50,4	162					
21. Place of Use CHK MOD DEL ENT PUSE	S T R	ID				
CHK 51878	26 11S 15E	10	WITHIN THE BOUNDARIES OF SHAWNEE RWD 01 CONSOLIDATED	7c.	No	See below
CHK 51879	26 11S 15E	11	WITHIN THE BOUNDARIES OF OSAGE RWD 08	7c.	No	See below
ENT 58540	26 11S 15E	13?	WITHIN THE BOUNDARIES OF SHAWNEE RWD 03 CONSOLIDATED	7c.	No	See below
ENT 58541	26 11S 15E	14?	WITHIN THE BOUNDARIES OF SHAWNEE RWD 04 CONSOLIDATED	7c.	No	See below
ENT 34486	26 11S 15E	?	ТОРЕКА МТАА	7c.	No	See below

70743 Comments:

*Has PUSE 19001 been modified following the formation of Consolidated SN CO RWD 1; 3; & 4? See File No. 46659. (SN RWD 3,4,5 became Consolidated RWD 4 and SN RWD 6 & 7 became Consolidated RWD 3)

All places of use overlap File Nos. SN-01; 2183 7721; 26012; 46659; 50462; 50463; 50464; 50465; 50466; & 50467.

Kansas Department of Agriculture Division of Water Resources

WAIVER REQUEST & WAIVER RULE WORKSHEET

File Number: 50,462; 50,463; 50,464; 50,465; 50,466; and 50,467 FO: 1 GMD:

WAIVER REQUEST:

UMW	Date Requested	Rule ID	Applies	Rule Type	Rule Subtype					
MUN	10/30/20	3	Statewide	Well Spacing	Well to Well Spacing					
Rule Number	Date Granted	Date Denied	Justification:							
K.A.R. 5-4-4c1c	3/3/2022			this set of applications and File No. 47908, with which it forms a part overlap. These wells will be operated as a single wellfield in a manne will minimize the impacts to individual wells and the surrounding aqu All wells in the wellfield are under common ownership and managem Meets safe yield and spacing to all other wells not owned by applicant						
UMW	Date Requested	Rule ID	Applies	Rule Type	Rule Subtype					
MUN	10/30/20	53	Statewide	Safe Yield	Yield of Unconfined Groundwater Exceeded					
Rule Number	Date Granted	Date Denied	Justification:	The proposed wells are supplied by recharge from the Kansas Ri applicant is a member of the Kansas River Water Assurance Dist						
K.A.R. 5-3-11	3/3/2022			and storage water is available. The proposed use of water is in the puinterest. This waiver is consistent with similar applications that rely on assurance district support.						

WAIVER RULE (complete only if a new rule needs to be created):

Rule ID	Applicability	Туре	Subtype	Rule Number	Date Active	Date Inactive
				K.A.R.		

Date Prepare	d 12/21/21	By LHH/TFO
Date Entered		By
	3/9/2022	,
	LMoody	

KANSAS DEPARTMENT OF AGRICULTURE Division of Water Resources

<u>MEMORANDUM</u>

TO: Files DATE: January 11, 2022

FROM: Lloyd Hemphill RE: Application, File Nos. 50,462; 50,463;

50,464; 50,465; 50,466; & 50,467

The City of Topeka has filed the referenced applications to appropriate a total of 207.36 million gallons (636.6 acre-feet) of groundwater per calendar year at a total diversion rate not to exceed 4,800 gallons per minute from four batteries of wells and two individual wells as described below. All proposed points of diversion are located in the north half of Section 26, Township 11 South, Range 15 East, in Shawnee County, in the Kansas River drainage basin. The application form was signed by a representative of the City, stating that they have access to the points of diversion.

These applications were filed by the City in an effort to comply with a request from KDHE to have a temporary alternative water supply in the event that their existing supply (Kansas River) is compromised. The City will utilize existing Corps of Engineers flood relief wells currently authorized for dewatering use under Appropriation of Water, File No. 47,908. File No. 47,908 authorizes eight pump stations and 14 relief wells. Eleven of these relief wells overlap the wells proposed by these applications, either as individual wells or as well batteries.

The proposed place of use is within the City of Topeka, KS and immediate vicinity; the areas of Soldier, Menoken, Mission, Williamsport, Topeka and Tecumseh Townships in Shawnee County, KS served by the City of Topeka municipal water distribution system; within the boundaries of Consolidated RWD Nos. 1, 3, and 4 and RWD Nos. 8 and 9 in Shawnee County, KS; the Sherwood Improvement District and the Metropolitan Topeka Airport Authority in Shawnee County, KS; within the boundaries of RWD Nos. 1 and 3 Jackson County, KS; within the boundaries of RWD No. 3 Douglas County, KS; within the boundaries of RWD No. 8 Osage County, KS; the City of Hoyt, KS and immediate vicinity; and the Pottawatomie Indian Reservation. This place of use overlaps Water Right, File Nos. SN-01; 2,183; 7,721; 26,012; and Appropriation of Water, File No. 46,659.

During review of these applications, it was discovered that the City uses a different well numbering system than is on file and is documented in WRIS under the "Comments" field. The City's ID system was used on the applications. It was also found that the feet distances from the southeast section corner described on the application do not match the authorized points of diversion for the overlapping File No. 47,908. Per agreement of the applicant, the applications will be modified so that the point of diversion descriptions match the senior file. The feet distances will be updated when a field inspection is completed and GPS data is collected. The following table summarizes the well ID's and feet distances:

Application	Application	Application	WRIS	WRIS	WRIS	WRIS PD (Auth PD, File No. 47908)		
File No.	Battery ID	Map/ City ID	ID	CIN	Comment	Auth Feet North	Auth Feet West	
50462		Relief Well #9	78959	9	Relief Well #1	4375	3070	
50463		Relief Well #8	78960	10	Relief Well #2	4425	2940	
		Relief Well #7	78961	11	Relief Well #3	4485	2860	
50465	Battery #4	Relief Well #6	78962	12	Relief Well #4	4515	2770	
		Geocenter				4500	2815	
		Relief Well #5	78963	13	Relief Well #5	4475	2660	
50466	Battery #3	Relief Well #2	78964	14	Relief Well #6	4335	2720	
		Geocenter				4405	2690	
		Relief Well #4	78965	15	Relief Well #7	4420	2600	
50464	Battery #2	Relief Well #1	78966	16	Relief Well #8	4300	2590	
		Geocenter				4360	2595	
		Relief Well #3	78967	17	Relief Well #9	4490	2400	
50467	Patton, #1	Relief Well #10	78968	18	Relief Well #10	4170	2490	
50407	Battery #1	Relief Well #11	78969	19	Relief Well #11	4180	2230	
		Geocenter				4280	2373	

The City's consultants (Joe Rasmussen and Andrew Hansen, Black & Veatch Corporation) proposed that an extreme emergency scenario would be a pumping period of 30 days. At the wellfield design capacity of 5.4 million gallons per day (MGD) (see the following table) that totals a quantity of 163.555 million gallons.

Well No.	base	ng Capacity d on 2020 p Testing	Battery/Well ID	Battery/Well Capacity (GPM)	
	GPM	GPD		(GFIVI)	
3	190	273,600			
10	178	256,320	#1	713	
11	345	496,800			
1	476	685,440	#2	752	
4	276	397,440	#2	752	
2	447	643,680	#3	682	
5	235	338,400	#3	082	
6	239	344,160	#4	605	
7	456	656,640	#4	695	
8	500	720,000	#8	500	
9	444 639,360		#9	444	
Total:	3,786	5,451,840		3,786	

City of Topeka File No. 50,462; 50,463; 50,464; 50,465; 50,466; & 50,467 Page 3

These six applications propose to divert a total of 207.36 mgy at a maximum combined pumping rate of 4,800 gallons per minute. The requested quantity will allow them to use slightly more quantity than the "extreme" 30-day scenario as outlined. The requested 800 gpm pumping rate for each application is greater than the design capacities, however, this will allow for any potential upgrades to the design capacity. The City's surface water rights currently authorize the use a combined total of 15,431.6 mgy at a rate of 42,000 gpm (SN-01; 2,183; 7,721; 26,012; and 46,659). Based on this information, the requested rates and quantities appear reasonable to supply municipal water for a short duration emergency event. No rate or quantity limitations appear necessary.

Per K.A.R. 5-4-4, the minimum well spacing is 1,320 feet to non-domestic wells and 660 feet to domestic wells. The points of diversion proposed by these applications are all located within a 700-foot diameter circle. Therefore, these applications do not meet well spacing requirements. A waiver of well spacing is requested. Per the City's consultants, these wells will continue to be operated together as a wellfield. The pumping rates will be adjusted to maintain acceptable pumping water levels inside each well. The close spacing within the wellfield will also induce recharge from the river. The wellfield will only be operated for short periods of time during a future emergency. These factors will avoid direct impairment of any individual well and maintain acceptable groundwater levels in the alluvial aquifer. Furthermore, the wellfield is under common ownership and management, and it is unlikely to be divided. These applications meet spacing to all other non-domestic and domestic wells.

The wellfield is located in a developed area within the City limits where there could potentially be numerous wells located within a half-mile. The applicant requested on the applications that nearby well owners be notified by means of a published public notice. The applicant published a public notice in the Topeka Capital Journal on October 19 and 25; and November 1, 2021. The ending comment response date was November 16, 2021. No comments of any kind were received. The applicant provided both a copy of the notice, and an Affidavit of Publication from the newspaper. The proposed wells are located 300 to 700 feet from the Kansas River, so the KRWAD No. 1 was notified on November 17, 2021. No comments were received. These applications would only be exercised in lieu of the surface water intakes, thus there will be no net increase in demand for Water Assurance District flows.

Area well logs show that the subsurface lithology is clay and clayey sand to a depth of about 22 feet, underlain by sand and gravel with some clay layers to shale bedrock at a depth of about 52 feet. Static water levels were reported around 15 to 20 feet depths. Geologic maps show that the surficial geology in the area is Quaternary alluvial deposits of the Kansas River. As expected, the wellfield is located within the topographically defined river valley and close to the river. It can be reasonably determined that the source of supply is the Kansas River alluvial aquifer. Further supporting this determination is that the primary use for these wells is to relieve hydrostatic pressure caused by elevated water levels in the Kansas River.

Per K.A.R. 5-3-11, the safe yield area of consideration was based on the extent of the alluvium, which was determined to be 4,593 acres. Thus 4,593 acres x 8.4 inches of recharge x 75% recharge available / 12 provides a safe yield of 2,411.3 acre-feet. Prior appropriations total 33,111 acre-feet, leaving no quantity water available to meet safe yield. The overlapping File No. 47,908 authorizes 29,627 acre-feet for dewatering use. If this quantity is removed, prior appropriations still total 3,484 acre-feet. A significant source of water to these wells will be induced recharge of surface water from the Kansas River due to the wellfield's close proximity to the river and further enhanced by the close inter-well spacing. The applicant is a member of the Kansas River Water Assurance District No. 1 and benefits from releases of assurance water. Releases of storage water from upstream reservoirs, when necessary, should provide adequate recharge to the alluvial source for these wells. Therefore, because the water requested by these applications would be supported by these releases, a waiver of safe yield (K.A.R. 5-3-11) is recommended. This type of waiver is consistent with other member applications throughout the state.

City of Topeka File No. 50,462; 50,463; 50,464; 50,465; 50,466; & 50,467 Page 4

In accordance with K.S.A. 82a-706c, the Chief Engineer retains full authority to require any water user to install meters, gages, or other measuring devices, which he or she or his or her agents may read at any time. Water flowmeter requirements are further described in K.A.R. 5-1-4 through K.A.R. 5-1-12. If any chemical or foreign substance is injected into the water pumped under this permit, a check valve will also need to be installed.

According to Joe Rasmussen (Black & Veatch), flowmeters are installed at each individual well, making it possible to account for the water appropriated by each well battery, as will be required by these permits. Whether these wells are being used for municipal or dewatering use, it will typically be for short-term emergency use. It is recommended that the City be allowed to keep records of meter readings which are sufficient to determine which file (or use made of water) the diversion should be recorded under.

Per K.A.R 5-3-5d, each well with an authorized diversion rate of 100 gpm or more, drilled after May 1, 1980, except wells authorized under a temporary permit or domestic right, shall have a water level measurement tube (WLMT) installed. The only available WWC-5 reports indicate that some of the wells were constructed in 1979. Additionally, it is documented in the senior file that "the [levee] system has been place for many years (over 50 years)". Therefore, it appears that the wells were likely constructed prior to the effective date of K.A.R 5-3-5d and that a WLMT tube condition is not needed on the permit. This is consistent with the senior file. As previously discussed, the applicant has indicated that they plan to monitor water levels within the wells but it is unknown whether there is a tube installed or if any of the other approved methods of measurement are available. The original (and primary) use of these wells is short-term emergency dewatering use and they are intended to be operated in times of flooding when a WLMT would serve little purpose.

Katie Tietsort, Water Commissioner of the Topeka Field Office, recommended that the referenced application be approved in a January 11, 2022 e-mail. Based on the above discussion, the area is open to new appropriations, the applications are approvable with waivers of safe yield and well spacing, there are unique conditions that make the waivers acceptable, the additional quantity of water will provide the City an emergency supply of water, and approval of the application will not impair senior water rights nor prejudicially or unreasonably affect the public interest, it is recommended that the referenced application be approved.

Lloyd Hemphill Environmental Scientist Topeka Field Office

Hemphill, Lloyd [KDA]

From: Hemphill, Lloyd [KDA]

Sent: Tuesday, January 11, 2022 9:11 AM

To: Hemphill, Lloyd [KDA]

Subject: FW: City of Topeka - 50462 thru 50467: For your recommendation

Note that the well logs referenced in the e-mail below belong to a series of relief wells owned by the City of Topeka located on the north levy a little more than a mile downstream of the proposed wellfield. The only two WWC5 reports on record, within the proposed wellfield indicate that those wells were completed in 1979.

Lloyd Hemphill Topeka Field Office

From: Tietsort, Katie [KDA] <Katie.Tietsort@ks.gov>

Sent: Tuesday, January 11, 2022 7:30 AM

To: Hemphill, Lloyd [KDA] <Lloyd.Hemphill@ks.gov>

Subject: RE: City of Topeka - 50462 thru 50467: For your recommendation

Lloyd,

Yes, I agree this package is ready to move forward now and we've covered all the necessary provisions. I did find well logs from various ages ranging to , I believe it was, 2003, but that is not a problem.

Katie Tietsort

Water Commissioner

Katie.Tietsort@ks.gov
Ph. 785-296-5733 Cell 785-213-9188
Kansas Department of Agriculture
Topeka Field Office
1131 SW Winding Rd, Suite 400
Topeka, KS 66615

From: Hemphill, Lloyd [KDA] <Lloyd.Hemphill@ks.gov>

Sent: Monday, January 10, 2022 5:46 PM

To: Tietsort, Katie [KDA] < Katie.Tietsort@ks.gov>

Subject: City of Topeka - 50462 thru 50467: For your recommendation

Katie,

I have revised the memo for this application package following our discussions. See attached. It contains new discussion regarding metering and water level measurement tubes.

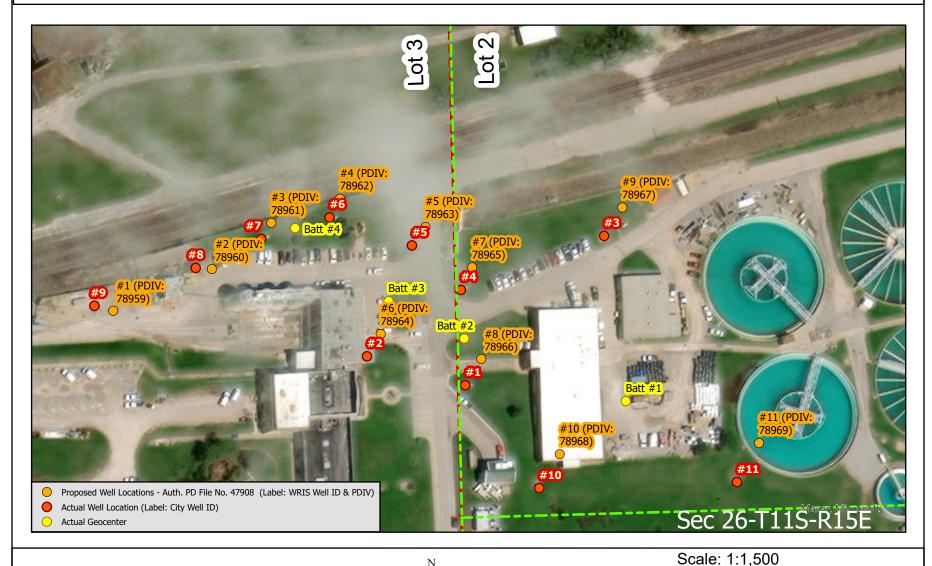
Note that the memo in the folder described below is not the current version.

Let me know if this is satisfactory and provide your recommendation.

Thanks,

Lloyd

NEW APPLICATIONS - FILE NOS. 50462; 50463; 50464; 50465; 50466; & 50467 CITY OF TOPEKA - MUNICIPAL USE



N

) 100 200 400 Feet

CITY OF TOPEKA, WPC 1115 NE POPLAR ST. TOPEKA, KS 66616

Affidavit of Publication

STATE OF KANSAS COUNTY OF SHAWNEE

I, said Legal Clerk, being duly sworn, says:

That I am the Legal Clerk of the Topeka Capital-Journal, a daily newspaper of general circulation, printed and published in Topeka, Shawnee County, Kansas; that the publication, a copy of which is attached hereto, was published in the said newspaper in the issues dated:

October 19, 2021, October 25, 2021, November 01, 2021

That said newspaper was regularly issued and circulated on those dates.

Said newspaper is a daily published at least 50 times a year; has been so published continuously and uninterrupted in said county and state for a period of more than five years prior to the first publication of said notice; and has been admitted at the post office of Topeka in said County as a second class matter/

Legal Clerk

Subscribed to and sworn to me this 1st day of November 2021.

I AAA

Notary Public, State of Wisconsin, County of Brown

My commission expires:

00001955 00081687

AMY KOKOTT Notary Public State of Wisconsin (Published in the Topeka Capital Journal on October 19, 25, November 1, 2021)

Public Notice

File Nos. 50,462; 50,463; 50,464; 50,465; 50,466; and 50,467
The City of Topeka Water Department has filed six new applications for permit to appropriate water for beneficial use, identified as File Nos. 50,462 through 50,467, with the Division of Water Resources, Kansas Department of Agriculture. These applications propose the appropriation of up to 207.36 million gallons of groundwater to be diverted per year at an individual rate up to 800 gallons per minute from six wells and well batteries. The proposed points of diversion are all located in the North Half of Section 26, in Township 11 South, Range 15 East, in Shawnee County, Kansas. Anyone owning wells within one-half mile of these wells, is invited to submit written comments regarding Application, File Nos. 50,462 through 50,467. Persons submitting comments should specifically indicate their interest in the proposed appropriation of water.;Comments regarding the application will be accepted through November 16th, 2021.

Written comments or questions regarding this application may be directed to the Office of the Chief Engineer, Division of Water Resources, Kansas Department of Agriculture, 1320 Research Park Drive, Manhattan, Kansas 66502. If you wish more information concerning this application, you may also contact Lloyd Hemphill, Environmental Scientist, in the Topeka Field Office of the Division of Water Resources at (785) 296-8682.

Topeka Field Office 1131 SW Winding Rd, Suite 400 Topeka, KS 66615



Mike Beam, Secretary

Laura Kelly, Governor

November 17, 2021

Phone: 785-296-5733

www.agriculture.ks.gov

KANSAS RIVER WATER ASSURANCE DISTRICT NO 1 % GALEN BIERY 212 SW 7TH STREET TOPEKA KS 66603-3717

RE: Application, File Nos. 50,462; 50,463; 50,464; 50,465; 50,466; and 50,467

Dear Mr. Biery:

This is to advise you that the City of Topeks has filed Applications for Permit to Appropriate Water for municipal use under the file numbers referenced above.

These applications propose to fulfill a request from the Kansas Department of Health and Environment for a temporary alternative water supply in the event that the existing supply (Kansas River) is compromised. The applicant proposes to appropriate a maximum of 207.36 million gallons per year at a maximum combined rate of 4,800 gallons per minute from the existing Corps of Engineers' flood relief wells located in Section 26, in Township 11 South, Range 15 East, Shawnee County, Kansas. These wells will operate as a series of well batteries and individual wells, as described in the applications. This appropriation will occur on a temporary basis and in lieu of pumping directly from the river, thus there is not expected to be any increase in the net demand for river flows.

As you know, the Kansas River Water Assurance Program Operations Agreement states, in part, that "the District reserves the right to review all applications to appropriate water and change applications, including term permits, filed with the Division of Water Resources that propose the diversion of water from the Kansas River or its alluvium". Therefore, you are being notified of receipt of this change application in order that you may be fully informed of the proposed location of the applicant's point of diversion and proposed use of water. You can find the application and site map posted by the file number referenced above under Topeka Field Office 2021 at:

http://agriculture.ks.gov/divisions-programs/dwr/water-appropriation/notices

You may contact me at (785) 296-8682 with any questions or comments.

Sincerely,

Lloyd Hemphill Environmental Scientist Topeka Field Office

Ilayd Hemplil

3×1 12, 505

Kansas Department of Agriculture Division of Water Resources Earl D. Lewis, Jr., Chief Engineer 1320 Research Park Drive Manhattan, Kansas 66502

Re:

Application

File No. 50462; 50463; 50464; 50465; 50,466; &

Kansas River Assurance District Water Reservation Rights

I understand that a Minimum Desirable Streamflow requirement has been established, an Assurance District has been formed and established or a Water Reservation Right is held by the Kansas Water Office for the source of supply to which the above referenced application applies, namely the Kansas River.

I understand that diversion of water pursuant to this application will be subject to regulation any time Assurance District or Water Marketing releases are being made from storage in Federal Reservoirs or when a Reservation Right upstream of a Federal Reservoir is being administered.

I also understand that if this application is approved, there could be times, as determined by the Division of Water Resources, when I would not be allowed to divert water. I realize that this could affect the economics of my decision to appropriate water.

I am aware of the above factors, and with the knowledge thereof, request that the Division of Water Resources proceed with processing and approval, if possible, of the above referenced application.

Signature of Applicant

State of Kansas

I hereby certify that the foregoing instrument was signed in my presence and sworn to before me , 2021

this

day of December

My Commission Expires:

Reita M. Horning NOTARY PUBLIC-STATE OF KANSAS

FORM TO BE USED WHEN APPLICABLE WHEN FILING AN APPLICATION FOR PERMIT TO APPROPRIATE WATER FOR BENEFICIAL USE

The Kansas Legislature has established minimum desirable streamflows for the streams listed below. If your proposed diversion of water is going to be from one of these watercourses or adjacent alluvial aquifers, please complete the back side of this page and submit it along with your application for permit to appropriate water.

Arkansas River Big Blue River

Chapman Creek
Chikaskia River
Cottonwood River
Delaware River
Little Arkansas River
Little Blue River

Marais des Cygnes River Medicine Lodge River

Mill Creek (Wabaunsee Co. area)

Neosho River

Ninnescah River

North Fork Ninnescah River

Rattlesnake Creek Republican River Saline River Smoky Hill River Solomon River

South Fork Ninnescah

Spring River Walnut River Whitewater River

Assurance Districts have been formed on the following rivers:

Kansas River

Marias des Cygnes River

Neosho River

The Kansas Water Office has Water Reservation Rights for the following reservoirs:

Big Hill

Marion

Clinton

Melvern

Council Grove Elk City Milford Perry

Hillsdale

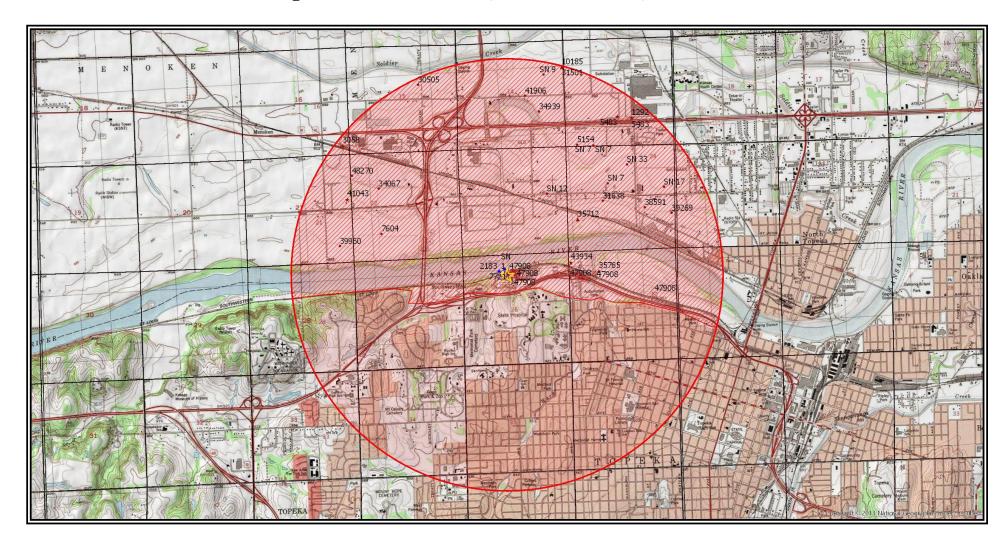
Pomona

John Redmond

Tuttle Creek

Safe Yield Report Sheet Water Right- Proposed Point of Diversion Point of Diversion in 26-11S-15E

Footages from SE corner- 4,376 feet North 3,069 feet West



Analysis Results

The selected PD is in an area OPEN to new appropriations.

The safe yield based on the variables listed below is 2,411.30 AF.

Total prior appropriations in the circle is 33,111.31 AF.

Total quantity of water available for appropriation is 0.00 AF.

Safe Yield Variables

The area used for the analysis is set at 4,593 acres.

The potential annual recharge at the circle center is estimated to be 8.4 inches.

The percent of recharge available for appropriation is 75%.

Authorized Quantity values are as of 17-AUG-2020 and are based on Appropriated and Vested ground water right and possible stream nodes for GMD #2. Domestic, Term and Temporary water rights have been excluded.

There are 26 water rights and 40 points of diversion within the circle.

NO WATER AVAILABLE

Even if you subtracted out the entire quantity under File #47,908 there would still be no water available. 33,111.31 AF - 29,627 AF = 3,484.31 AF

File	Number	Use	ST	SR	Q4	Q3	Q2	Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth Quant	Add Quant	Tot Acres	Net Acres
A	1292 00	IND	NK		Q4	Q5	Q2	Q1	1294	2045	13	1 wp	15E	5	WR	930.00	930.00	10t Acres	
	3058 00	IND	NK			SE	SE	SE	1294	2043	16	11	15E	1	WR	14.55	14.55		
A	5154 00	IRR	NK	_		SW	SW	SW	109	4762	13	11	15E	20	WR	32.00	32.00	63.00	63.00
A	5483 00	IND	NK			3 W	3 W	S W	109	2045	13	11	15E	5	WR	5,520.60	756.60	05.00	03.00
A		IND								2043		11	15E	11		3,320.00	730.00		
Sam	7604 00	IRR	NK NK				NC	SW	1423 1255	3958	13 22	11	15E	11	WR WR	66.00	66.00	02.60	93.60
A				_		NIE							_	1				93.60	93.00
A	10185 00		NK NK			NE	SE	NE	3914	95	14	11	15E	5	WR	229.30	229.30	126.00	126.00
A	30505 00		NK	_		NIE	C.E.	NIE	3257	1845	15	11	15E	9	WR	105.00	105.00	136.00	136.00
A	31501 00		I NK			NE	SE	NE	3914	95	14	11	15E	5	WR	982.92	810.85	12.00	42.00
A	31638 00	IRR	NK	_			~		2650	3500	24	11	15E	9	WR	28.00	28.00	43.00	43.00
A	34067 00	IRR	NK			NW	SE	NW	3462	3950	22	11	15E	2	WR	99.00	99.00	110.00	110.00
A	34939 00	IRR	NK						1761	1270	14	11	15E	4	WR	34.00	34.00	34.00	34.00
A	35712 00		I NK						1580	4800	24	11	15E	3	WR	6.78	6.78		
A	35765 00	MUN	I NK	G					4250	3800	25	11	15E	2	WR	1.14	1.14		
A	38591 00	IRR	NK	G		NE	NW	SE	2050	1450	24	11	15E	10	WR	14.00	14.00	14.50	14.50
A	39269 00	IRR	NK	G		SE	NE	SE	1900	220	24	11	15E	12	WR	14.00	14.00	21.50	21.50
A	39960 00	IRR	NK	G		NW	SE	SE	804	666	21	11	15E	11	WR	68.00	68.00	71.00	71.00
A	41043 00	IND	NK	G		SE	SE	NE	3060	205	21	11	15E	13	WR	3.13	3.13		
A	41906 00	IRR	NK	G		SE	SW	NE	2700	1888	14	11	15E	8	WR	9.30	9.30	18.00	18.00
V SI	N 700	IRR	AA	G					5240	3900	24	11	15E	6	WR	41.00	41.00	66.00	66.00
Sam	e	IRR	AA	G					5240	2600	24	11	15E	5	WR				
Sam	e	IRR	AA	G					3330	3300	24	11	15E	18	WR				
V SI		IRR	NV	G		NW	SE	NE	0	0	14	11	15E	1	WR	39.00	39.00	39.00	39.00
V SI		IRR	AA			SW	SE	NE	0	0	23	11	15E	2	WR	4.00	4.00	8.00	8.00
V SI		IRR	NV			NC	SE	NE	3252	550	24	11	15E	15	WR	75.50	75.50	75.50	75.50
, 51	. 17.00	11(1(117	J		110)L	111	3232	330	<i>2</i> F	11	151	1.5	*****	75.50	75.50	75.50	75.50

File Number	Use ST SR	Q4 Q3 Q2 Q1	FeetN	FeetW	Sec	Twp	Rng	ID	Qind	Auth Quant	Add Quant	Tot Acres	Net Acres
V SN 33 00	IRR AA G	SW NW NE	4170	2269	24	11	15E	4	WR	27.00	27.00	25.50	25.50
A 43934 00	IND NK G		4836	5166	25	11	15E	5	WR	10.17	10.17		
A 47908 00	DEW KE G		3167	1098	25	11	15E	6	WR	29,627.00	29,627.00		
Same	DEW KE G		4291	4082	25	11	15E	7	WR				
Same	DEW KE G		4006	4703	25	11	15E	8	WR				
Same	DEW KE G		4375	3070	26	11	15E	9	WR				
Same	DEW KE G		4425	2940	26	11	15E	10	WR				
Same	DEW KE G		4485	2860	26	11	15E	11	WR				
Same	DEW KE G		4515	2770	26	11	15E	12	WR				
Same	DEW KE G		4475	2660	26	11	15E	13	WR				
Same	DEW KE G		4335	2720	26	11	15E	14	WR				
Same	DEW KE G		4420	2600	26	11	15E	15	WR				
Same	DEW KE G		4300	2590	26	11	15E	16	WR				
Same	DEW KE G		4490	2400	26	11	15E	17	WR				
Same	DEW KE G		4170	2490	26	11	15E	18	WR				
Same	DEW KE G		4180	2230	26	11	15E	19	WR				
A 48270 00	IRR LR G	SW NW NW	4360	5140	22	11	15E	4	WR	66.00	66.00	66.00	66.00

Limitations

File	Number	Seq Num Limitations
A	5483 00	1 1,798,884,000 BG (5520.6 AF)/YR COM/W SN 19,1292 ON LAND IN CERT
A	10185 00	1 175 GPM WHEN WELLS ARE OPERATED SIMULTANEOUSLY
A	31501 00	1 338.933MGY @ 790GPM COM/W #10185

KANSAS DEPARTMENT OF AGRICULTURE Mike Beam, Secretary of Agriculture

DIVISION OF WATER RESOURCES Earl D. Lewis Jr., Chief Engineer

APPROVAL OF APPLICATION and PERMIT TO PROCEED

(This Is Not a Certificate of Appropriation)

This is to certify that I have examined Application, File No. 50,462 of the applicant

CITY OF TOPEKA WATER DEPARTMENT Attn: OPERATIONS MANAGER 3245 WATERWORKS DR TOPEKA, KS 66606

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

- 1. That the priority date assigned to such application is **October 30**, **2020**.
- 2. That the water sought to be appropriated shall be used for municipal purposes within the City of Topeka, KS and immediate vicinity; the areas of Soldier, Menoken, Mission, Williamsport, Topeka and Tecumseh Townships in Shawnee County, KS served by the City of Topeka municipal water distribution system; within the boundaries of Consolidated RWD Nos. 1, 3 and 4 and RWD Nos. 8 and 9 in Shawnee County, KS; the Sherwood Improvement District and the Metropolitan Topeka Airport Authority in Shawnee County, KS; within the boundaries of RWD Nos. 1 and 3 Jackson County, KS; within the boundaries of RWD No. 8 Osage County, KS; the City of Hoyt, KS and the Pottawatomie Indian Reservation.
- 3. That the authorized source from which the appropriation shall be made is groundwater, to be withdrawn by means of one (1) well located in Lot 3 in Section 26, more particularly described as being near a point 4,375 feet North and 3,070 feet West of the Southeast corner of said section, in Township 11 South, Range 15 East, Shawnee County, Kansas, located substantially as shown on the topographic map accompanying the application.
- 4. That the appropriation sought shall be limited to a maximum diversion rate not in excess of **800** gallons per minute (1.78 c.f.s.) and to a quantity not to exceed **34.56 million gallons** (106.1 acre-feet) of water for any calendar year.
- 5. That installation of works for diversion of water shall be completed on or before **December 31, 2023** or within any authorized extension thereof. The applicant shall notify the Chief Engineer and pay the statutorily required field inspection fee of \$400.00 when construction of the works has been completed. Failure to timely submit the notice and the fee will result in revocation of the permit. Any request for an extension of time shall be submitted prior to the expiration of the deadline and shall be accompanied by the required statutory fee of \$100.00.

File No. 50,462 Page 2 of 4

6. That the proposed appropriation shall be perfected by the actual application of water to the proposed beneficial use on or before <u>December 31, 2042</u> or any authorized extension thereof. Any request for an extension of time shall be submitted prior to the expiration of the deadline and shall be accompanied by the required statutory fee of \$100.00.

- 7. That the applicant shall not be deemed to have acquired a water appropriation for a quantity in excess of the amount approved herein nor in excess of the amount found by the Chief Engineer to have been actually used for the approved purpose during one calendar year subsequent to approval of the application and within the time specified for perfection or any authorized extension thereof.
- 8. That the use of water herein authorized shall not be made so as to impair any use under existing water rights nor prejudicially and unreasonably affect the public interest.
- 9. That the right of the appropriator shall relate to a specific quantity of water and such right must allow for a reasonable raising or lowering of the static water level and for the reasonable increase or decrease of the streamflow at the appropriator's point of diversion.
- 10. That this permit does not constitute authority under K.S.A. 82a-301 through 305a to construct any dam or other obstruction; nor does it grant any right-of-way, or authorize entry upon or injury to, public or private property.
- 11. That all diversion works constructed under the authority of this permit into which any type of chemical or other foreign substance will be injected into the water pumped from the diversion works shall be equipped with an in-line, automatic quick-closing, check valve capable of preventing pollution of the source of the water supply. The type of valve installed shall meet specifications adopted by the Chief Engineer and shall be maintained in an operating condition satisfactory to the Chief Engineer.
- 12. That an acceptable water flow meter shall be installed and maintained on the diversion works authorized by this permit in accordance with the Kansas Administrative Regulations 5-1-4 through 5-1-12 adopted by the Chief Engineer. This water flow meter shall be used to provide an accurate quantity of water diverted as required for the annual water use report (including the meter reading at the beginning and end of the report year).
- 13. That the applicant shall maintain accurate and complete records from which the quantity of water diverted during each calendar year may be readily determined and the applicant shall file an annual water use report with the Chief Engineer by March 1 following the end of each calendar year. Failure to file the annual water use report by the due date shall cause the applicant to be subject to a civil penalty.
- 14. That no water user shall engage in nor allow the waste of any water diverted under the authority of this permit.
- 15. That failure without cause to comply with provisions of the permit and its terms, conditions and limitations will result in the forfeiture of the priority date, revocation of the permit and dismissal of the application.
- 16. That the right to appropriate water under authority of this permit is subject to any minimum desirable streamflow requirements identified and established pursuant to K.S.A. 82a-703c for the source of supply to which this water right applies.

County of Riley

17. That the permit holder shall submit a progress report to the office of the Chief Engineer by March 1, following the tenth full calendar year after the permit was issued. The progress report must be submitted on a form prescribed by the Chief Engineer, and shall compare annual water use projected in the original application with the actual annual water use for the prior 10 years. The progress report must document compliance with the approved conservation plan, contain sufficient details to determine the extent of perfection of the water right during the previous ten years, and demonstrate how the water right, in association with other water rights, meets the municipal use need.

Ordered this 3 day of March, 2022, in Manhattan, Riley County, Kansas.

Earl D. Lewis Jr., P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

The foregoing instrument was acknowledged before me this 3 day of Warch ,2027 by Earl D. Lewis Jr., P.E., Chief Engineer, Division of Water Resources, Kansas Department of Agriculture.

Notary Public



RIGHT TO A HEARING AND TO ADMINISTRATIVE REVIEW

If you are aggrieved by this Order, then pursuant to K.S.A. 82a-1901, you may:

- 1) request an evidentiary hearing before the Chief Engineer, or
- 2) request administrative review by the Secretary of Agriculture.

Failure to request an evidentiary hearing before the Chief Engineer does not preclude your right to administrative review by the Secretary. To obtain an evidentiary hearing before the Chief Engineer, a written request for hearing must be filed within 15 days after service of this Order as provided in K.S.A. 77-531 (i.e., within a total of 18 days after this Order was mailed to you), with: Kansas Department of Agriculture, Attn: Legal Section, 1320 Research Park Drive, Manhattan, Kansas 66502, FAX (785) 564-6777.

If you do not file a request for an evidentiary hearing before the Chief Engineer, you may petition for administrative review of the Order by the Secretary of Agriculture. A petition for review shall be in writing and state the basis for requesting administrative review. The request for hearing may be denied if the request fails to clearly establish factual or legal issues for review. See K.S.A. 77-527. The petition must be filed within 30 days after service of this Order as provided in K.S.A. 77-531 (i.e., within a total of 33 days after this Order was mailed to you), and be filed with: Secretary of Agriculture, Attn: Legal Division, Kansas Department of Agriculture, 1320 Research Park Drive, Manhattan, Kansas 66502, FAX (785) 564-6777.

If neither a request for an evidentiary hearing nor a petition for administrative review is filed as set forth above, then this Order shall be effective and become a final agency action as defined in K.S.A. 77-607(b). Failure to timely request either an evidentiary hearing or administrative review may preclude further judicial review under the Kansas Judicial Review Act.

CERTIFICATE OF SERVICE

On this day of Application and Permit to Proceed, File No. 50 prepaid, first class, US mail to the following:		I hereby	certify	that th	_	 oroval of postage
CITY OF TOPEKA WATER DEPARTMENT Attn: OPERATIONS MANAGER 3245 WATERWORKS DR TOPEKA, KS 66606						
With photocopies to:						
Black & Veatch - Joe Rasmussen, P.E.						
Topeka Field Office						
	-	Division o	f Water	Resour	200	



KANSAS DEPARTMENT OF AGRICULTURE Mike Beam, Secretary of Agriculture

DIVISION OF WATER RESOURCESEarl D. Lewis Jr., Chief Engineer

WAIVER OF REGULATION K.A.R. 5-3-11 Safe Yield

Date: March 3 , 2022.

Re: Applications, File Nos. 50,462; 50,463; 50,464; 50,465; 50,466; and 50,467

EARL D. LEWIS, JR., P.E.

CHIEF ENGINEER

- 1. That the source of water for these applications appears to be the Kansas River alluvium.
- 2. That the applications do not meet safe yield criteria as set forth in K.A.R. 5-3-11. The alluvial aquifer in the area of consideration is fully appropriated and no additional groundwater is available for these applications.
- 3. That the applicant is a member of the Kansas River Water Assurance District No. 1 as determined by the Chief Engineer. The source of supply to these wells includes induced recharge of surface water from the adjacent Kansas River and they will benefit from releases made by the District.
- 4. That the Kansas River Water Assurance District No. 1 has not indicated any concern regarding the pending applications and will be able to support these applications with releases of assurance storage water upstream reservoirs.
- 5. That these wells will only be used in lieu of the diversion of water from the applicant's surface water intakes on the Kansas River which are also supported by releases made by the District. Therefore, there will be no net increase in demand for District releases.
- 6. That a waiver of safe yield when supported by assurance district releases is consistent with how the Division of Water Resources has previously processed similar applications.
- 7. That the waiver will not prejudicially or unreasonably affect the public interest because the requested water is supported by the Kansas River Water Assurance District No. 1, and senior rights will not be impaired by the proposed use.

Comments:

Earl D. Lewis Jr., P.E. Chief Engineer

Division of Water Resources Kansas Department of Agriculture



KANSAS DEPARTMENT OF AGRICULTURE Mike Beam, Secretary of Agriculture

DIVISION OF WATER RESOURCESEarl D. Lewis Jr., Chief Engineer

WAIVER OF REGULATION K.A.R. 5-4-4(c)(1)(c) Well Spacing

Date: <u>March 3</u>, 2022.

Re: Applications, File Nos. 50,462; 50,463; 50,464; 50,465; 50,466; and 50,467

- 1. That the points of diversion (individual wells or geographic center of well battery) proposed under the referenced applications fail to meet the minimum well spacing criteria of 1,320 feet to the other points of diversion proposed for municipal use by this set of applications, as required by K.A.R. 5-4-4(c)(1)(C). The proposed points of diversion are located approximately 105 to 236 feet from other points of diversion proposed by this package of applications.
- That the eleven wells related to these applications will be operated as a single wellfield in a manner that will avoid direct impairment of any individual well and maintain acceptable groundwater levels in the alluvial aquifer. The pumping rates will be adjusted to maintain acceptable pumping water levels inside each well. The close well spacing in the wellfield will also induce recharge from the river. The wellfield will only be operated for short periods of time during a future emergency.
- 3. That the wellfield is under common ownership and management, and it is unlikely to be divided in the future.
- 4. That the proposed points of diversion also partially overlap dewatering (flood relief) wells authorized by Appropriation of Water, File No. 47,908. This water right is only in use when there is excess water in the aguifer so potential impairment will not be an issue.
- 5. That the proposed points of diversion meet spacing to all other existing wells and water rights that are not owned by the applicant.
- 6. That a waiver of K.A.R. 5-4-4(c)(1)(C) will not prejudicially or unreasonably affect the public interest and should not impair any existing water rights.

EARL D. LEWIS, JR., P.E.

CHIEF ENGINEER

Comments:

Earl D. Lewis Jr., P.E. Chief Engineer

Division of Water Resources Kansas Department of Agriculture 1320 Research Park Drive Manhattan, KS 66502 785-564-6700 www. agriculture.ks.gov



900 SW Jackson, Room 456 Topeka, KS 66612 785-296-3556

Mike Beam, Secretary

Laura Kelly, Governor

CITY OF TOPEKA WATER DEPARTMENT Attn: OPERATIONS MANAGER 3245 WATERWORKS DR TOPEKA, KS 66606 March 15, 2022

Re: Appropriation of Water, File No. 50,462; 50,463; 50,464; 50,465; 50,466; and 50,467

Dear Sir or Madam:

Enclosed are permits authorizing you to proceed with construction of the proposed diversion works and to appropriate water for beneficial use as set forth in these permits. Your attention is directed to the enclosures and to the terms, conditions, limitations, and requirements specified in these permits.

Notice must be filed on the enclosed form once the diversion works have been completed. Failure to complete the diversion works within the time allowed, or within any authorized extension of time thereof, will result in dismissal of the permit. If you need an extension of time, you must request it before the deadline for completion set forth in the permit. Any request for an extension of time must be accompanied by the statutorily required fee, which is currently \$100.00.

An acceptable water flowmeter must be installed on the diversion works authorized by these permits prior to using water. An annual water use report must be filed with the Chief Engineer by March 1, following the end of each calendar year. If a complete annual water use report is not received by the deadline, then a fine may be assessed and all water use under such permit or right may be suspended. Reports submitted in paper form will be assessed a \$20 per file number paper filing fee. In order to avoid this filing fee, you may submit your report online at www.kswaterusereport.org.

The approval of your applications constitutes a permit to appropriate water. It does not give authority to construct any dam or other stream obstruction regulated by K.S.A. 82a-301 through 305a. It does not give authority to access any right-of-way or authorize trespassing upon or injury to public or private property. It may also be necessary for you to comply with other local, state or federal requirements.

Enclosed is an informational sheet that sets forth the procedure to obtain a Certificate of Appropriation which will establish the extent of your perfected water right. Additional information and applicable forms may be found on our website at agriculture.ks.gov/divisions-programs/dwr. If you have any questions or need assistance with any of these requirements, please contact our office at 785-564-6640 or your local Topeka Field Office at 785-296-5300. If you call, please reference the file number so we can help you more efficiently.

Sincerely,

Grister a Baum

Kristen A. Baum New Application Unit Supervisor Water Appropriation Program

KAB:lhh Enclosures

pc: Topeka Field Office

Black & Veatch - Joe Rasmussen

RIGHT TO A HEARING AND TO ADMINISTRATIVE REVIEW

If you are aggrieved by this Order, then pursuant to K.S.A. 82a-1901, you may:

- 1) request an evidentiary hearing before the Chief Engineer, or
- 2) request administrative review by the Secretary of Agriculture.

Failure to request an evidentiary hearing before the Chief Engineer does not preclude your right to administrative review by the Secretary. To obtain an evidentiary hearing before the Chief Engineer, a written request for hearing must be filed within 15 days after service of this Order as provided in K.S.A. 77-531 (i.e., within a total of 18 days after this Order was mailed to you), with: Kansas Department of Agriculture, Attn: Legal Section, 1320 Research Park Drive, Manhattan, Kansas 66502, FAX (785) 564-6777.

If you do not file a request for an evidentiary hearing before the Chief Engineer, you may petition for administrative review of the Order by the Secretary of Agriculture. A petition for review shall be in writing and state the basis for requesting administrative review. The request for hearing may be denied if the request fails to clearly establish factual or legal issues for review. See K.S.A. 77-527. The petition must be filed within 30 days after service of this Order as provided in K.S.A. 77-531 (i.e., within a total of 33 days after this Order was mailed to you), and be filed with: Secretary of Agriculture, Attn: Legal Division, Kansas Department of Agriculture, 1320 Research Park Drive, Manhattan, Kansas 66502, FAX (785) 564-6777.

If neither a request for an evidentiary hearing nor a petition for administrative review is filed as set forth above, then this Order shall be effective and become a final agency action as defined in K.S.A. 77-607(b). Failure to timely request either an evidentiary hearing or administrative review may preclude further judicial review under the Kansas Judicial Review Act.

CERTIFICATE OF SERVICE

On this 15 day of *Mosch*, 2027, I hereby certify that the foregoing Approval of Application and Permit to Proceed, File No. 50,462, dated 3 *Mosch* 2027 was mailed postage prepaid, first class, US mail to the following:

CITY OF TOPEKA WATER DEPARTMENT Attn: OPERATIONS MANAGER 3245 WATERWORKS DR TOPEKA, KS 66606

With photocopies to:

Black & Veatch - Joe Rasmussen, P.E.

Topeka Field Office

Division of Water Resources