



Lower Colorado River Authority, Administrative Agent
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January 12, 2018

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Mr. Jeff Walker, Executive Administrator
Texas Water Development Board (TWDB)
P.O. Box 13231
1700 North Congress Avenue
Austin, Texas 78711-3231

Re: Request by the Lower Colorado Regional Water Planning Group (Region K) to use a modified TCEQ WAM Run 3 for surface water availability modeling in the 2021 Region K Water Plan development

Dear Mr. Walker:

On January 10, 2018, the Lower Colorado Regional Water Planning Group (Region K) authorized submitting this request to you for approval of using the Region K WAM Run 3 Cutoff Model (Cutoff Model) in determining availability of surface water resources for development of the 2021 Region K Regional Water Plan (RWP).

Previously in development of the 2011 Region K RWP, Region K determined that the standard TCEQ full-basin WAM Run 3 did not adequately reflect the historical operation of water rights and existing contractual commitments in the Colorado River Basin and subsequently requested and received TWDB's permission to use the Cutoff Model in determining surface water availability for the 2011 RWP.

Region K again requested to use the Cutoff Model for the 2016 Region K RWP, after making some updates that reflected new data and changed conditions within the basin. That request was also approved by TWDB, with limitations identified for water management strategy analysis.

The Cutoff Model proposed for this 2021 RWP uses the same assumptions as approved previously by TWDB plus some limited revisions to include appropriate updates and provide clarification to the assumptions. The attached **Table A - Summary of Region K Cutoff Model Modeling Assumptions** outlines all of the major assumptions and identifies where a change to an assumption has been made since the 2016 Plan.

There are two basic purposes for applying a WAM in the context of regional water planning. One is to establish the available firm supply of surface water under drought-of-record conditions for each individual existing surface water right and for each decade of the planning period. The second is to analyze potential strategies for meeting projected future water demand shortages by decade, including strategies that potentially involve new appropriations of state water.

COUNTIES

Bastrop
Blanco
Burnet
Colorado
Fayette
Gillespie
Hays (partial)
Llano
Matagorda
Mills
San Saba
Travis
Wharton (partial)
Williamson (partial)

Our understanding of the application and use of WAMs for these different purposes in the Region K planning process is described in the following sections.

REGION K SUPPLY ANALYSES

Region K requests to perform water supply availability analyses using the Cutoff Model. This Cutoff Model reflects historical and current water management operations in the basin with regard to existing water rights, and as such, it provides the most realistic representation of available water supplies during drought-of-record conditions for individual water rights. The basic assumptions included in this model as it is to be applied for purposes of the supply analyses for Region K are identified in the attached **Table A column 1**. The basic assumptions that differ from those included in the standard TCEQ Colorado WAM Run 3 are as follows:

1. All water rights at and above Lakes O.H. Ivie and Brownwood are senior to downstream water rights (while maintaining relative date priority in rights upstream). This assumption reflects historical and current water management operational practices between the upper and lower Colorado Basin, and allows for increased water availability upstream of Lakes O.H. Ivie and Brownwood in Region F and decreased availability downstream in Region K.
2. Expand the period of naturalized flows to include 1940-2016. Extending the hydrology period to 2016 will allow for better analysis of the recent drought and may identify a new "drought of record".
3. Calculation of the firm yield for the Buchanan-Travis Reservoir System. These two reservoirs are operated as a system, and their firm yield should be determined as such.
4. Include provisions of LCRA-STP 2006 Settlement Agreement. This is an agreement that is not included in the TCEQ WAM Run 3, but is representative of current water management operations in the basin.
5. The 2015 LCRA Water Management Plan environmental flow criteria is not used for water supply analysis. An amount of firm water (33,440 AFY) is allocated per year, and is a commitment from the firm yield of the Highland Lakes.
6. 2015 LCRA Water Management Plan Interruptible Water is turned off for water supply analysis.

As noted, it is our understanding that estimates of future drought-of-record surface water supplies for specific water rights are to be made by decade through the year 2070 assuming that reservoir capacities will be gradually reduced over time due to sedimentation. The changing reservoir capacities would be the only variables in these simulations of future supply quantities.

REGION K STRATEGY ANALYSES

The analysis of potential surface water supply strategies can involve different WAM modeling approaches depending on the nature of a particular strategy and the purpose for which the analysis is being made. First and foremost, for a strategy that represents a new appropriation of surface water from TCEQ, the amount of water that the strategy is capable of producing under drought-of-record conditions should be determined under the same permitting assumptions

used by TCEQ. This means that the strategy should be analyzed using TCEQ's standard full-basin WAM Run 3 as it currently exists with all existing water rights in the entire Colorado River Basin fully exercised in accordance with their authorized impoundment and diversion amounts and with no return flows. The result of this analysis will define a reasonable estimate of the legal quantity of water available from implementing the strategy, and this will be the maximum amount of water that can be relied upon for the strategy in the Region K planning process. The basic assumptions included in this WAM Run 3 model as it is to be applied for purposes of analyzing new surface water appropriations for potential Region K strategies also are identified in the attached **Table A column 2**.

The other important application of a WAM for strategy analysis involves the evaluation of how a particular water supply strategy will serve to meet the projected future water demands of a particular water user over time on a decade-by-decade basis through 2070. This is fundamental to the regional water planning process, and according to TWDB guidance, should reflect realistic future conditions. In this regard, the Cutoff Model provides the most useful tool for making these evaluations since it reflects historical and current water management operational practices between the upper and lower Colorado Basin with regard to existing water rights and provides the most realistic representation of water availability during drought-of-record conditions for individual water rights.

For the strategy evaluations undertaken in support of the Region K planning process, the effects of different types of water supply strategies can be incorporated into the Cutoff Model in terms of new supplies, including strategies such as a new groundwater source, an aquifer storage-recovery project, seawater or brackish groundwater desalinization, indirect reuse of return flows, an interbasin surface water or groundwater transfer, or a new surface water appropriation. Once included in the Cutoff Model, these new sources of supply then would be available to meet the projected demands for specific surface water users at different decades in the future. These simulations with the Cutoff Model would be made for specific decadal conditions with regard to the water demands of individual surface water users and with regard to reservoir storage capacities as influenced by future sedimentation. For a strategy involving a new appropriation of surface water, the maximum amount of water available under the strategy would be limited to that amount determined from the previous analysis of the strategy using TCEQ's standard full-basin WAM Run 3 model under fully-authorized water rights conditions. This would ensure that the available supply of water relied upon from the strategy for planning purposes would be consistent with the legal amount of water that could potentially be permitted by TCEQ. While the specific assumptions incorporated in the Cutoff Model for these types of strategy planning simulations may vary depending on the particular strategies being evaluated, the basic assumptions are listed in the attached **Table A column 3**.

CONCLUSION

We believe that the WAM modeling approach outlined above is consistent with directives from TWDB regarding regional water planning and meets the requirements of TCEQ with regard to how strategies involving potential new appropriations of surface water are analyzed and represented in the regional planning process. Furthermore, we believe that this approach will provide the most realistic estimates of future available surface water supplies that reflect actual water management operations in the basin with regard to existing water rights.

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We appreciate your consideration of this submittal. If you have any questions about this request, please contact me as shown below.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "John E. Burke", with a long horizontal flourish extending to the right.

John E. Burke
Region K Chairman
512-914-3474
JohnEBurke@RegionK.org

Enclosures: Table A - Summary of Region K Cutoff Model Modeling Assumptions

Cc: Lann Bookout, TWDB (electronically)
Teresa Lutes, Region K Water Modeling Committee Chair (electronically)
Jaime Burke, AECOM (electronically)

**TABLE A
SUMMARY OF REGION K CUTOFF MODEL MODELING ASSUMPTIONS
REGARDING SUPPLY AND STRATEGY ANALYSES
FOR 2021 REGIONAL PLAN DEVELOPMENT**

NO.	ASSUMPTION	(1)	(2)	(3)	Change from 2016 Planning Cycle
		SUPPLY ANALYSIS Region K Cutoff Model by Decade	STRATEGY ANALYSIS TCEQ Full-Basin WAM Run 3	Region K Cutoff Model by Decade	
1	Use TCEQ Full-Basin WAM Run 3 Without Modification for New Appropriation Water Supply Strategies Analysis	No	Yes	No	No Change
2	All Rights at and Above Ivie/Brownwood Senior to Downstream Rights (maintaining relative date priority in rights upstream)	Yes	No	Yes	No Change
3	Use Expanded 1940-2016 Naturalized Flows	Yes	No	Yes	Extended hydrology period to 2016
4	Determine Firm Yield for Buchanan-Travis Reservoir System	Yes	No	No	No Change
5	Use Sediment-Adjusted Future Reservoir Storage by Decade	Yes	No	Yes	No Change
6	Use 2015 Water Management Plan Environmental Flow Criteria	No*	Yes	Yes	Changed "2010" to "2015"; Added a footnote for clarification
7	Set All Water Right Demands at Authorized Diversion Amounts	Yes	Yes	No	No Change
8	Include Provisions of LCRA-STP 2006 Settlement Agreement	Yes	No	Yes	No Change
9	Include Operating Rules for Lakes Buchanan and Travis to Reflect Combined Firm Yield Operation	Yes	Yes	Yes	Revised "Maintain Consistent Levels of Drawdown in the Lakes" to say "Reflect Combined Firm Yield Operations"
10	Include Latest Approved LCRA Permits and Amendments (as of December 2017)	Yes	Yes	Yes	Added "(as of December 2017)"
11	Include 2015 Water Management Plan Highland Lakes Interruptible Water	No	Yes	Yes	Changed "2010" to "2015"
12	Adjust 2015 Water Management Plan Environmental Flow Triggers (Decadal)	No	No	Yes	Changed "2010" to "2015"; Added "(Decadal)" for clarification
13	Set All Region K Municipal and Industrial Water Right Demands at Projected Future Demand Amounts by Decade	No	No	Yes	Expanded "M&I" to "Municipal and Industrial" for clarification
14	Modify Curtailment of Highland Lakes Interruptible Water as Necessary to Satisfy LCRA Future Firm Municipal and Industrial Demands	No	No	Yes	Expanded "M&I" to "Municipal and Industrial" for clarification
15	Set LCRA Lower Basin Irrigation Demands Equal to Projected Future Demands by Decade	No	No	Yes	Removed "Weather Variable" after the word "Future"
16	Include LCRA Irrigation Return Flows to the Colorado River	No	No	Only As A Strategy	No Change
17	Include Return Flows from Austin Wastewater Treatment Plants	No	Only As A Strategy	Only As A Strategy	No Change
18	Include Other Municipal and Industrial Return Flows	No	Only As A Strategy	Only As A Strategy	Expanded "M&I" to "Municipal and Industrial" for clarification
19	Include Reuse Provisions and Environmental Flow Requirements of LCRA-Austin 2007 Settlement Agreement	No	Only As A Strategy	Only As A Strategy	No Change

* The LCRA 2015 Water Management Plan states that the amount of firm water allocated for environmental purposes is 33,440 acre-feet per year (10-year average). This amount is a commitment from the firm yield of the Highland Lakes.

Note TCEQ SB-3 requirements will be taken into consideration in strategies involving a new appropriation of water