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BRAZOS RIVER  
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## WEST-CENTRAL-TEXAS-MUNICIPAL-WATER-DISTRICT

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# MEMORANDUM

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TO: Brazos G Regional Water Planning Group 

FROM: WCTMWD General Manager, David Bell

DATE: October 9, 2009

SUBJECT: 2 Year Safe Yield Analysis for Hubbard Creek Reservoir

CC: WCTMWD Board of Directors, Attorney, Engineer and Staff

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In early August of this year, the District and the City of Abilene independently requested that BGRWPG consider the possibility of allowing the use of 2 year safe yield analysis of the water supply capabilities of Hubbard Creek Reservoir and Lake Fort Phantom Hill. At the August 19th meeting of the Planning Group, these requests were accepted and forwarded with a favorable recommendation to the Texas Water Development Board.

At the same time that the TWDB was considering these requests, the District reviewed the 2 year safe yield option with Member Cities and the Board. On August 25th, HDR [David Dunn and Peter Newell] delivered a detailed memorandum of comparison data for Hubbard Creek Reservoir using 1 year and 2 year safe yield analysis. This memo was also shared with the Board and Member City Managers.

At the September 16th meeting of the Planning Group it was learned that the Water Development Board would likely give favorable consideration to the District and City requests to use 2 year safe yield. Based on this result, a choice needs to be made from among the options in the August 25th HDR technical memo.

Based on discussion with Member Cities, the District Board, and among District Staff, the data in HDR's "table 5" is the representation of planning information that best suits our needs and interests at this time. Without objection from HDR, please use this selected data to continue the analysis of available water supplies from Hubbard Creek Reservoir in completing the 2010 Regional Water Plan.

To: David Bell, P.E., West Central Texas Municipal Water District	
From: Peter Newell David Dunn, P.E.	Project: Brazos G Regional Water Plan
CC:	
Date: 8/25/09	Job No: 100488

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**RE: Scenarios for determining demands and safe yield supplies for West Central Texas MWD**

Based on conversations with the West Central Texas Municipal Water District (the District), HDR has developed six scenarios to represent alternative contractual demands, based on alternative safe yield supplies from Hubbard Creek Reservoir (HCR). A safe yield analysis determines the volume of water that can be supplied by the reservoir each year while maintaining a minimum buffer in storage during a repeat of the drought of record. A one-year safe yield analysis retains a volume equal to the computed yield. A two-year safe yield estimate is more conservative and retains a volume equal to twice the computed yield, resulting in a smaller estimated supply than does a one-year safe yield. The one-year safe yield for HCR under year 2060 projected sedimentation conditions is 32,600 acre-feet per year (acft/yr). The two-year safe yield under year 2060 sedimentation conditions is 27,370 acft/yr. The Brazos G Regional Water Plan varies the safe yield by planning decade, to account for storage capacity lost to sedimentation. This results in declining yields over time. Table 1 presents the HCR one- and two-year safe yield supplies from 2010 through 2060.

**Table 1. One-year and two-year safe yield supplies from HCR (acft/yr).**

	Year					
	2010	2020	2030	2040	2050	2060
<i>One-year Safe Yield</i>	33,188	33,070	32,953	32,835	32,718	32,600
<i>Two-year Safe Yield</i>	27,708	27,640	27,573	27,505	27,438	27,370

Currently the District supplies water to four member contract holders: the cities of Abilene, Albany, Anson and Breckenridge. Contracts volumes are determined based upon the "allocated" safe yield, which is 85% of the safe yield supply adopted by the District's Board of Directors. Abilene contracts for 72.98% of the HCR allocated safe yield; Albany for 7.91%; Anson for 8.66% and Breckenridge for 10.45%.

The following tables present various combinations of assumptions regarding how to compute the contractual commitments to the member cities, and how those commitments can be compared to the assumed supply from HCR (either one-year or two-year safe yield). Table 2 computes the contractual commitments based on the year 2060 one-year safe yield, which holds the contractual commitments constant over time. Table 3 computes the contractual commitments based on the various one-year safe yield supplies as the yield declines from 2010 to 2060 due to sedimentation. Both Tables 2 and 3 assume the one-year safe yield is the supply from HCR.

**Table 2. One-year safe yield supply from HCR; contracts at 85% of the 2060 one-year safe yield.**

<i>Contractual Demands</i>	Year (acft/yr)					
	2010	2020	2030	2040	2050	2060
CITY OF ABILENE	20,223	20,223	20,223	20,223	20,223	20,223
CITY OF ALBANY	2,192	2,192	2,192	2,192	2,192	2,192
CITY OF ANSON	2,400	2,400	2,400	2,400	2,400	2,400
CITY OF BRECKENRIDGE	2,896	2,896	2,896	2,896	2,896	2,896
<b>Total Demand</b>	<b>27,710</b>	<b>27,710</b>	<b>27,710</b>	<b>27,710</b>	<b>27,710</b>	<b>27,710</b>
<i>Supply</i>						
Hubbard Creek Reservoir (1yr SY)	33,188	33,070	32,953	32,835	32,718	32,600
<i>Projected Balance</i>	5,478	5,360	5,243	5,125	5,008	4,890

**Table 3. One-year safe yield supply from HCR; contracts at 85% of the 2010 – 2060 one-year safe yields.**

<i>Contractual Demands</i>	Year (acft/yr)					
	2010	2020	2030	2040	2050	2060
CITY OF ABILENE	20,587	20,514	20,441	20,369	20,296	20,223
CITY OF ALBANY	2,231	2,223	2,216	2,208	2,200	2,192
CITY OF ANSON	2,443	2,434	2,426	2,417	2,408	2,400
CITY OF BRECKENRIDGE	2,948	2,937	2,927	2,917	2,906	2,896
<b>Total Demand</b>	<b>28,209</b>	<b>28,110</b>	<b>28,010</b>	<b>27,910</b>	<b>27,810</b>	<b>27,710</b>
<i>Supply</i>						
Hubbard Creek Reservoir (1yr SY)	33,188	33,070	32,953	32,835	32,718	32,600
<i>Projected Balance</i>	4,978	4,961	4,943	4,925	4,908	4,890

On August 19, 2009, the Brazos G Regional Water Planning Group voted to support adopting a two-year safe yield as the basis of determining the supply available from HCR. This action has been forwarded to the Texas Water Development Board (TWDB) for approval. If the TWDB does not approve this request, then one of the supply/demand analyses presented in Tables 2 and 3 will be used to develop the 2011 Brazos G Regional Water Plan.

If the TWDB approves the request, then one of the supply/demand analyses presented in Tables 4 – 7 will be used in the 2011 Plan. Tables 4 – 7 present variations basing the member cities' contracts on the one-year or two-year safe yield supply, as summarized below.

- Table 4 – Uses the two-year safe yield estimate for supply, but includes contracts based on the one-year safe yield in 2060 (32,600 acft/yr).
- Table 5 – Uses the two-year safe yield estimate for supply, but includes contracts based on the one-year safe yield as it varies by decade.

- Table 6 – Uses the two-year safe yield estimate for supply, and includes contracts based on the two-year safe yield in 2060 (27,370 acft/yr).
- Table 7 – Uses the two-year safe yield estimate for supply, and includes contracts based on the two-year safe yield as it varies by decade.

The analyses presented in Tables 4 and 5 assume that the current contracts between the District and the member cities are intended to be based on an 85% allocation of the one-year safe yield supply. This will necessarily create projected shortages for the District as the contracts would be based on a larger yield than the supply assumed for the 2011 Plan. The analyses presented in Tables 6 and 7 assume that the basis of supply from HCR establishes the amounts of the contractual commitments. In all cases, the contractual commitments are based on an 85% allocation of whichever safe yield supply is pertinent to the table.

As the technical consultant to the Brazos G Regional Water Planning Group, we would like to know the preference of the District, based on answers to the following two questions:

1. Regardless of the action taken by the TWDB regarding the two-year safe yield supply, should the contractual commitments be held constant (based on the year 2060 yield) or allowed to vary as the yield varies by decade?
2. If the TWDB approves the use of the two-year safe yield as the basis of supply from HCR, should the contractual commitments be based on the one-year safe yield or the two-year safe yield?

**Table 4. Two-year safe yield supply from HCR; contracts at 85% of the 2060 one-year safe yield.**

<i>Contractual Demands</i>	Year (acft/yr)					
	2010	2020	2030	2040	2050	2060
CITY OF ABILENE	20,223	20,223	20,223	20,223	20,223	20,223
CITY OF ALBANY	2,192	2,192	2,192	2,192	2,192	2,192
CITY OF ANSON	2,400	2,400	2,400	2,400	2,400	2,400
CITY OF BRECKENRIDGE	2,896	2,896	2,896	2,896	2,896	2,896
Total Demand	27,710	27,710	27,710	27,710	27,710	27,710
<i>Supply</i>						
Hubbard Creek Reservoir (2yr SY)	27,708	27,640	27,573	27,505	27,438	27,370
<i>Projected Balance</i>	(3)	(70)	(138)	(205)	(273)	(340)

**Table 5. Two-year safe yield supply from HCR; contracts at 85% of the 2010 – 2060 one-year safe yields.**

<i>Contractual Demands</i>	Year (acft/yr)					
	2010	2020	2030	2040	2050	2060
CITY OF ABILENE	20,587	20,514	20,441	20,369	20,296	20,223
CITY OF ALBANY	2,231	2,223	2,216	2,208	2,200	2,192
CITY OF ANSON	2,443	2,434	2,426	2,417	2,408	2,400
CITY OF BRECKENRIDGE	2,948	2,937	2,927	2,917	2,906	2,896
<b>Total Demand</b>	<b>28,209</b>	<b>28,110</b>	<b>28,010</b>	<b>27,910</b>	<b>27,810</b>	<b>27,710</b>
<i>Supply</i>						
Hubbard Creek Reservoir (2yr SY)	27,708	27,640	27,573	27,505	27,438	27,370
<i>Projected Balance</i>	(502)	(470)	(437)	(405)	(372)	(340)

**Table 6. Two-year safe yield supply from HCR; contracts at 85% of the 2060 two-year safe yield.**

<i>Contractual Demands</i>	Year (acft/yr)					
	2010	2020	2030	2040	2050	2060
CITY OF ABILENE	16,978	16,978	16,978	16,978	16,978	16,978
CITY OF ALBANY	1,840	1,840	1,840	1,840	1,840	1,840
CITY OF ANSON	2,015	2,015	2,015	2,015	2,015	2,015
CITY OF BRECKENRIDGE	2,431	2,431	2,431	2,431	2,431	2,431
<b>Total Demand</b>	<b>23,265</b>	<b>23,265</b>	<b>23,265</b>	<b>23,265</b>	<b>23,265</b>	<b>23,265</b>
<i>Supply</i>						
Hubbard Creek Reservoir (2yr SY)	27,708	27,640	27,573	27,505	27,438	27,370
<i>Projected Balance</i>	4,443	4,376	4,308	4,241	4,173	4,106

**Table 7. Two-year safe yield supply from HCR; contracts at 85% of the 2010 – 2060 two-year safe yields.**

<i>Contractual Demands</i>	Year (acft/yr)					
	2010	2020	2030	2040	2050	2060
CITY OF ABILENE	17,188	17,146	17,104	17,062	17,020	16,978
CITY OF ALBANY	1,863	1,858	1,854	1,849	1,845	1,840
CITY OF ANSON	2,040	2,035	2,030	2,025	2,020	2,015
CITY OF BRECKENRIDGE	2,461	2,455	2,449	2,443	2,437	2,431
<b>Total Demand</b>	<b>23,551</b>	<b>23,494</b>	<b>23,437</b>	<b>23,379</b>	<b>23,322</b>	<b>23,265</b>
<i>Supply</i>						
Hubbard Creek Reservoir (2yr SY)	27,708	27,640	27,573	27,505	27,438	27,370
<i>Projected Balance</i>	4,156	4,146	4,136	4,126	4,116	4,106