
FINAL:
**Water Supply Planning for
City of Franklin**

Presentation to Franklin Public Enterprise Committee Meeting
for Harpeth River Watershed Association

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(See Qualifications last slide)
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Preface

“Fifty years ago Franklin was a small town and the Harpeth was a small river, which was a good source for its water supply. Today Franklin is a rapidly expanding small city with growing needs; the river remains the same small river it was in 1956.”

- Franklin citizen

Evaluation of alternatives to meet Franklin’s water demand growth is more uncertain and complicated than rank ordering of single-point cost estimates. Harpeth River flow uncertainty and instream flow values to stakeholders must be incorporated in the analysis.

Presentation supplements and corrects CTE’s work, relying on their data and descriptive information.

- Based on my August 16 report to HRWA and additional information.

Most Important Policy Questions

Most critical questions unasked in the public debate:

1. Is the drinking water plant or Harpeth flows for wastewater dilution the more pressing economic necessity to the City?
2. What are the instream flow values at stake for existing and expanded water withdrawals for drinking water?
3. Does changing “**Face**” of **Franklin** affect the decision to expand or close the existing water withdrawal plant?

Benefit-Cost analysis should be employed in project analyses like this to evaluate and compare the economic benefits of instream water flows versus benefits of water diversion for drinking water.

- Economic benefits are society’s values for services provided by the water resource.
- Economists have been empirically measuring these values for 40 years.

Two Bottomline Findings Support WTP Closure

1 Conventional cash flow analysis corrected for

- Harpeth River flow variability,
- HVUD 1998 contract take-or-pay minimum monthly purchases,
- HVUD rate increases caused by reduced sales

negates cost advantage of expanded WTP.

2 Values of Harpeth instream flow services

- most importantly wastewater dilution ignored by the scope of CTE analysis

negate economic reasonableness of Harpeth withdrawal.

Baseline

Supply Diversion v. Instream Conditions

Baseline and Alternative Water Supply Scenarios

Franklin's Practicable Alternatives					
	WTP	HVUD	Cap Cost	W/D Limitation	
Baseline	2 mgd	4.2 mgd		1 CFS	
Alt 2A DAF - 4 mgd plant	2.9 mgd	3.3 mgd	\$7.5 Mil	5 CFS	10 CFS
Alt 2B DAF - w/ storage	2.9 mgd	3.3 mgd	\$8.6 Mil	5 CFS	10 CFS
Shut Down	0	6.2 mgd	\$1.3 Mil		

Franklin August 8, 1998 Contract with HVUD requires minimum purchase of 3.3 mgd.
CTE analysis omitted its effect on project economics.

Upgrade existing plant without expanding -- alternative dismissed by CTE.

Upgrade to membrane technology and double capacity -- dismissed by my August 16 report to HRWA as uneconomic and inconsistent with the bulk of the water purchased from HVUD, which is not membrane.

Alternatives to expand and upgrade plant are governed by effects of HVUD contract and Harpeth River natural flow variability on project economics.

Baseline Instream Flow Considerations 1: Harpeth River Wastewater Dilution Capacity

Harpeth River flows provide critical dilution service to Franklin's Wastewater Plant (POTW).

- Permit up for renewal this fall.

POTW is running at 6 mgd, but sized for 12 mgd!

- Its growth must be anticipated and accommodated.

Harpeth River below Franklin is effluent dominated during low flow season.

- Harpeth River has been in violation of the DO standard of 5 mg/L during low-flow warm summer months for at least six years.

Two other POTWs, Lynwood and Cartwright Creek, discharge into Harpeth.

- Lynwood Utility POTW has pending application to hook-up 350+ homes.

WTP plant withdrawals conflict with instream effluent dilution service requirements.

- Aquater 2006, TDEC 2002 & 2003, and EPA 2000 show that Harpeth flows range between 20% - 50% wastewater effluent during low flow months.

Baseline Instream Flow Considerations 2: Franklin Parks and Greenbelt System

City of Franklin has spent \$millions and has active plans to develop and enhance four parks along the River:

- Battle Field Park
- Pinkerton Park
- Bicentennial Park
- Harlinsdale Park
- Williamson County Rec Center Park

Parks will be linked by the Franklin Greenbelt system and river access will be enhanced at various locations.

Canoe access and recreation access to the Harpeth will be enhanced.

Ecosystem services and recreation services are highly valued by society.

Baseline Instream Flow Considerations 3: Forthcoming Riverfront Hotel, Restaurant & Condominium Developments

Forthcoming enhancements to downtown Franklin economy depend importantly on Harpeth River view shed.

- **Face of Franklin is changing.**

Former Dodson's property in planning and design phase for small boutique hotel, retail, bar and grill.

- Ties-in with City marketing to attract heritage tourism.

Other river frontage property under consideration for condo development.

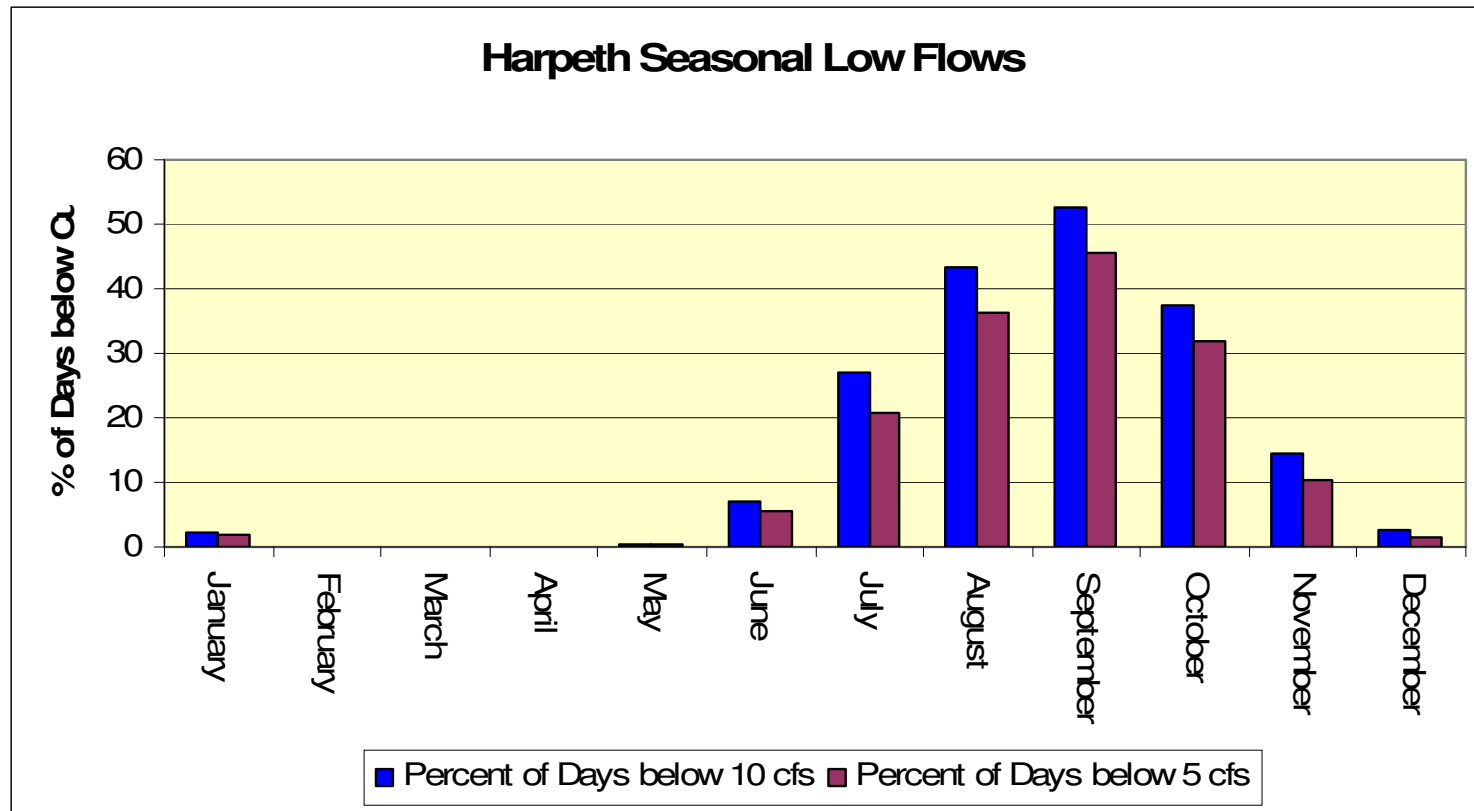
Property and sales taxes provided by downtown enhancements likely are substantial.

Like Columbia's forthcoming Riverwalk and Chattanooga's existing Riverwalk, City of Franklin and citizens are returning to the Harpeth as a valuable aesthetic natural resource.

**Harpeth River Flow Variability Reduces
Supply Reliability of WTP**

% of monthly days below 5 cfs and 10 cfs flows - 30 years.

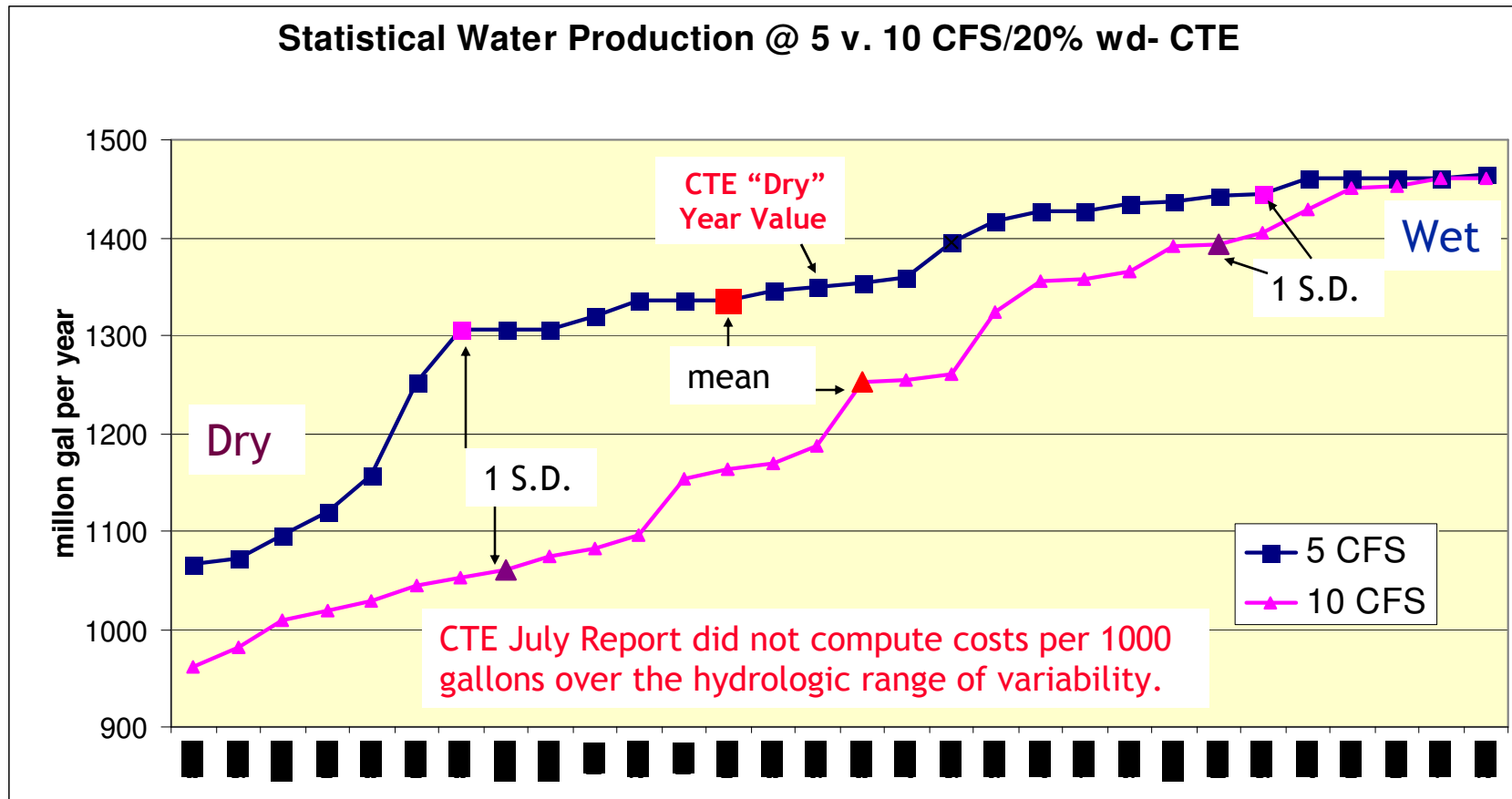
Harpeth River flows reveal significant % of days below both cut off alternatives during the dry months - unreliable seasonal system.



USGS Flow Data, 1975 - 2005

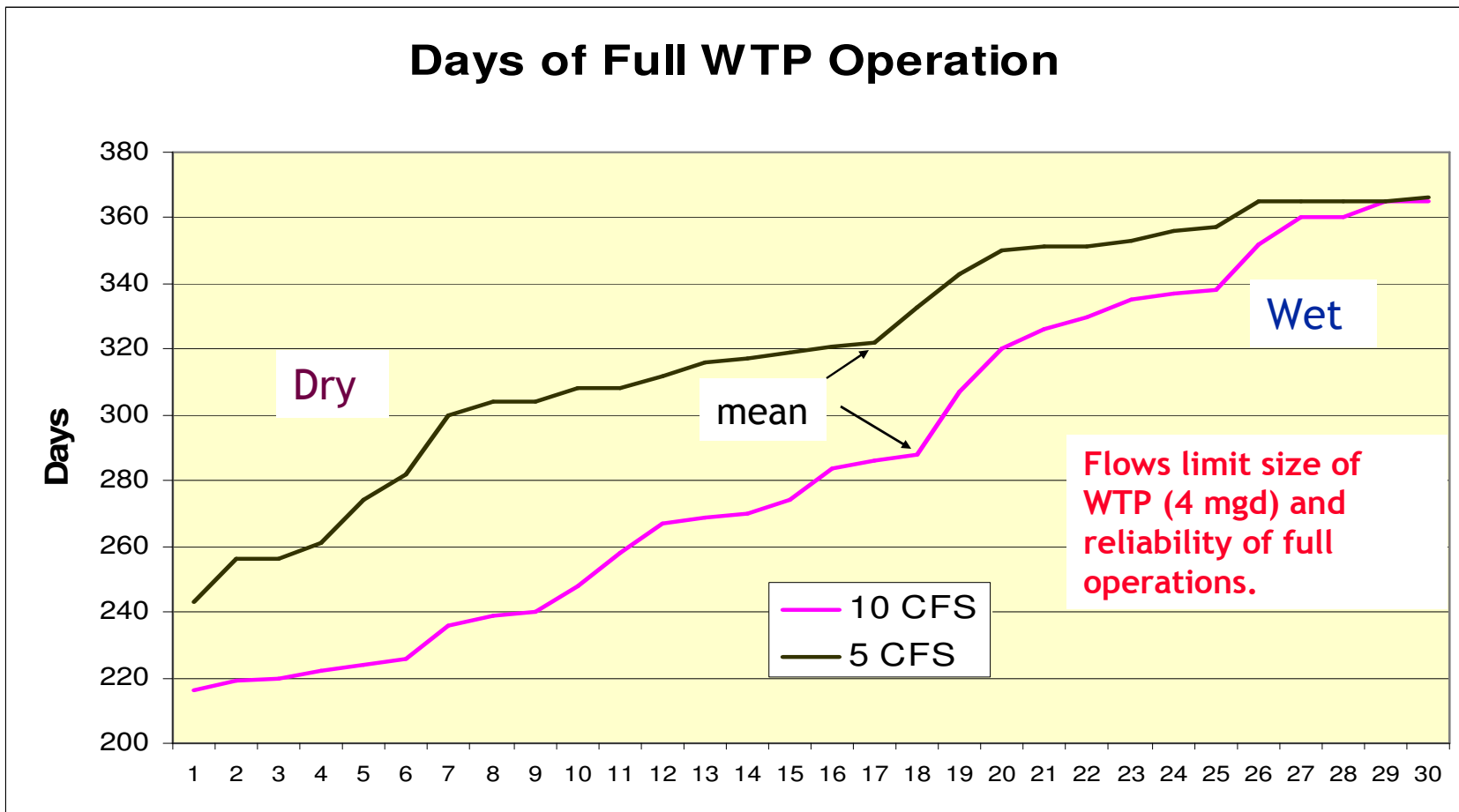
Annual water supplies available from the Harpeth River flow record for the 5 & 10 cfs cut off.

Ignores HVUD contract limits.

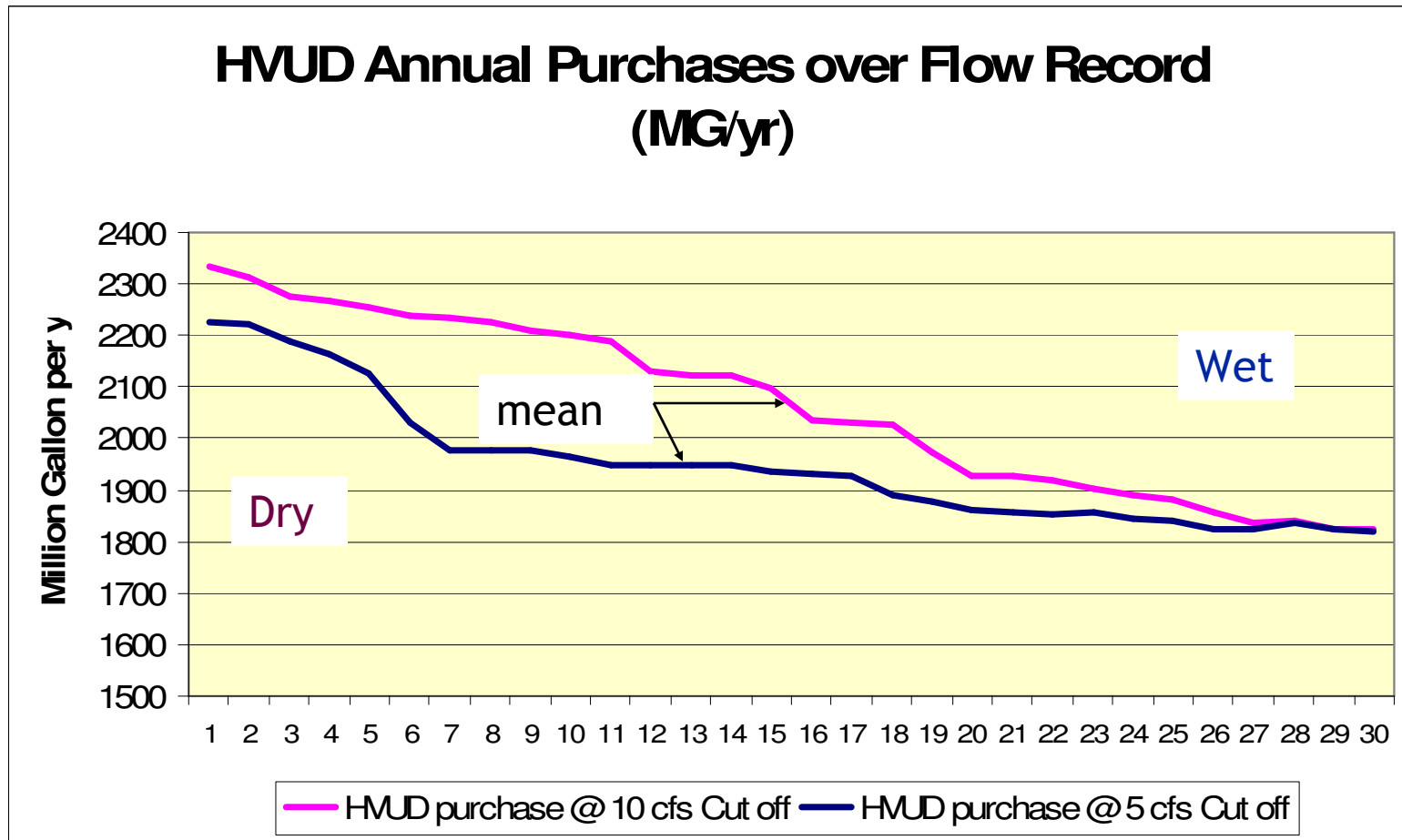


Source: CTE email July 27, 2006 and June Report, Figure 13.

Harpeth flows allow 365 day max WTP operation only 2 - 5 years in 30.
The driest years allow max WTP operation 220 - 260 days.
Mean days of full operation is **286** and **321** days for W/D scenarios.
On average, WTP could operate only 78 - 88 % at full capacity - 4 mgd.

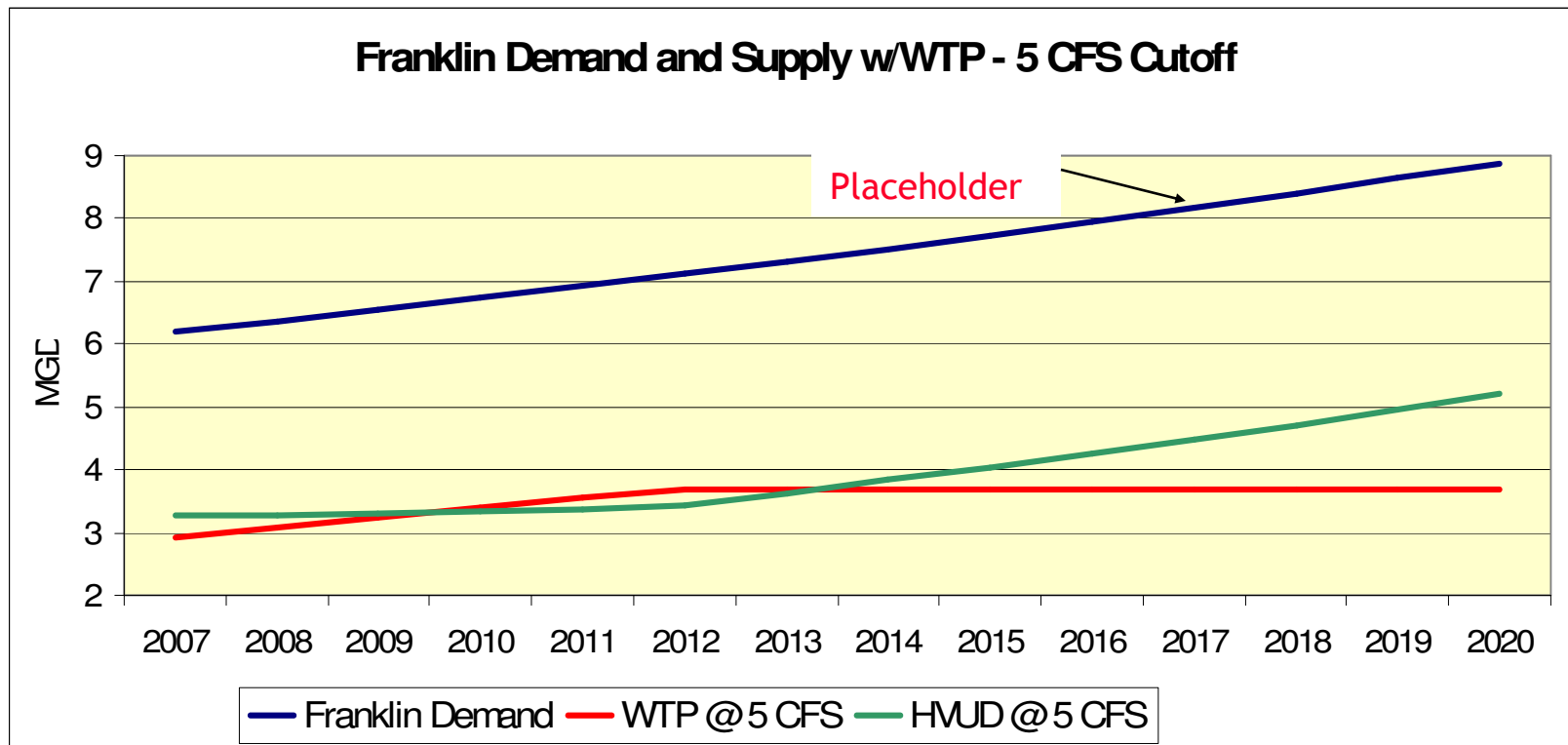


Flow restrictions and lack of reservoir storage require City of Franklin to buy 1,825 - 2,350 mg/yr (5 - 6.4 mgd) against 2020 demand of 9 mgd. Average purchases 5.3 - 5.7 mgd. Lack of demand forecast makes the 9 mgd estimate a placeholder value.



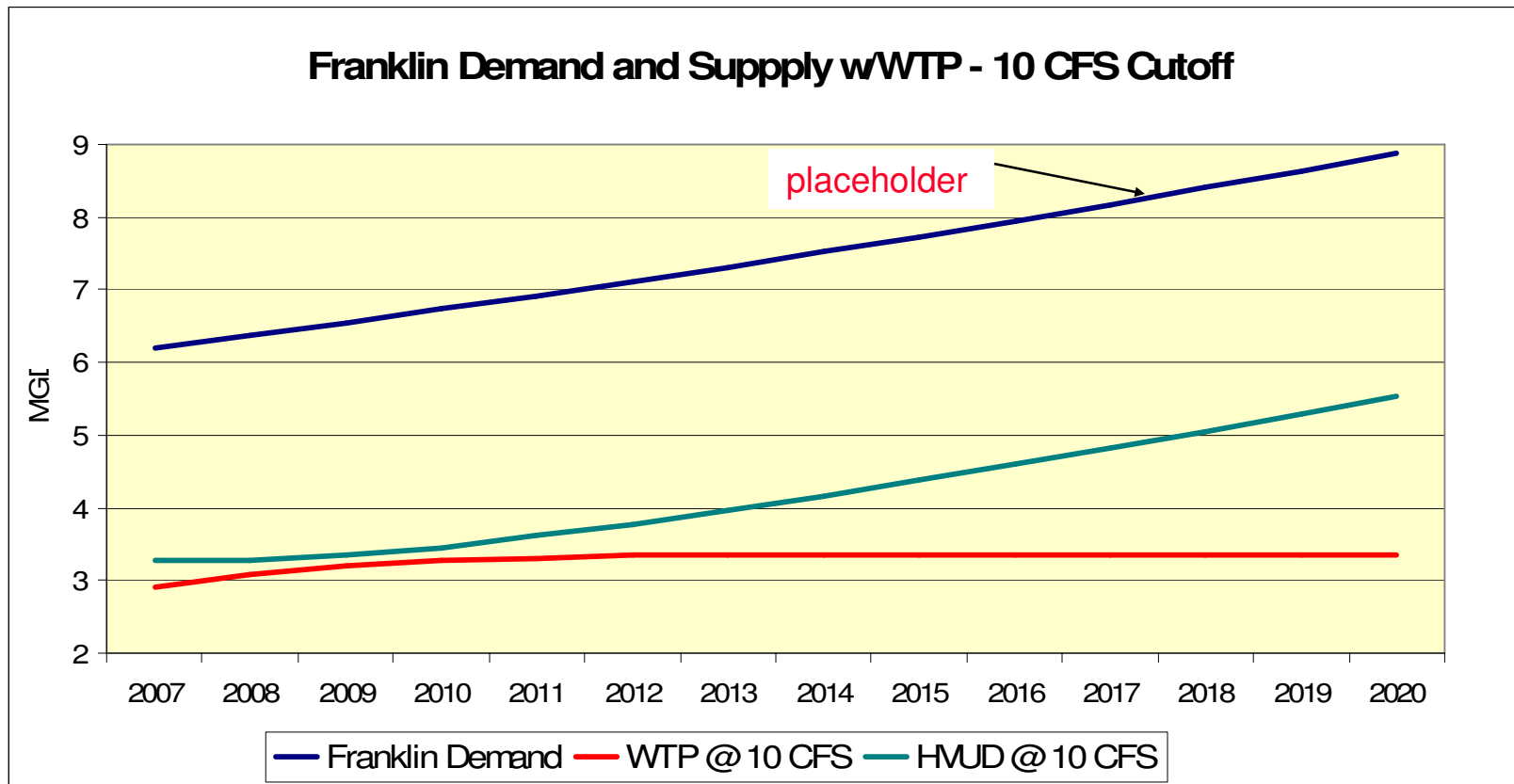
CTE Analysis and ARAP Permit Application
Omitted HVUD 30 Year Contract

HVUD contract caps WTP operations thru 2011.
Harpeth flows limit expected operating capacity to 3.7 mgd average after 2012 - @ 5 cfs cutoff.



**August 5, 1998 30 year contract with HVUD
requires Franklin to buy or pay for
minimum 3.3 mgd.**

HVUD contract caps WTP operations thru 2011.
Harpeth flows limit expected operating capacity to 3.3 mgd average after 2012 - @ 10 cfs cutoff.



August 5, 1998 30 year contract with HVUD requires Franklin to buy or pay for minimum 3.3 mgd.

Summary 1: Project Feasibility Including HVUD Contract Limit 2007 - 2011 Plant Capacity

Economic Comparison of Plant Expansion Alternatives with 5 CFS and 10 CFS Cut offs - 2007				
	4 mgd Alt 2A DAF w/filtration	4 mgd Alt 2B Added Storage	4 mgd Alt 2A DAF w/filtration	4 mgd Alt 2B Added Storage
	5 CFS Cutoff		10 CFS Cutoff	
Expected Cost	\$2.07	\$2.16	\$2.07	\$2.16
Cost of HVUD 2006 Incremental Purchased Water	\$1.76	\$1.76	\$1.76	\$1.76
% 2007 Saving/(Cost)	-15.3%	-18.7%	-15.3%	-18.7%
2007 Savings/(cost) of Expected WTP Water Production	(\$336,611)	(\$428,890)	(\$336,611)	(\$428,890)
HVUD contract limited Water Production WTP	1,063,600	1,063,600	1,063,600	1,063,600

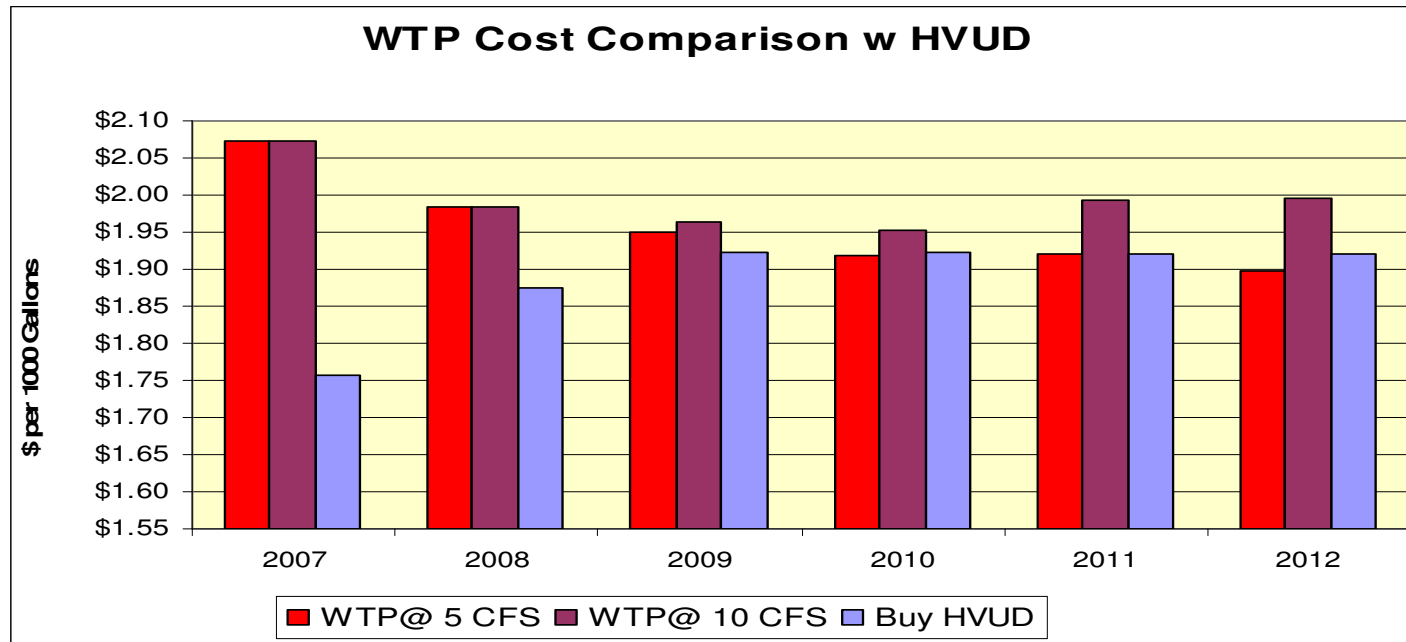
The 2007 cost of project alternatives based on the HVUD contract minimum shown above to correct CTE single year result. Water from DAF plant with 5 or 10 cfs cutoff will be substantially more costly than purchased water.

Plant can operate only at 73% of capacity 2007 due to HVUD contract minimum.

Effect of 5 CFS or 10 CFS cut off is a moot point.

Added storage worsens the economics: "Catch 22."

Summary 2: Effect of Rising Demand on Average Costs



HVUD rates include \$0.05 per 1000 gallons to amortize shutdown cost. HVUD rates based on 2006 Water and Wastewater Rate Studies - Adjusted up 5-8% for lost sales for incremental Franklin water purchases in plant expansion columns, but not adjusted down for HVUD gained sales in shut down column.

WTP costs based on CTE capital and op costs shown on Exhibit D of ARAP and re-analysis by EWE to include effects of HVUD contract limits and Harpeth flow limits.

Summary 3: Present Value of difference in cost of WTP operations v. Shut down and buy HVUD

Present Value 2007 of WTP Water v. Purchased Water @ 5 %				
	4 mgd Alt 2A DAF w/filtration	4 mgd Alt 2B Added Storage	4 mgd Alt 2A DAF w/filtration	4 mgd Alt 2B Added Storage
	5 CFS Cutoff		10 CFS Cutoff	
Total incl inc HVUD costs	(\$459,195)	(\$852,930)	(\$911,631)	(\$1,219,740)
Plant Only	(\$90,025)	(\$488,870)	(\$518,560)	(\$836,117)

Present Value of 2007 - 2012 operations. Neither WTP costs, HVUD rates nor City of Franklin demand are known sufficiently to project further.

Conventional cash flow analysis shows that the project is uneconomic -- correcting CTE's work for unreliable Harpeth flows, HVUD contract caps on plant production, and HVUD rate increases to offset lost sales to City of Franklin with expanded plant.

Significant Bias for the WTP in CTE Economic Analysis

1. HVUD incremental rate - \$1.71, not average rate, \$1.80.
2. HVUD correct average rate - \$1.75, not \$1.80; but moot point.
3. HVUD rate with “lost” sales must increase 5 – 8 percent to replace HVUD lost revenue.
4. Assumed “dry” year production “not” -- actually above Harpeth mean flow.
5. Results displayed in July report and ARAP Exhibit D provide insufficient analysis of effects of flow variability on reliability.
6. Failure to evaluate and compare 5 cfs v. 10 cfs withdrawal limits ignores necessary decision information; but moot point.
7. Failure to evaluate 45 mg added storage at cost of \$1.15 million leads to mistaken economic evaluation of needed storage.
8. **Omission of HVUD contract limits on plant production negates CTE economic findings.**

Instream resource values at stake further enhance the Shut Down Alternative.

CTE scope of work considers only conventional cash flow economics. Instream flow resource benefit values must be included in the analysis.

- Instream benefit values in the Harpeth River at stake should be assessed and included in the decision process.
- Wastewater dilution alone doubtless dominates decision.
- Wastewater dilution is an economic necessity with no apparent substitute.

Regional water supply opportunities exist that substitute for water supplies from Harpeth River and Franklin WTP.

Harpeth water supplies are more variable and uncertain than HVUD supplies. Existing storage provides sufficient back up.

Downstream wastewater effluent dilution requirements might be a valuable asset for City of Franklin to shut down plant and sell 2 mgd to down stream POTW.

- Limited by considerations of riparian water rights.
- Requires legal advice.

Concluding Policy Recommendations

Evaluation of alternatives to meet Franklin's water demand growth is more uncertain and complicated than the rank ordering within CTE Report.

Financial economic differences between the DAF plant project and reliance on HVUD purchases vary with withdrawal limits.

- Shut down is superior to expand the plant under both.

Harpeth dry season flows are so low that Franklin's and TDEC's decision must include instream values at risk; i. e., the cost of externalities due to reduced flows.

Instream flow values lost by withdrawals reinforce conventional cost advantage of HVUD purchases over WTP operation.

- Further resource valuation of instream flows would reveal magnitude of benefit values at risk.
- Changing "**Face**" of **Franklin** emphasizes government tax revenues at risk.

William W. Wade

Water Supply & Demand Policy Background

Dr. Wade specializes in issues related to water policy working with executives, lawyers, engineers and scientists on multi-discipline regulation, litigation, and planning projects. He has 30 years experience managing and conducting financial and economic evaluations of policies and decisions bearing on natural resources and infrastructure. Since 1986 he has conducted dozens of studies on various aspects of water supply problems, including tradeoffs between protection of instream fisheries, habitat and recreation values versus consumptive use and residential reliability values. Dr. Wade has worked on significant water supply policy issues related to conflicts among multiple uses within several watersheds:

Sacramento-San Joaquin Delta, California;

ACT/ACF: GA-FL-AL;

Tennessee Valley

Harpeth River

Duck River

Buffalo River

Piney River

Republican River, Nebraska;

Missouri River, Upper Midwest.

Current work includes state of the art water demand elasticity estimation for large urban water agencies, including the effect of water rates on outdoor water use. Dr. Wade is working on various policy alternatives to assure reliable water supplies for the San Francisco Bay Area. He worked with a team of inside and outside TVA economists throughout much of 2002-2003 on TVA's Reservoir Operations Study, conducting the economic analysis of alternative operations. From 1998 – 2001, he worked on issues related to the ACF/ACT Water Supply disagreement developing NED and RED benefit estimates for Atlanta water supply reliability and Lake Lanier recreation usage. From 1995 to 1999 he led a team of economists forecasting visitation and evaluating amenity mixes to implement the recreation master plan for Diamond Valley Reservoir, Riverside County, California. In California he presented testimony at SWRCB Bay-Delta Hearings on supply shortage costs and before CPUC and CA Legislative Committee on water rates to induce conservation by private water agencies, and presented information on drought impacts to California economy to Associated California Water Agencies Drought Hearings, and other forums. Other water agency clients include: San Francisco Bay Area Water Supply and Conservation Association, TVA, Santa Clara Valley Water District, California Urban Water Agencies, California Water Association, Los Angeles Department of Water and Power, USBR, CDWR, Army Corps of Engineers and Duck River Agency.