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April 21, 2010

John N. Hughes, Esq.
124 W. Todd Street
Frankfort, Kentucky 40601

Mr. Ron Lovan
Northern Kentucky Water District
Post Office Box 18640
Erlanger, Kentucky 41018

Re: Case No. 2010-00038
Case No. 2010-00093

Dear Mr. Hughes and Mr. Lovan:

The enclosed memorandum has been filed in the record of the above-referenced cases. Any comments regarding this memorandum's contents should be submitted to the Commission within five days of receipt of this letter. Any questions regarding this memorandum should be directed to Gerald Wuetcher, Executive Advisor, at (502) 564-3940, Extension 259.

Sincerely,

Jeff Derouen
Executive Director

gw
Enclosure

INTRA-AGENCY MEMORANDUM

KENTUCKY PUBLIC SERVICE COMMISSION

TO: Cases File No. 2010-00038 and No. 2010-00093

FROM: Gerald Wuetcher GEW
Executive Advisor

DATE: April 21, 2010

RE: Telephone Conference Call of April 19, 2010

On April 19, 2010, a conference call was conducted in the above-referenced cases. Participating were:

Jack Bragg	-	Northern Kentucky Water District
Richard Harrison	-	Northern Kentucky Water District
John N. Hughes	-	Northern Kentucky Water District
Barri Joslyn	-	Northern Kentucky Water District
Amy Kramer	-	Northern Kentucky Water District
Ron Lovan	-	Northern Kentucky Water District
Eddie Beavers	-	Commission Staff
Reggie Chaney	-	Commission Staff
Mark Frost	-	Commission Staff
Todd Osterloh	-	Commission Staff
Preston Robards	-	Commission Staff
George Wakim	-	Commission Staff
Gerald Wuetcher	-	Commission Staff

Commission Staff and officials of Northern Kentucky Water District (NKWD) arranged the conference call on April 15, 2010. Prior to the call, Commission Staff submitted a list of questions (Attachment 1) for discussion at the conference. At the start of the conference call, NKWD officials provided a chronology of events (Attachment 2) related to the proposed construction projects for which it seeks certificates of public convenience and necessity.

Beginning the conference, Mr. Osterloh stated that Commission Staff would prepare minutes of the conference for the case records, that a copy of these minutes would be provided to all parties, and that all parties would be given an opportunity to submit written comments upon those minutes.

Mr. Lovan then introduced the members of NKWD staff who were participating in the conference call. He noted that the proposed projects were intended to ensure NKWD's compliance with the Stage 2 Disinfectant and Disinfection Byproducts Rule

and the Long Term 2 Enhanced Surface Water Treatment Rule. He further noted that the planning for compliance had been conducted in conjunction with the development of NKWD's strategic plan and its five-year capital budgets. This planning involved a continuous and constant review of the water utility's needs and objectives and the available means to accomplish those objectives. Mr. Harrison then discussed the chronology of events related to NKWD's compliance strategy

During this discussion, Commission Staff inquired about the bids submitted on both projects. Mr. Lovan, Mr. Harrison, and Ms. Kramer stated that the bids were very favorable to the water district and represented a once-in-a-lifetime opportunity. The bids for the Fort Thomas Water Treatment Plant ("FTTP") were 52 percent below estimated costs. The bids for the Memorial Parkway Treatment Plant ("MPTP") were 48 percent below estimated costs. Mr. Lovan and Ms. Kramer attributed the lower amounts to poor economic conditions, the lack of work in the construction sector in December and the desire of many contractors to accept work at lower cost to continue to employ their work crews. Ms. Kramer further stated that equipment suppliers had also made significant reductions in the cost of equipment. They noted that market conditions are now exerting upward pressure on prices. Market prices for metals are increasing. They have received reports that subcontractors have shown reluctance to further decreases in prices and are pressing for price increases.

Ms. Joslyn, NKWD's Vice-President of Water Quality and Production, discussed the compliance strategies for organics removal that NKWD considered. She noted that a summary of these strategies is found in the 2008 Preliminary Design Report at Table 1-4. She noted that several of the compliance strategies were not effective for use at either at the FTTP or MPTP. Granular Activated Carbon ("GAC") and Membranes were the only treatment methodologies that were considered effective. Ms. Joslyn noted that membrane treatment, while very effective, was three to four times more expensive than GAC treatment and was subject to bacteria buildup. No specific cost estimates were developed for membrane treatment. NKWD instead relied upon industry studies.

Ms. Joslyn noted that a recent article in the Journal of the American Water Works Association (Attachment 3) had declared GAC treatment to be "the most cost effective method available" for compliance. GAC treatment required no additional chemical, would assist in meeting expected new drinking water requirements, addressed taste and odor issues, was simple to use, and its spent media could be reactivated and reused.

As to other strategies that the U.S. Environmental Protection Agency has recommended, Ms. Joslyn stated that moving the point of chlorination was an effective compliance strategy, but noted that NKWD has already taken all available actions to optimize its chlorination efforts. NKWD currently chlorinates in two locations and has reduced its chlorine dosage during warm weather conditions. It experimented with enhanced softening, but found that process, which requires chemicals that increase the

pH of the treated water, would increase THM levels and reduce the effectiveness of its chlorination efforts. Finally, she noted that modifications to pre-sedimentation basin operations had not resulted in sufficient reductions of sedimentation.

Ms. Joslyn then discussed the design of the proposed GAC system. She noted that proposed system will use post-filter contactors. This system will be added on to NKWD's existing treatment process. Water is first treated through NKWD's existing treatment process. It then is run through GAC filters. The filters, which are 12 feet in depth at the FTTP and 10 feet in depth at the MPTP, provide for greater removal of organics than a GAC filter adsorber. Had NKWD used a GAC adsorber system, the existing filter basins at each treatment plant would have been used. Ms. Joslyn noted that these basins would have allowed for only three foot deep filters. She also noted that GAC adsorbers have a greater tendency to collect bacteria than a GAC post-filter contactor system. Ms. Joslyn stated that Division of Water did not express in writing any preference toward a particular system.

Mr. Lovan and Ms. Kramer explained NKWD's approach to compliance. The Board considered three different approaches: minimum, moderate, and aggressive. The minimum approach sought to achieve compliance with Stage 2 Disinfectant/Disinfection Byproduct Rule. It assumed a maximum contaminant level (MCL) equal to the MCL in the Rule and considered an empty bed contact time of 15 minutes as sufficient to achieve this goal. Under this approach, the water district could have some individual sampling events that tested above the Rule's maximum concentration levels for TTHM and HAA5, but still have a local running annual average within those levels. NKWD's Board viewed this approach as having significant risk since any change in sampling results could place the water district in a non-compliance status.

The moderate approach sought to ensure that all individual sampling events were at or below MCL and that local running annual averages were equal to 80 percent of MCL or less. NKWD considered the necessary empty bed contact time for this approach to be 20 minutes. This approach would allow NKWD maintain compliance even if an unexpected sampling result occurred.

The aggressive approach sought to achieve levels so that all individual sampling events were at or below MCL and local running annual averages were equal to 60 percent of MCL or less. NKWD considered the necessary empty bed contact time for this approach to be 25 minutes. This approach allowed for compliance with existing requirements and to meet some anticipated future requirements without additional efforts.

The estimated costs of these compliance approaches were: Minimum approach - $23 million; Moderate approach - $28 million; and Maximum approach - $35 million. The difference in cost stems from the size of the facilities necessary to ensure the

required contact time. A larger number of contactors and a larger building to house those contactors is necessary to ensure a longer contact times.

Mr. Lovan noted that in selecting the moderate approach, NKWD considered GAC's ability to address pharmaceutical contaminants. He noted that the water industry considers the likelihood of additional requirements to remove pharmaceuticals from water as very high. GAC allows NKWD to comply with such requirements.

Ms. Kramer also noted the problems associated with the configuration and lack of available space at both plants. The plants' limited footprint will prevent additional modifications after the proposed modification. Simply put, NKWD had to plan and implement all modifications at once. It would not be able to make further modifications in the future. The moderate approach better addressed this issue.

Mr. Harrison also noted that the moderate approach allowed easier compliance for wholesale water operations. It avoided excessive use of chlorine and increased levels of disinfection byproducts that would have prevented NKWD's delivery of water to wholesale customers and those customers' subsequent resale within acceptable levels.

Ms. Joslyn noted that NKWD is currently experiencing greater difficulty meeting MCL levels. Sampling at the worst locations within its water system in 2009, as present water quality regulations require, indicated that NKWD exceeded MCL levels. (Following the conference call, NKWD provided its compliance results for 2009. See Attachment 4.)

Ms. Kramer discussed NKWD's plans to expand the MPTP's treatment capacity. She noted that NKWD plans to make the expansion in phases. Various components of the plant, to include its raw water intake, will be replaced or upgraded during the next 18 years to permit the plant to operate at a capacity of 20 million gallons per day (MGD). Ms. Kramer noted that the proposed ultraviolet (UV) disinfection facilities are being built for 20 MGD capacity, despite the plant's current capacity of 10 MGD, because the cost of adding an additional 10 MGD of UV capacity at a later date would be much greater than constructing a 20 MGD facility now. Mr. Harrison noted that the proposed facilities are necessary even if the MPTP is not expanded in the near future. The water district expects to need the expanded plant capacity at some point in the future.

Ms. Joslyn answered questions regarding the need for proposed UV disinfection facilities at FTTP and MPTP. She noted that *Cryptosporidium* had been detected in the Ohio River. Even at low levels, *Cryptosporidium* is capable of causing serious infection. She further noted that raw sewage bypasses have increased in frequency and severity in recent years. Sewage treatment facilities are located above NKWD's water intakes on the Ohio River and increase the risk of *Cryptosporidium* contamination. Runoff from non-point sources also increases this risk. Currently, NKWD has only one barrier to

micro-biological contamination — chlorine disinfection. She noted that GAC technology has shown an ability to store micro-biological contaminants.

Ms. Joslyn noted that the addition of UV disinfection presents several advantages. It is very effective against *Cryptosporidium,* does not produce any disinfection byproducts, and is effective against several micro-biological contaminants in addition to *Cryptosporidium*. She also that UV disinfection has a low capital cost and low operational cost.

Ms. Joslyn noted that there has been no change in regulatory requirements since the issuance of the Preliminary Design Report that would require the use of UV disinfection. While conceding that NKWD had not conducted any cost-benefit analysis regarding the addition of the UV process, she noted that the cost of the proposed systems at FTTP and MPTP compared very favorably to the cost of the UV system that NKWD installed at the Taylor Mill Water Treatment Plant in 2007. She noted that the cost of the respective UV systems represents less than five percent of the total cost of the MPTP improvements and approximately three percent of the total cost of the FTTP improvements.

Ms. Joslyn stated that the addition of the UV disinfection systems provided significant public health benefits. She noted that NKWD's is currently at risk for *Cryptosporidium*. Moreover, UV presents an additional backup in the event that NKWD experiences problems with its filters.

Ms. Joslyn noted that GAC technology does not provide an effective barrier against *Cryptosporidium.* It is effective against organic matter, but not against micro-biological contaminants. She also noted that UV is not very effective in disinfecting high turbidity water.

Ms. Kramer and Mr. Harrison stated that NKWD briefly considered treating the two proposed projects as a single project for bidding purposes, but determined that approach was not in the water district's best interests. They noted that requesting separate bids on each project encouraged competition among construction firms. Combining the projects as a single project would have increased the size of the required construction bond and thus lessen the number of construction firms financially capable of submitting bids. By staggering the submission time for potential bidders, it allowed firms additional time to closely evaluate the bid specifications of each project and to identify and eliminate unknowns or uncertainties regarding the project. By eliminating these uncertainties, the bidding firms reduced the potential risks associated with their bid and were able to reduce the amount of their bid.

Ms. Kramer also noted that bidding both projects as one project would have increased NKWD's risk. Unforeseen problems or delays experienced by the successor bidder would place completion of the required work at both water treatment plants at

risk. By bidding the projects separately, NKWD reduced the risk that a problem experienced by one successful contractor would affect the completion schedule of renovations at both plants.

Ms. Kramer conceded that bidding both projects as one project would have produced some efficiencies, primarily in construction administration and management. She further noted that, as the construction is not being performed at one work site, many of efficiencies that might be associated with combining two projects would not occur.

Prior to adjourning, the participants discussed NKWD's delivery of requested documents to Commission Staff and NKWD's timing requirements. It was agreed that NKWD would provide all documents by electronic mail and that these documents would be attached to the minutes of the conference call. NKWD representatives advised that, to ensure adequate time to issue a notice of award to the successful bidders, NKWD must have notice of the Commission's decision in both proceedings no later than 3:00 p.m. on April 21, 2010. (NKWD subsequently advised Commission Staff notice of the Commission's decision was required no later than 1:00 p.m.) NKWD representatives advised that the successful bidder on the MPTP project had informally agreed to a short extension of its bid but that further extensions were not likely. Failure to issue a decision on the applications by April 21, 2010 would likely require the projects to be rebidded and result in higher bids.

The conference then adjourned.

cc: Parties of Record

Attachments:
1 - Questions Submitted By Commission Staff
2 - History of Activities in Chronological Order
3 - Journal AWWA Article
4 - Letter of 4/19/2010
5 - TTHM Sampling Data
6 - Minutes of NKWD Board Meetings

ATTACHMENT 1

Questions for Northern Kentucky Water District related to its request for certificates of public convenience and necessity.

1. Identify all compliance strategies that NKWD considered. State the expected cost of each strategy and why the strategy was not selected. Identify the advantages and disadvantages of each strategy.

2. State whether the following options were considered to be implemented to address compliance with the EPA's Stage 2 D/DBP Rule.
   a. Microfiltration
   b. Nanofiltration
   c. Moving the point of chlorination
   d. Reducing chlorine dose under warm weather conditions
   e. Enhanced Softening
   f. Modifying Pre-sedimentation Basin Operations

3. For each of the options listed in the question above,
   a. if the option was considered, provide a detailed description of why the treatment type was rejected.
   b. if the option was not considered, explain the disadvantages the would not make the option a more reasonable solution to ensure NKWD's regulatory compliance.

4. On page 9 of Appendix B of the Preliminary Design of GAC Systems Report (March 2008), it states, "In determining whether GAC filter adsorbers or post-filter contactors would be more appropriate for the NKWD treatment plants, a variety of factors must be considered; especially the limitations associated with filter adsorbers and the chlorination preferences of the Kentucky Division of Water." Provide any correspondence between the Division of Water and NKWD or other materials that evidences the "preferences" of the Division of Water with respect to GAC filter adsorbers.

5. Provide all minutes of the Board of Directors' meetings at which the proposed project was discussed.

6. Provide all reports and other documents that were presented to NKWD Board of Directors, in order to advise the Board of options to comply with the D/DBP Rule.

7. Provide a detailed explanation of why NKWD adopted a moderate approach strategy to address future water quality goals, as opposed to a minimum or aggressive approach.

8. Explain whether any of the options (other than GAC post-filter adsorption) would satisfy the minimum approach to addressing future water quality goals.

9. On pages 2-3 and 2-11 of the Basis of Design Report (January 2009), it states that "Based on conservative assumptions for the distribution system (water age) and treatment (pH, chlorine residual concentration and water temperature), the PD Report, March 2008 predicted TTHM formation would occur at a concentration of 0.064 mg/L if the target GAC effluent TOC concentration is 1.25 mg/L."

a. Identify what conservative assumptions were used and why those assumptions were used.

b. Explain how 1.25 mg/L was established as the target GAC effluent TOC concentration.

10. Explain how the sizing of the planned GAC contactors was determined and how that size will help achieve regulatory compliance.

11. Describe the plans to expand the Memorial Parkway Treatment Plant ("MPTP") capacity and the current status of these plans.

12. Explain the effect on compliance strategies if scheduled treatment capacity expansion at MPTP does not occur.

13. Page 1-4 of the Basis of Design Report (January 2009) states that NKWD is proposing to have 5 fully functional GAC contactor beds and 1 empty bed for future expansion at the MPTP. If the MPTP capacity is currently set at 10 MGD and can be upgraded 100% to 20 MGD, explain why one additional bed (an upgrade of 20% over the other 5 beds) would be sufficient to handle the additional capacity.

14. At Section 1.5 of the Preliminary Design Study, the authors state: "Current knowledge of NKWD water quality indicates that *Cryptosporidium* detections are low and that additional treatment is not likely to be required. However in the event that regulatory requirements or source water quality characteristics change, or it the District desires to add an additional microbial barrier to the WTP process, UV disinfection is a cost-effective treatment alternative approved for *Cryptosporidium* removal/interaction by LT2ESWTR."

a. Given that *Cryptosporidium* detections are low and that additional treatment is not likely to be required, state why NKWD is requesting the addition of a UV facility to the proposed construction.

b. Identify the regulatory requirements that have changed since March 2008.

c. Identify the source water quality characteristics that have changed since March 2008.

d. Identify all cost benefits of including the UV disinfection facilities in the present project, as opposed to adding the facilities at a future date.

15. At Section 3.1.2 of Basis of Design Report, authors state that "[a]lthough *Cryptosporidiurn* sampling of the NKWD source waters does not indicate a regulatory need to provide UV disinfection, the NKWD has identified the water quality improvement and public health benefit of UV disinfection as meriting the inclusion of UV facilities in the project."

a. What are the water quality improvement benefits of UV disinfection?

b. What are the public health benefits of UV disinfection?

c. Describe how NKWD quantified these benefits to determine that they exceeded construction and operation cost of UV facilities. Provide the calculations and all analyses performed.

16. At Section 5.1.6.1 of Basis of Design Report, the authors state that GAC adsorption is "an effective barrier for taste and odor control and for most emerging contaminants." They further note that "NKWD has sampled for NDMA on a few occasions, and NDMA has not been detected in the raw water." In light of the low level of *Cryptosporidium* detections and the effectiveness of GAC adsorption, why is UV disinfection necessary?

17. Explain why the two projects for which certificates are requested were not grouped together in the contractor bidding process.

18. Explain whether total cost for the projects could have been reduced if the projects were submitted for bids in tandem.

19. Paragraph 7 of the application in Case No. 2010-00093 states, "The total financing for which approval is sought is approximately $30,000,000." Paragraph 5 states that NKWD will finance this project through bond anticipation notes for which Commission approval may not be needed under KRS 278.300(8). Confirm whether or not NKWD is seeking Commission approval for financing in this case.

ATTACHMENT 2

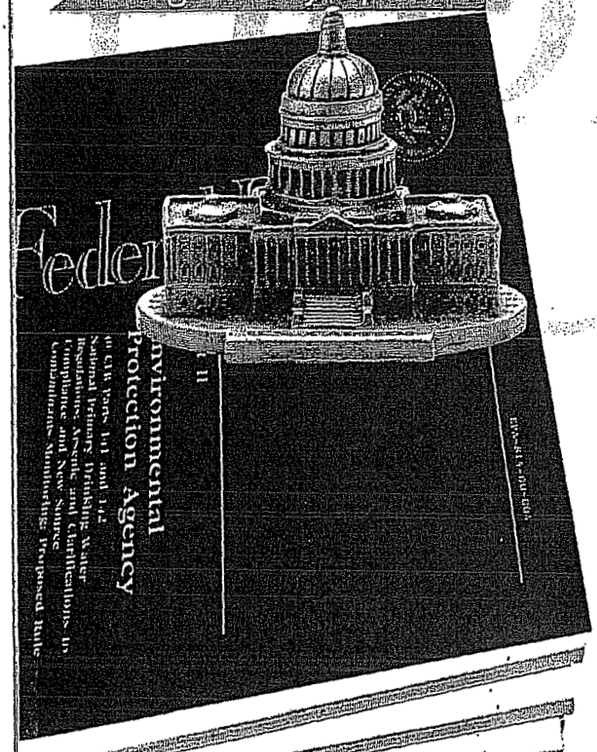
History of Activities in Chronological Order - Advanced Treatment
Public Service Commission Informal Conference
April 19, 2010

Date	Description
1992 - 1995	Preliminary GAC studies
Dec 15, 1998	2012 Regulatory Compliance – Board Presentation
2000 - 2007	Evaluations or Pilot Studies on 8 Treatment Options
May 2002	DOW visits UV pilot at TMTP
Aug 18, 2005	2012 Regulatory Compliance – Board Presentation
Feb 16, 2006	2012 Regulatory Compliance – Board Presentation
June 2006	TMTP UV Design Memo (Case # 2007-00052)
Aug 17, 2006	2012 Regulatory Compliance – Board Presentation
Oct 19, 2006	Board approves 07-11 cap budget including AT projects
Sep 20, 2007	2012 Regulatory Compliance – Board Presentation
Oct 18, 2007	Board approves 08-12 cap budget including AT projects
June 25, 2008	PSC Informal Teleconference – Eng Design for AT
July 31, 2008	Eng Design for AT – Board Presentation/Approved
Oct 16, 2008	Board approves 09-13 cap budget including AT projects
July 13, 2009	Applied for SRF Loan (UV key component)
Sep 3, 2009	PSC Presentation – Future Rates including AT Projects
Sep 3, 2009	Submitted FTTP and MPTP AT Project Designs to DOW
Sep 30, 2009	DOW approved AT preliminary design report
Oct 6, 2009	DOW Approved MPTP AT Project
Oct 15, 2009	Board approves 10-14 cap budget including AT projects
Nov 10, 2009	DOW Approved FTTP AT Project
Dec 6, 2009	KIA Approved 2% SRF Loan for $8 M
Dec 16, 2009	MPTP AT Bids Opened (48% under engineer's estimate)
Jan 14, 2010	NKWD Tour – Presentation to PSC Commissioners/Staff
Jan 20, 2010	MPTP AT Bids – Board Presentation/Approved
Jan 21, 2010	FTTP AT Bids Opened (52% under engineer's estimate)
Jan 28, 2010	MPTP AT Certificate Initially Filed
Feb 19, 2010	FTTP AT Bids – Board Presentation/Approved
Feb 24, 2010	KIA Commitment Letter for SRF Loan Filed to PSC
Feb 24, 2010	PSC accepted MPTP AT Certificate as Filed
Feb 26, 2010	FTTP AT Certificate Initially Filed
Mar 8, 2010	PSC accepted FTTP AT Certificate as Filed
Mar 18, 2010	Sent PSC letter for expedited review of MPTP Certificate
Apr 14, 2010	PSC first contact with NKWD with any concerns
Apr 15, 2010	Phone conversation between PSC and NKWD staff
Apr 16, 2010	PSC sent list of 19 informal questions
Apr 16, 2010	Last day for PSC to approve MPTP before bids expire
Apr 18, 2010	MPTP AT Bids Expire per contract
Apr 19, 2010	Informal Conference Call – 19 questions
Apr 21, 2010	Anticipated PSC order for MPTP Certificate
Apr 21, 2010	Anticipated PSC order for FTTP Certificate
Apr 21, 2010	FTTP AT Bids Expire
Apr 21, 2010	Issue Notice of Award for MPTP and FTTP AT Projects
May 21, 2010	Issue Notice to Proceed MPTP and FTTP AT Projects
June 1, 2010	Contractor anticipated to begin construction
Apr 1, 2012	New regulations in place
May 21, 2012	Project substantial completion date

Acronym list

UV – Ultra Violet
GAC – Granular Activated Carbon
FTTP – Fort Thomas Treatment Plant
TMTP – Taylor Mill Treatment Plant
MPTP – Memorial Parkway Treatment Plant
AT – Advanced Treatment
SRF – State Revolving Fund
DOW – Division of Water
PSC – Public Service Commission
NKWD – Northern Kentucky Water District
Board – Northern Kentucky Water District Board of Commissioners
KIA – Kentucky Infrastructure Authority

ATTACHMENT 3



DBPR USEPA

ALAN J. ROY

Treatment alternatives for compliance with the Stage 2 D/DBPR: An economic update

TO HELP UTILITIES PREPARE FOR COMPLIANCE WITH STAGE 2 OF THE DISINFECTANTS/DISINFECTION BYPRODUCTS RULE, THIS ARTICLE UPDATES THE DECEMBER 2005 REPORT FROM THE US ENVIRONMENTAL PROTECTION AGENCY ON DISINFECTION BY-PRODUCT CONTROL TECHNOLOGIES AND THEIR ASSOCIATED COSTS.

Chlorine disinfection is a long-used and highly effective means of preventing waterborne disease. However, chlorine reactions with natural organic matter (NOM) have created by-products, namely trihalomethanes (THMs) and haloacetic acids (HAAs), that also pose health risks. The US Environmental Protection Agency (USEPA) has implemented water quality standards to address these problems and to ensure the safety of the nation's drinking water.

Water utilities across the United States will soon face difficult choices as they formulate plans to comply with the requirements of the Stage 2 Disinfectants/Disinfection Byproducts Rule (D/DBPR) while working to continue controlling capital and operating costs. In December 2005 USEPA published a report on the technologies that can be used to control DBPs and their associated costs (USEPA, 2005). Since that time, a number of technologies have emerged as popular choices to achieve the Stage 2 treatment requirements. The costs associated with these technologies must also undergo significant adjustment in order to reflect current economic conditions and supply costs.

Although removal of DBPs from treated water may be economically feasible in some cases, in others prevention of DBP formation by changing the disinfectant or removing NOM would be more cost-effective. The use of alternative disinfectants is often considered an easily implemented and inexpensive means of reducing THMs and HAAs. There are, however, additional concerns with the use of alternative disinfectants, primarily the creation of other by-products that may pose their own health risks and ultimately prove to exhibit greater toxicity than THMs and HAAs—the "traditional" DBPs. A combina-

TABLE 1 Capital cost comparisons—2005 and 2009

	Capacity Cost—$					
	1 mgd		17 mgd		76 mgd	
Treatment Technology	2005	2009	2005	2009	2005	2009
Alternate disinfectants						
Chloramine	53,396	62,608	98,772	113,899	397,173	451,036
Chlorine dioxide	40,035	47,531	268,223	302,344	603,425	683,678
UV disinfection	317,091	359,359	1,418,926	1,625,710	3,569,168	4,078,398
Ozone	804,614	974,973	3,946,957	4,865,079	12,628,950	15,996,225
Organic removal technologies						
Granular activated carbon (annual exchange)	783,808	863,696	6,140,593	6,902,107	18,311,317	20,481,136
Nanofiltration	912,423	1,057,344	15,546,118	17,948,220	57,558,238	67,328,295
Microfiltration/ultrafiltration	1,594,911	1,786,445	15,991,348	17,940,217	61,150,358	69,100,740

TABLE 2 Operations and maintenance cost comparisons—2005 and 2009

	Capacity Cost—$					
	1 mgd		17 mgd		76 mgd	
Treatment Technology	2005	2009	2005	2009	2005	2009
Alternate disinfectants						
Chloramine	4,443	4,861	11,333	13,528	31,538	41,078
Chlorine dioxide	18,571	21,217	35,939	41,818	87,061	102,220
UV disinfection	9,016	10,855	22,908	26,871	66,755	78,023
Ozone	76,470	91,862	455,559	652,134	1,974,401	2,906,241
Organic removal technologies						
Granular activated carbon (annual exchange)	57,078	61,531	227,710	251,037	709,287	777,712
Nanofiltration	112,309	133,392	1,780,761	2,161,229	7,914,024	9,684,873
Microfiltration/ultrafiltration	69,214	78,573	786,427	902,132	3,301,730	3,800,074

TABLE 3 Annual costs (based on a 10-year life cycle)—2005 and 2009

	Capacity Cost—$					
	1 mgd		17 mgd		76 mgd	
Treatment Technology*	2005	2009	2005	2009	2005	2009
Alternate disinfectants						
Chloramine	9,800	11,122	21,210	24,918	70,800	86,182
Chlorine dioxide	22,600	25,970	62,700	72,052	147,300	170,588
UV disinfection	40,200	46,791	164,800	189,442	423,700	485,863
Ozone	156,900	189,359	850,300	1,138,642	3,237,000	4,505,864
Organic removal technologies						
Granular activated carbon (annual exchange)†	135,500	147,900	841,100	941,248	2,539,000	2,825,826
Nanofiltration	203,000	239,126	3,326,000	3,956,051	13,660,000	16,417,703
Microfiltration/ultrafiltration	228,700	257,218	2,385,000	2,696,154	9,420,000	10,710,148

*Additional details regarding each treatment technology are available from the author upon request.
†Recent developments regarding the custom reactivation of activated carbon would result in decreases of approximately 20% in the operations and maintenance costs for that technology versus what is shown in Tables 2 and 3 for 2009.

Nanofiltration and reverse osmosis. These higher-pressure membrane processes are well known for the extremely high purity they are capable of producing. Operating at 90 psi, nanofiltration has a nominal pore size of 0.001 µm.

Advantages. Effective for water softening; effective for microbe removal; shown to achieve 50–90% removal of total organic carbon, depending on its molecular size, shape, chemical characteristics, and ionic character.

Disadvantages. Very expensive technology; prone to fouling in surface water treatment; no more effective for microbe removal than ultrafiltration; adsorption of organics by the membrane can be irreversible and decrease membrane life; significant wastewater volume to be treated.

Enhanced oxidation. Using UV light in combination with hydrogen peroxide or ozone, this technology serves to destroy much of the NOM by breaking chemical bonds between the

TABLE 5 2009 economic update

Product/Service	Commodity Code	February 2005 Index	February 2009 Index	Increase—%
Accommodations	721	129.1	139.7	8.2
Aluminum compounds	0613-0209	108.8	150.5	38.3
Building Cost Index (NAICS 235221)	N/A	100 (December 2004)	130.7 (January 2009)	30.7
Building Cost Index (Turner)	N/A	655	866	32.2
Capital equipment	N/A	143.9	157.4	9.4
Chemical and allied products	06	186.4	228.4	22.5
Chlorine, sodium hydroxide, and other alkali	0613-0302	100 (June 2005)	205.6	105.6
Concrete ingredients and related products	132	180.4	236.2	30.9
Electric machinery and equipment	117	113.4	113.8	0.4
Employee compensation per hour (private industry)	N/A	$24.17 (Q1, 2005)	$27.35 (Q4, 2008)	13.1
Engineering and scientific instruments	1185	177.8	193.1	8.6
Engineering services	54133	103.0	114.4	11.1
Environmental controls	1181	149.1	159.7	7.1
General purpose machinery and equipment	114	165.9	199.7	20.4
Heavy equipment leasing	532412	104.5	117.3	12.2
Industrial chemicals	061	179.2	226.2	26.2
Industrial commodities	N/A	153.6	170.9	11.3
Industrial electric power	0543	148.0	189.7	28.2
Industrial natural gas	0553	211.9	235.3	11.0
Inorganic acids	0613-0224	79.7	155.5 (November 2008)	95.1
Integrating and measuring instruments	1172	148.1	156.4	5.6
Legal services	5411	137.1	164.6	20.0
Lime	0613-0213	140.2	219.6	56.7
Medical and diagnostic laboratories	6215	104.2	108.3	3.9
Metal and metal products (iron and steel)	101	179.8	183.0	2.8
Metal valves (except fluid power)	1149-02	186.9	245.4	31.3
Miscellaneous general purpose equipment	1149	183.7	226.4	23.2
Natural sodium carbonate and sulfate	0613-0301	99.8 (March 2005)	174.7	75.0
No. 2 diesel fuel	0573-03	149.5	145.6	–2.6
Potassium and sodium compounds (except bleaches)	0613-0217	105.6	289.1	173.8
Process control instruments	1182	162.2	196.4	21.1
Pumps, compressors, and equipment	1141	175.4	212.8	21.3
Sodium hydroxide	0613-0108	145.9	N/A	N/A
Steel pipe and tube	1017-06	193.8	206.6	5.0
Sulfuric acid	0613-0232	166.7	254.8 (November 2008)	52.8
Synthetic ammonia	0652-0135	123.2	181.3	47.2
Transformers and power regulators	1174	145.2	205.9	41.8
Water treatment compounds	325998-A	152.1	182.8	20.1
Water treatment compounds	0679-0961	168.4	181.9	8.0

N/A—not applicable, Q—quarter

concentrationss can produce higher brominated DBPs; adds inorganics (manganese, aluminum, sulfate, chloride, and sodium) to the water supply; may increase floc fragility.

TREATMENT SYNERGIES ARE POSSIBLE

The effectiveness of most of the treatment technologies will be limited in some regard because of the diverse nature of NOM. Combinations of treatment technologies may prove to offer significant advantages in terms of cost-effective achievement of treatment goals. For example, combining the two technologies currently designated as BAT (USEPA, 2001) may provide a significant benefit over their individual performance.

Activated carbon adsorption is most effective for the portion of NOM composed of smaller-size organic compounds without charged functional groups (DeSilva, 2000). Conversely, enhanced coagulation is generally considered to be most effective for the portion of NOM composed of large organic molecules with negatively charged functional groups (Uyak, 2007). By using a combination of technologies, the percentage reduction of DBP precursor compounds can be increased and possibly maintained for a longer duration. Combining treatment technologies with an alternative disinfectant may be a course of action worth considering for many source water applications.

CAPITAL AND OPERATING COSTS ARE CRITICAL CONSIDERATIONS

In uncertain economic times, capital and operating costs are vital considerations in the selection of best available control technologies. Although the specific capital costs for different technologies can differ greatly, general estimates have been used to account for project costs aside from the direct costs of the capital equipment. The past few years have seen significant cost increases, particularly for commodity chemicals. Rapid international growth along with production capacity limitations have resulted in significant cost increases for most water treatment chemicals. Rising fuel and energy prices have added to chemical costs as well as transportation costs. Steel and other building materials costs have also risen during this period.

In December 2005, USEPA published cost estimates (along with their component cost elements) for many of the treatment technologies that can be used to assess the cost of compliance with the Stage 2 D/DBPR (USEPA, 2001). These estimates, which include both capital and operating costs, are summarized in Tables 1 and 2, respectively; each table has been updated to also provide 2009 costs for each parameter. A simple 10-year life cycle cost analysis for 2005 (and updated here for 2009) is given in Table 3. USEPA's 2005 cost elements are listed in Table 4.

Using the cost escalations of the matching elements contained in the 2005 USEPA publication, a revised set of projected capital and operating costs for the respective technologies was generated. As the 2009 data in Tables 1–3 show, taken as a whole these price differences do not change the comparative economics of the respective technologies.

Capital costs include major equipment cost, pilot-testing, permitting, land cost, operator training, housing, pipes and valves, instrumentation and control, chemical addition systems, and on-line analyzers. As the major equipment is priced, general additions are included for initial budgeting. Typically, the following can be assumed:

- add 20% for site work and installation,
- add 10% for electrical and instrumentation and control (more if full automation is needed),
- add 20% for engineering and administration, and
- add 20% for contingencies.

Initial operations and maintenance costs (labor, power, maintenance materials, performance monitoring, media replacement, chemicals) can be estimated by using the estimates for annual chemical costs and power costs for major equipment and by adding 3% of capital cost for annual materials, labor, and maintenance.

Over the past few years, there have been several changes in costs for both products and services. Calculated from US Bureau of Labor Statistics data, values for products, services, and cost indexes for both 2005 and 2009 are shown in Table 5.

In the nearly five-year period since the initial development of USEPA's cost estimates, some capital and operating costs have changed significantly. The largest price increases

TABLE 7 Operations and maintenance cost factors and cost escalators

Cost Factor (Operations & Maintenance)	Escalator (Commodity Code)
Chemicals (activated carbon)	Vendor quote
Chemicals (antiscale)	Water treatment compounds (0679-0961)
Chemicals (chloramine)	Synthetic ammonia (0652-0135) + chlorine (0613-0302)
Chemicals (ClO_2)	Chlorine (0613-0302)
Electricity	Industrial electric power (0543)
Labor	Employee compensation per hour (private industry)
Maintenance materials	Miscellaneous general purpose equipment (1149)
Parts	Miscellaneous general purpose equipment (1149)
Performance monitoring	Medical and diagnostic laboratory (6215)
Tank lease	Heavy equipment lease (532412)

ATTACHMENT 4

Northern Kentucky
Water District

April 19, 2010

Jeff Derouen
Executive Director
Public Service Commission
211 Sower Blvd.
Frankfort, KY40601

Re: Northern Kentucky Water District
Case No. 2010-0038 & Case No. 2010-0093

Dear Mr. Derouen:

As a result of the conference call of April 19th, 2010, the Northern Kentucky Water District (NKWD) has been asked by the Commission Staff to provide the following additional information; NKWD Board minutes and associated presentations that are pertinent, and results for TTHM readings as requested.

In today's Conference call NKWD staff requested that the Kentucky Public Service Commission issue an Order for a Certificate for both referenced cases before 3:00 p.m. on Wednesday, April 21, 2010 to ensure time for the NKWD to issue the required "Notice of Award". Staff has since determined that Certificates are needed by 1:00 p.m. on Wednesday, April 21, 2010 to avoid any potential problems in issuing notice of award in a timely manner.

Thank you for your consideration in this extremely time sensitive matter.

Very truly yours,

Richard Harrison, P.E.
Vice President of Engineering
Northern Kentucky Water District

Cc: Jack Hughes

ATTACHMENT 5

2012 Compliance Estimate using 2009 TTHM Data

(Locational Running Average greater than the MCL of 80 ug/L)

Locational Sample Name	Running Avg. Result	Units
IDSE 2	99.398	ug/L
IDSE 3	141.31	ug/L
ISDE 9	112.22	ug/L
IDSE 13	116.10	ug/L
T 01	86.40	ug/L
T 38	83.80	ug/L
T44	128.71	ug/L

ATTACHMENT 6

Northern Kentucky Water District
Board of Commissioners Meeting
August 18, 2005

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on August 18, 2005 at the District's Aqua Drive office. All Commissioners were present. Also present were Ron Lovan, Ron Barrow, Richard Harrison, Bari Joslyn, Mark Lofland, Don Gibson, Amy Kramer, Bob Buhrlage, Bill Wulfeck, Jim Dierig, Mary Carol Wagner, Lori Simpson, Rocky Hensley, Joe Webster, Dave Courtney, Seth Bingham, Mark Gindele, Brian Flanagan, Laura Whitman and Charles Pangburn.

Commissioner Wagner called the meeting to order.

Ms. Simpson of the District staff led those in attendance in the Pledge of Allegiance.

Ms. Joslyn of the District staff delivered a presentation to the Board on regulatory compliance at the District treatment plants.

The Board recognized Foremen Rocky Hensley and Joe Webster and Fieldmen Dave Courtney, Seth Bingham, Mark Gindele and Brian Flanagan for their dedicated efforts in repairing a main break in Newport on August 4, 2005.

The Board reviewed articles published and correspondence received since the last regular Board meeting on July 27, 2005.

On motion of Commissioner Collins, seconded by Commissioner Koester, the Board unanimously approved the minutes for the regular Board meeting held on July 27, 2005.

On motion of Commissioner Jackson, seconded by Commissioner Collins, the Board unanimously approved the expenditures of the District for the month of July, 2005.

On motion of Commissioner Macke, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to authorize the execution of contract documents to award the Filter Media Replacement and Pump No. 3 Retrofit project to Building Crafts, Inc.

On motion of Commissioner Sommerkamp, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to authorize the execution of contract documents to award the Fort Thomas Treatment Plant Tube Settler Replacement project to Building Crafts, Inc.

On motion of Commissioner Jackson, seconded by Commissioner Macke, and after discussion, the Board unanimously agreed to authorize the execution of contract documents to award the Ida Spence Tank and Fort Thomas Treatment Plant Carbon Silo Painting project to Utility Service Co., Inc.

On motion of Commissioner Sommerkamp, seconded by Commissioner Koester, and after discussion, the Board unanimously agreed to authorize a change order in the amount of

$26,800.00 to the existing contract with Aqua-Rehab, Inc. to add Southgate Street in the City of Fort Thomas to the 2005 Water Main Cleaning and Lining project.

On motion of Commissioner Koester, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to authorize the execution of contract documents to award the Nine Mile Road Regulator Vault project to United Plumbing & Sewer.

On motion of Commissioner Koester, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to authorize the sale of the vacant lot at 435 Byrd Street in Covington to Mr. Ron King for $2,250.00.

On motion of Commissioner Sommerkamp, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to authorize the District staff to negotiate and execute an agreement with the Bullock Pen Water District to allow the conditional provision of water service to an approximate 10 acre site in the Northern Kentucky Water District's service area.

On motion of Commissioner Collins, seconded by Commissioner Macke, and after discussion, the Board unanimously agreed to authorize the execution of engineering contract documents for the design of the East Alexandria Pike Water Main Replacement project to Bayer Becker Engineers.

On motion of Commissioner Koester, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to authorize the execution of contract documents to award the Regal Ridge Meter Vault project to G.M. Pipeline.

Mr. Buhrlage of the District staff informed the Board that the President and staff of the District had selected the firm of Business Benefits, Inc. to provide professional broker services in evaluating certain of the District's employee benefit programs.

The Board reviewed the District's financial reports and department reports.

On motion of Commissioner Jackson, seconded by Commissioner Collins, the Board unanimously agreed to go into executive session under the provisions of K.R.S. § 61.810(1)(c) to discuss possible litigation.

The Board returned to open session.

On motion of Commissioner Sommerkamp, seconded by Commissioner Jackson, the Board unanimously agreed to authorize the District's legal counsel to proceed with the commencement of a condemnation action if the President determines that such action is necessary in order to secure a new tank site from a private owner on Rossford Avenue in the City of Fort Thomas.

The Board unanimously agreed to move the date of the regular Board meeting in September to September 21, 2005.

Other matters of a general nature were discussed.

There being no further business to come before the Board, and upon motion of Commissioner Collins, seconded by Commissioner Sommerkamp, the Board unanimously agreed to adjourn the meeting.

CHAIR

SECRETARY

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Regulatory Compliance at NKWD Treatment Plants

Board of Commissioners Meeting
August 18, 2005

Northern Kentucky Water District

Presentation Highlights

- » Upcoming Regulations
- » NKWD Plant Compliance
- » Treatment Options
- » Taylor Mill UV Pilot Study
- » Future Regulatory Course of Action
- » Budget Overview
- » Project Timeline

Northern Kentucky Water District

UPCOMING REGULATIONS

- » Disinfection By-Product Rule Stage 2 (DBPR2)
  - » Find highest readings in distribution system
  - » Locational Running Annual Average
  - » THM 80 ug/L, HAA5 60 ug/L
  - » 2011 ????
- » Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
  - » *Cryptosporidium* concentrations dictate the "Bin" number, which determines the removal/inactivation requirements

NKWD Plant Compliance

- Fort Thomas
  - DBPR2 — No
  - LTESWTR2 — Yes
- Taylor Mill
  - DBPR — Yes
  - LTESWTR2 — Yes *
- Memorial Parkway
  - DBPR — Yes *
  - LTESWTR2 — Yes

Northern Kentucky Water District

Treatment Options DBPR2

- Precursor removal
  - Riverbank infiltration
  - Powdered activated carbon
  - Actiflo
  - Enhanced coagulation
- Disinfection alternatives
  - Chloramines
  - Chlorine dioxide *
  - Ozone *
- Organics removal
  - Membranes
  - Granular activated carbon

Combinations of above

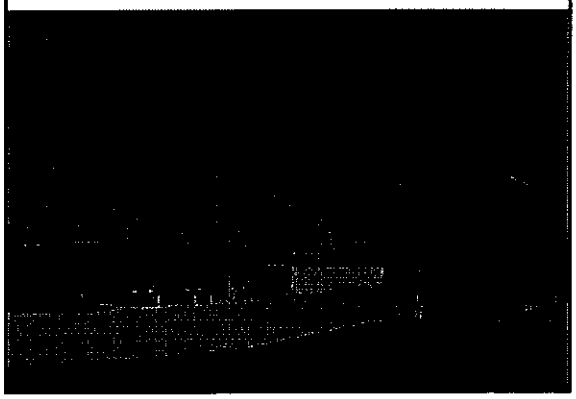
Northern Kentucky Water District

Treatment Options LT2ESWTR

- Ozone
- Membranes
- UV

Northern Kentucky Water District

TAYLOR MILL TREATMENT PLANT UV PILOT STUDY



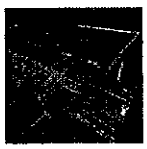
RAW WATER CHARACTERISTICS OF THE LICKING RIVER

Turbidity	74 NTU
Coliform	2,130/100 ml
HPC	73,000/1 ml
Crypto	5 "hits"
Giardia	16 "hits"

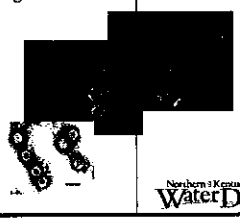
Licking River still under advisory

NKWD INTEREST IN UV at TMTP

- Additional barrier against crypto and giardia
  - no reservoirs
  - poor raw water quality
  - close to noncompliance on LT2ESWTR (bins)
- Assist in meeting future regulations (less Cl_2)
- Relatively low costs
- Allow plant to meet CT during cold months



Taylor Mill Plant basins



Northern Kentucky Water District

Contact Time (CT) = chlorine dosage X time in contact with water

CT = WORST CASE SCENARIO (high pH, low chlorine, high flow rate, low clearwell level)

MONTHLY OPERATING REPORT

DATE	1	2	3	4
highest pH	7.4	7.4	7.4	7.4
lowest Temp.	4	4	4	5
Lowest CW	11	11	11	11
Flow Rate	(Insert highest flow rate in MGD for each Zone.)			
Zone 1 rate	6	6	6	6
Zone 2 rate	6	6	6	6
Residual	(Insert lowest chlorine residual in mg/l for each Zone.)			
Zone 1 Cl	0.4	0.4	0.7	0.8
Zone 2 Cl	2.5	2.1	2.1	2
Plant CT	ZONE TOTAL X RESIDUAL J FLOW RATE			
Zone 1 CT	3	3	5	5
Zone 2 CT	231	194	194	185
CT Required	USE I-LOG CT TABLE			
Zone 1 Req.	79	79	80	87
Zone 2 Req.	99	95	96	87
CT Achieved	PLANT CT / CT REQUIRED			
Zone 1	0.04	0.04	0.07	0.08
Zone 2	2.34	2.05	2.05	2.78
Total LOG*	2.38	2.08	2.11	2.84

Must be ≥ 1.0

Taylor Mill Treatment Plant

LT2ESWTR

Crypto BIN Results

Collection date	TMTP (SWP)
4/29/2003	1
5/26/2003	1
6/24/2003	1
7/29/2003	1
8/26/2003	1
9/23/2003	1
10/28/2003	1
11/18/2003	2
12/16/2003	1
1/27/2004	1
2/24/2004	1
3/23/2004	1
4/26/2004	1
5/25/2004	1
6/29/2004	1
7/27/2004	2
8/23/2004	1
9/27/2004	1
10/27/2004	1
11/29/2004	2
12/28/2004	2
1/25/2005	1
3/22/2005	1
3/13/2005	1

Northern Kentucky Water District

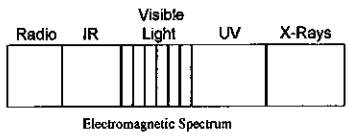
BIN CLASSIFICATION

Bin #	Average *Cryptosporidium* Concentration	Additional Treatment Requirements
1	*Cryptosporidium* < 0.075/L	No Action
2	0.075/L < *Cryptosporidium* < 1.0/L	1.0 – Log Treatment
3	1.0 < *Cryptosporidium* < 3.0/L	2.0 – Log Treatment
4	*Cryptosporidium* > 3.0/L	2.5 – Log Treatment

0.5 log	watershed control	1 - 5 log	membranes
	reservoir		slow sand filtration
	bank filtration		chlorine dioxide
	softening		ozone
	enhanced filters		UV

WHAT IS UV?

- » Disinfectant
- » Physical process
- » Inhibits replication
- » An organism that cannot replicate cannot infect



Electromagnetic Spectrum

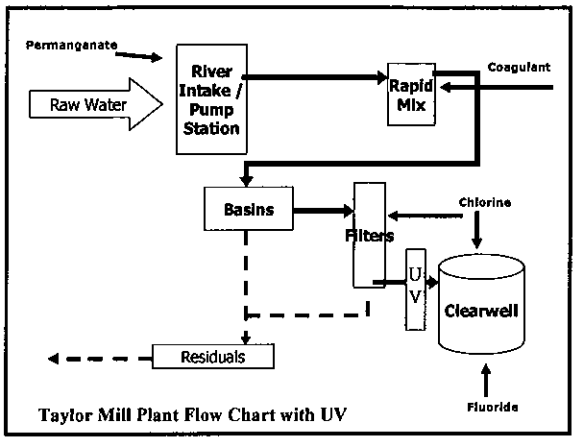
ADVANTAGES OF UV	DISADVANTAGES OF UV
» Lower capital/operating costs	» No real-time measurement
» No disinfection by-products	» Lamp fouling
» Effective against microorganisms	
» Easy maintenance, operation, handling	
» Small footprint	
» Easy retrofit	

Northern Kentucky Water District

PILOT PLANT OPERATING CONDITIONS

- » January 2002 – November 2003
- » flow rate 0.5 MGD
- » reactor "challenge"

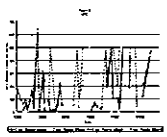
Northern Kentucky Water District



Taylor Mill Plant Flow Chart with UV

RESULTS

1. Effectively removed microorganisms
   - » coliform
   - » Heterotrophic plate count
   - » MS2 (surrogate for cryptosporidium)
2. Very little fouling from filtered water
3. Equipment easy to use
4. Annual power costs $25,000
5. No formaldehyde, carboxylic acids, AOC formed



Northern Kentucky Water District

CONCLUSIONS

» UV at TMTP is a reliable, low cost technology that will:
- » allow NKWD to meet CT under all flow conditions
- » provide an additional crypto barrier
- » potentially decrease organics by lowering chlorine dose

Northern Kentucky Water District

FUTURE REGULATORY COURSE OF ACTION

» Install UV at TMTP (September 2007)

» Conduct demonstration study at MPTP with GAC/UV (January 2008)

» UV/GAC at FTTP (December 2012)

Northern Kentucky Water District

CURRENT BUDGET
(million $)

Project	2005	2006	2007	2008	2009	2010	2011	Total
FTTP UV	0.5	3.5						4.0
FTTP GAC					1.0	9.50	10.5	21.0
TMTP UV						0.95		0.95
Total	0.5	3.5			1.0	10.45	10.5	25.95

MODIFIED BUDGET (million $)

Project	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
TMTP UV	0.1	2.4								2.5
MPTP STUDY		1.5								1.5
MPTP UV									2.5	2.5
MPTP GAC									10.0	10.0
FTTP GAC					1.0		10.5	10.5		22.0
FTTP Actiflo								8.0		8.0
FTTP UV					1.0	4.0				5.0
Total	0.1	3.9			2.0	4.0	10.5	18.5	12.5	51.5

Northern Kentucky Water District
Board of Commissioners Meeting
February 16, 2006

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on February 16, 2006 at the District's Aqua Drive office. All Commissioners except Commissioner Sommerkamp were present. Also present were Ron Lovan, Bari Joslyn, Richard Harrison, Mark Lofland, Jack Bragg, Amy Kramer, Bob Buhrlage, Mary Carol Wagner, Jim Dierig, Lori Simpson and Charles Pangburn.

Commissioner Koester called the meeting to order.

Mr. Pangburn led those in attendance in the Pledge of Allegiance.

Ms. Joslyn of the District staff delivered to the Commissioners present a sixty minute training presentation on regulatory requirements and water quality standards.

The Board reviewed articles published and correspondence received since the last regular Board meeting on January 19, 2006.

On motion of Commissioner Jackson, seconded by Commissioner Collins, the Commissioners present unanimously approved the minutes for the regular Board meeting held on January 19, 2006.

On motion of Commissioner Macke, seconded by Commissioner Collins, and after discussion, the Commissioners present unanimously approved the expenditures of the District for the month of January, 2006.

On motion of Commissioner Wagner, seconded by Commissioner Macke, and after discussion, the Commissioners present unanimously agreed to reject all bids received on December 8, 2005 for the Ft. Thomas Treatment Plant reservoir sediment removal project.

On motion of Commissioner Collins, seconded by Commissioner Wagner, and after discussion, the Commissioners present unanimously agreed to award the Ft. Thomas Treatment Plant reservoir sediment removal project to Creative Waste Management and to authorize District staff to execute appropriate contract documents.

On motion of Commissioner Wagner, seconded by Commissioner Collins, and after discussion, the Commissioners present unanimously agreed to authorize District staff to execute engineering contract documents with Viox & Viox, Inc. for the design of the 36" water main project on Licking Pike from Moock Road to the Aspen Ridge Subdivision.

On motion of Commissioner Macke, seconded by Commissioner Jackson, and after discussion, the Commissioners present unanimously agreed to authorize District staff to execute engineering contract documents with Cardinal Engineering to design the 24" water main project

in Campbell County with three alternate routes with a not to exceed fee limitation of $55,761.00 for Alternate No. 1, $61,541.00 for Alternate No. 2 and $72,071.00 for Alternate No. 3.

On motion of Commissioner Wagner, seconded by Commissioner Collins, the Commissioners present unanimously agreed to award the annual grounds keeping contract to Davey Commercial Grounds Management and to authorize District staff to execute appropriate contract documents with a possible two year extension at the District's discretion.

The Board reviewed the District's financial reports and department reports.

The Commissioners present unanimously agreed to move the regular meeting in April to April 25, 2006 at 12:30 p.m.

On motion of Commissioner Wagner, seconded by Commissioner Jackson, the Commissioners present unanimously agreed to go into executive session under the provisions of KRS 61.810(1)(c) to discuss pending litigation.

The Commissioners returned to open session.

Other matters of a general nature were discussed.

There being no further business to come before the Board, the meeting was adjourned.

CHAIR

SECRETARY

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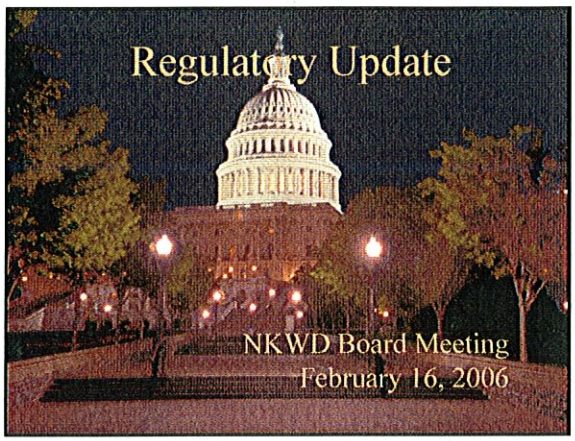
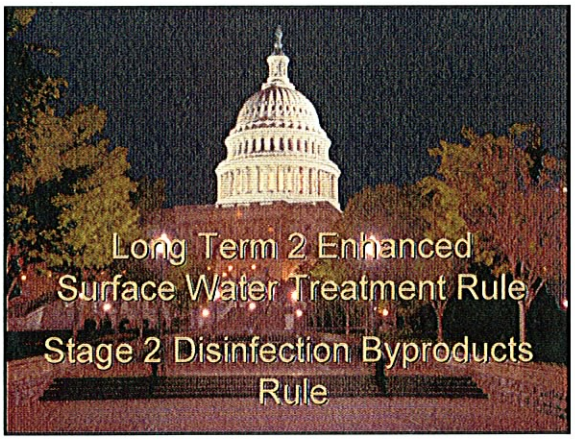

Regulatory Update
NKWD Board Meeting
February 16, 2006


Long Term 2 Enhanced Surface Water Treatment Rule
Stage 2 Disinfection Byproducts Rule


Long Term 2 Enhanced Surface Water Treatment Rule
(LT2)

Current Status

- The LT2 was published in the Federal Register on January 5, 2006
- The Final Rule is effective on March 6, 2006
- NKWD must be in compliance by March 6, 2012

Purpose

- Supplements existing regulations by focusing on *Cryptosporidium* in filtered systems with high source water occurrence
- Maintains microbial protection while risks from disinfection byproducts are addressed

New Data on *Cryptosporidium*

- High levels in some filtered systems
- Infectivity greater than previously thought
  - 89,000-1,459,000 cases per year
  - 20-314 deaths per year
- Effectiveness of UV light and ozone better than thought

Key Requirements

- Source Water Monitoring
  - Crypto, e coli, turbidity for 2 years
- Treatment Bins
  - Each system assigned to a "bin" based on monitoring results
- Microbial Toolbox
  - Treatment based on requirements for each "bin", choosing from a set of options in the "Toolbox"
- Disinfection Profiling and Benchmarking

Bin Classification and Treatment

Bin Number	*Cryptosporidium* Concentration (in oocysts L)	Additional Treatment Beyond Current Requirements
1	*Crypto* < 0.075	No additional treatment
2	0.075 to <1.0	1.0 log
3	1.0 to <3.0	2.0 log
4	3.0 or more	2.5 log

Toolbox Options

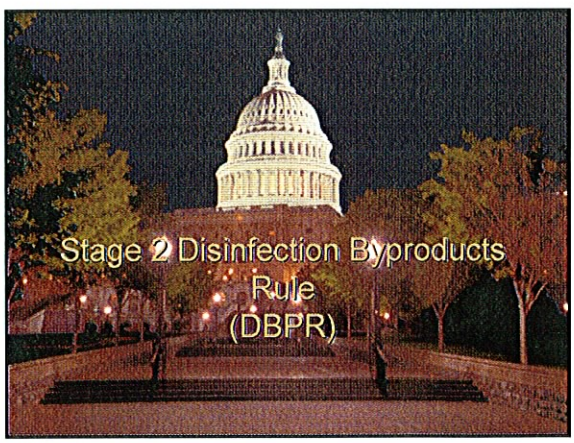
Option	Log Credit	Criteria
Bag filters	1.0	Demonstrate 2 log removal efficiency in challenge test
Cartridge filters	2.0	Demonstrate 3 log removal efficiency in challenge test
Membrane filtration	0.5-6.5	The lower of the removal efficiency demonstrated in challenge test of efficiency verified in direct integrity test

Toolbox Options (cont)

Option	Log Credit	Criteria
Chlorine dioxide	0.5-3.0	Must meet CT table values for desired credit
Ozone	0.5-3.0	Must meet CT table values for desired credit
UV light	0.5-3.0	Must meet operating conditions for desired credit as established by validation testing

Costs of the Rule

- The average annualized present value cost of the LT2 are estimated at a range of $92 to $133 Million



Current Status

- The DBPR was published in the Federal Register on January 4, 2006
- The IDSE monitoring plan is due October 1, 2006
- Submit IDSE Report January 1, 2009
- NKWD must be in compliance by March, 2012
  - IDSE - Initial Distribution System Evaluation - maximum holding sites

MCLs for TTHM and HAA5

Compliance Begins	MCL concentrations	Compliance Calculations	Monitoring Locations
6 years after rule promulgation - - must be in compliance with DBPR by 2012	80 micrograms/L TTHM 60 micrograms/L HAA5	LRAA	Stage 2B sites, based on results of IDSE

Consecutive Systems

- Consecutive systems are an issue in the DBPR
  - DBPs can increase in the distribution system
  - Schedule determined by the largest system in the combined distribution system
  - Monitoring and MCL violations are attributed to the PWS where the violation occurred

Costs of the Rule / Benefits

- The rule applies to 75,000 systems
- The average cost of the rule is $79 million annually
- Projected that the rule will prevent approximately 280 bladder cancer cases per year

Timeline

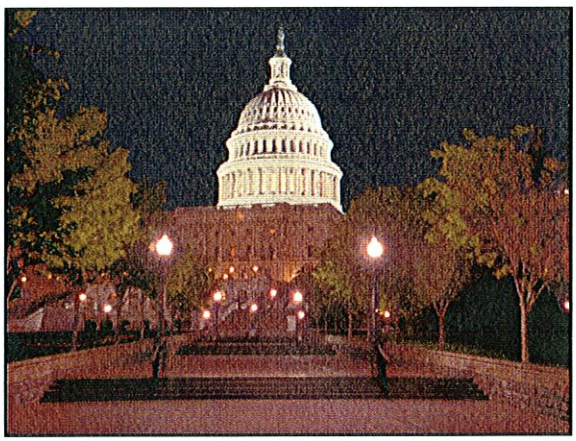
NKWD Compliance

LT2 ↑

DBPR ↓

BUDGET (million $)

Project	2006	2007	2008	2009	2010	2011	2012	Total
TMTP UV	0.5	2.0						2.5
FTTP GAC		1.0	1.0	3.0	5.0	12.0		22.0
FTTP Actifio		0.5	1.5	6.0				8.0
FTTP UV				1.0	4.0			5.0
Total	0.5	3.5	2.5	10.0	9.0	12.0		37.5



Northern Kentucky Water District
Board of Commissioners Meeting
August 17, 2006

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on August 17, 2006 at the District's facility at 2835 Crescent Springs Road in Erlanger, Kentucky. All Commissioners were present. Also present were Ron Lovan, Richard Harrison, Bari Joslyn, Mark Lofland, Jack Bragg, Bill Wulfeck, Amy Kramer, Jim Dierig, Mary Carol Wagner, Dave Enzweiler and Charles Pangburn.

Commissioner Koester called the meeting to order.

Commissioner Sommerkamp led those in attendance in the Pledge of Allegiance.

Ms. Joslyn of the District staff delivered a presentation to the Board on Regulatory Compliance.

The Board reviewed articles published and correspondence received since the last regular Board meeting on July 26, 2006.

On motion of Commissioner Macke, seconded by Commissioner Wagner, the Board unanimously approved the minutes for the regular Board meeting held on July 26, 2006.

On motion of Commissioner Collins, seconded by Commissioner Jackson, and after discussion, the Board unanimously approved the expenditures of the District for the month of July, 2006.

On motion of Commissioner Wagner, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the Chesapeake Road water main interconnect and 12-inch replacement project in the cities of Newport and Ft. Thomas to G.M. Pipeline, Inc. and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Macke, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the Montrose Avenue 6-inch water main replacement project to Jack Gemmer & Son's, Inc. and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Collins, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the Ohio River Pump Station No. 2 discharge line replacement project to Americon Construction and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, and after discussion, the Board unanimously agreed to award the Taylor Mill Standpipe painting

project to Security Painting Co., Inc. and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to award the Ft. Thomas Treatment Plant filter building roof project to CA Eckstein Inc. and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, and after discussion, the Board unanimously agreed to increase the project budget for the Memorial Parkway Treatment Plant improvements to $6,865,000, to award the project to Building Crafts, Inc. and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Wagner, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to authorize the District staff to execute an amendment to the existing engineering design contract with CH2MHill to add the design of a 1,400 square foot, treatment unit building.

On motion of Commissioner Collins, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to engage CDM to perform engineering services for an enhanced coagulation trial at the Ft. Thomas Treatment Plant and to authorize the District staff to execute appropriate engineering contract documents.

The Board reviewed the District's financial reports and Department reports.

Other matters of a general nature were discussed.

There being no further business to come before the Board, the meeting was adjourned.

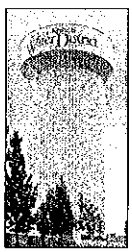
CHAIR

SECRETARY

S chp WATER DISTRICT Minutes MINUTES 8-17-06 doc

2012 Regulatory Compliance

Commission Meeting
August 17, 2006



Northern Kentucky
Water District
Strategic
Direction

KEY GOALS

- **Security:** *Represents an ongoing assessment and implementation of security measures in a cost-effective manner*
- **New Regulations:** *Represents an ongoing assessment and implementation of new and future federal/state standards*
- **Fiscal Responsibility:** *Represents a comprehensive approach to long-term fiscal soundness through planning, revenue enhancement, operational efficiency and long-term rate strategy*
- **Customer Service:** *Represents the establishment of the most effective options to meet the expectations and needs of our customers*
- **Staff:** *Represents an effort to maintain a safe and desirable workplace, remaining competitive with compensation, fringe benefits, recognition and on-going training and succession planning programs, with a focus on building teamwork and inclusiveness.*
- **Consumer and Regulatory Education and Communication:** *Represents consumer and regulatory education and communication enabling the District to build goodwill, strong customer support and interaction with the business community*

2012 Regulatory Compliance

- Summary of the two new rules
- What is a disinfection by-product?
- NKWD treatment process
- How are we complying now?
- First sampling results for the new DBP rule
- Treatment options
- To-Do List and Decision matrix
- Upcoming action items

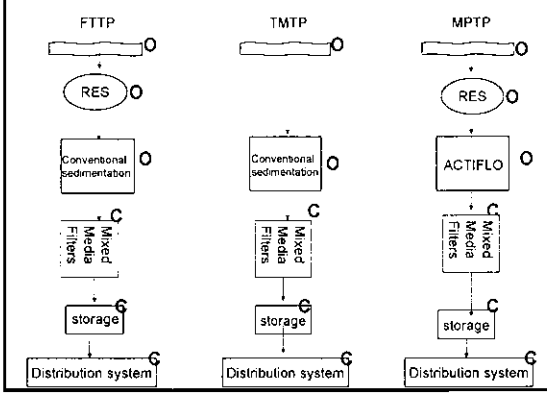
TWO NEW RULES SUMMARY – COMPLIANCE BY 2012

- Long Term 2 Enhanced Surface Water Treatment Rule
  - Source water monitoring for crypto
  - Results determine future treatment technology
  - NKWD should comply
- Disinfection By-Product Rule
  - Find highest TTHMs and THAAs in system
  - Locational running annual average
  - NKWD will probably not comply

WHAT IS A DISINFECTION BY-PRODUCT (DBP)?

- A DBP is a compound that is formed when the disinfectant (chlorine for example) reacts with the naturally occurring organic matter (dirt, leaves, animal waste) in the raw water
- Total Trihalomethanes (TTHMs) and Total Haloacetic Acids (THAAs) are examples of DBPs
  - These are the only two DBPs included in this rule
  - There are hundreds of other DBPs not yet regulated
- TTHMs and THAAs increase with water age and with amount of disinfectant added

ORGANICS (O) + LIQUID CHLORINE (C) = DBP



HOW ARE WE COMPLYING RIGHT NOW? (ug/L)

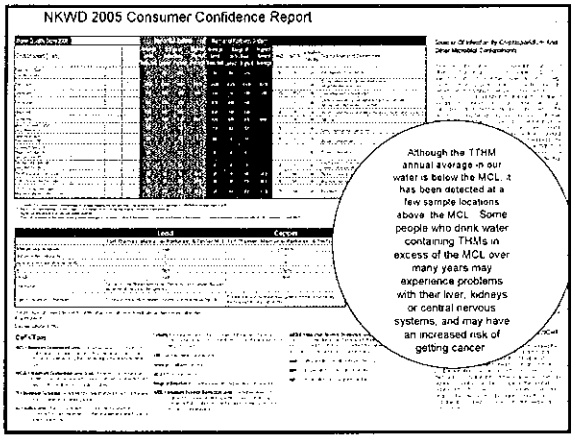
TTHM REGULATION: average of all locations = 80

- TTHMs range = 56 to 178

THAA REGULATION: average of all locations = 60

- THAAs range = 32 to 58

NKWD 2005 Consumer Confidence Report



2012 DISINFECTION BY-PRODUCT RULE

- Find highest readings of TTHMs and THAAs in distribution system
- Locational Running Annual Average
- TTHM 80 ug/L, THAA 60 ug/L
- Compliance date = 2012

WATER AGE

- Water age = high TTHMs, THAAs
- SURPRISE: Oldest water not necessarily the furthest away!!!

1st Sampling of Highest Readings July 2006, ug/L

THMs (max is 80)		THAAs (max is 60)	
Red Bud Lane, Ryland Heights	129	Flagg Springs	87
Hasco Tag Co., Dayton	127	Hasco Tag Co, Dayton	84
Visalia Rd	123	Sara Lee, Campbell Co	79
Wilder City Bldg	119	Walton Meter Pit	74
Dixie, Boone Co.	119	Dixie, Boone Co.	74
Airport	112	Ameristop, Alexandria	73
Walton Meter Pit	111	Ft Thos City Bldg	72
Decoursey, Ryland	108	Red Bud Lane, Ryland Heights	71
Apple Valley, Independence	108	Visalia Rd	70
Sara Lee, Campbell Co	107	Decoursey, Ryland	69

TREATMENT OPTIONS

ORGANICS REMOVAL

- Riverbank infiltration
- Powdered activated carbon
- Actiflo
- Enhanced coagulation
- Membranes
- Granular activated carbon
- MIEX

ALTERNATIVE DISINFECTANT

- Chlorine dioxide/ Chloramines
- Ozone

TREATMENT OPTIONS - ORGANICS REMOVAL

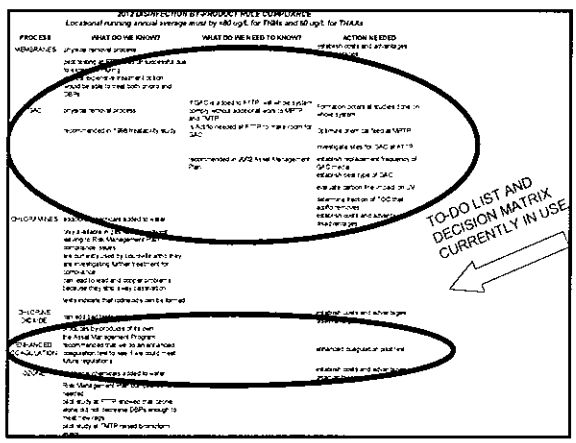
TREATMENT TYPE	DESCRIPTION	NKWD RESULT	WILL IT WORK ?
RIVERBANK INFILTRATION	Drill well near river – natural filtration	Geology not right in our area – also very $	No
POWDERED CARBON	Add chemical	Cannot add enough to be effective	No
ACTIFLO	Sand aids organic removal	Process alone does not remove enough	No

TREATMENT OPTIONS – ORGANICS REMOVAL CONTINUED

ENHANCED COAGULATION	Lower pH to aid in organics removal	Exploring in 2006 - 2007	?
MEMBRANES $45 million	Tightly woven mesh in large cartridges	Very expensive – past pilot studies show bacteriological build up	Yes
GRANULAR ACTIVATED CARBON $21 million	Additional filters in treatment process filled with carbon	Needs to be regenerated - has a big footprint – proven technology	Yes
MIEX $12 million	Use resin to take out organics – like actiflo	Few locations in US – discharge a problem – proprietary process	?

TREATMENT OPTIONS – DISINFECTION ALTERNATIVES
(NKWD = chlorine = used by 68% of surface water utilities in US)

CHLORINE DIOXIDE/CHLORAMINES $ 5 million (10% surface water utilities)	Chlorine dioxide = sodium chlorite and chlorine Chloramines = mixture of ammonia and chlorine	Not as effective as chlorine – can increase lead and copper leaching – has its own DBPs – adverse effect on kidney dialysis patients – does not reduce manganese – system shock required	?
OZONE/CHLORINE $7 million (1% surface water utilities)	Oxygen and electricity = O_3	Process alone does not reduce organics enough – also has its own DBPs	No



SUMMARY OF PROCESSES THAT WOULD WORK AND PROGRESS

PROCESS	INVESTIGATION COMPLETE
Enhanced coagulation	
Membranes	✓
Granular activated carbon	
MIEX	✓
Chlorine dioxide/chloramines	✓

INVESTIGATIONS TO COMPLETE

- Enhanced coagulation trial
  - Request board approval of engineering assistance on August 17
- Granular activated carbon analysis
  - Request board approval of engineering assistance in November

OUR CURRENT 5 YEAR CAPITAL BUDGET

Granular Activated Carbon at Fort Thomas

- $ 1 million 2009
- $ 9.5 million 2010
- $10.5 million 2011

Northern Kentucky Water District
Board of Commissioners Meeting
September 20, 2007

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on September 20, 2007 at the District's facility located at 2835 Crescent Springs Road in Erlanger, Kentucky. All Commissioners except Commissioner Jackson were present. Also present were Ron Lovan, Bari Joslyn, Richard Harrison, Jack Bragg, Bill Wulfeck, Jim Dierig, Don Gibson, Amy Kramer, Chris Bryant, Mary Carol Wagner, Becky McCormick, Lori Simpson, Frances Robinson, Chris Wetherell, Chris Weber, Vanessa Speight, Doug Owens, Lori Giberson, Ted Vogelpohl and Charles Pangburn.

Commissioner Koester called the meeting to order.

Ms. Robinson of the District staff led those in attendance in the Pledge of Allegiance.

Mr. Vogelpohl of Thelen Associates, Inc. delivered a training presentation to the Board on the value of engineering reconnaissance in the selection of collections/distribution pipeline alignments and structure locations.

On motion of Commissioner Collins, seconded by Commissioner Sommerkamp, and after discussion, the Commissioners present unanimously agreed to take a brief recess.

The Board meeting reconvened.

Ms. Joslyn and Mr. Harrison of the District staff and Ms. Speight and Mr. Owens of Malcolm Pirnie delivered a presentation to the Board on granular activated carbon.

The Board reviewed correspondence received and articles published since the last regular Board meeting on August 16, 2007.

On motion of Commissioner Wagner, seconded by Commissioner Macke, and after discussion, the Commissioners present unanimously approved the minutes for the regular Board meeting held on August 16, 2007.

On motion of Commissioner Wagner, seconded by Commissioner Sommerkamp, and after discussion, the Commissioners present unanimously approved the expenditures of the District for the month of August, 2007.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, and after discussion, the Commissioners present unanimously agreed to authorize the District staff and legal counsel to commence condemnation proceedings to secure easements from Glenna Bridges on Fowler Creek Road and from Denise and Dennis Embry and from Marvin Edwards on Bullock Pen Road.

On motion of Commissioner Collins, seconded by Commissioner Wagner, and after discussion, the Commissioners present unanimously agreed to award the West 4th Street and Covington Avenue main replacement project to Fields Excavating and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, and after discussion, the Commissioners present unanimously agreed to reject all bids received on September 12, 2007 for voice and data transport services.

On motion of Commissioner Collins, seconded by Commissioner Macke, and after discussion, the Commissioners present unanimously agreed to accept the bid of O.I. Analytical in the amount of $102,517.00 for the purchase of a Gas Chromatograph Mass Spectrometer.

The Board reviewed the District's financial reports and Department reports.

Other matters of a general nature were discussed.

On motion of Commissioner Koester, seconded by Commissioner Collins, the Commissioners present unanimously agreed to go into executive session under the provisions of KRS 61.810(1)(c) in order to protect the District's legal interests and strategy in connection with pending litigation.

Commissioners Sommerkamp, Macke and Wagner departed the meeting prior to the commencement of the executive session.

The Board returned to open session.

There being no further business to come before the Board, the meeting was adjourned.

CHAIRMAN

SECRETARY

UPDATE: Preliminary Design of GAC Systems for the NKWD Treatment Plants

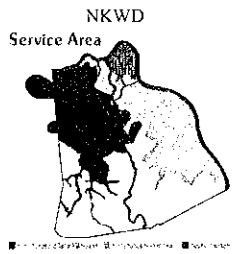
NKWD Commission Meeting

September 20, 2007

Richard Harrison
Bari Joslyn
Vanessa Speight, Malcolm Pirnie
Chris Weber, Malcolm Pirnie

Presentation

- Our Team
- Where We Left Off..
- Need for Project
- GAC Overview
- Project Specifics
- Next Steps



Our Team

PROJECT MANAGEMENT
CHRIS WEBER, PIRNIE
BARI JOSLYN, WQ&P
BRAD MONTGOMERY, GRW
RICHARD HARRISON, E&D

PROJECT DESIGN
VANESSA SPEIGHT
KIRK NOWAK
STEVE VOGELSBURG
JESSICA CUNNINGHAM
JENNIFER WEBSTER

NKWD INPUT & REVIEW
JIM DIERIG, MAINT.
MIKE GREER, OPERAT.
AMY KRAMER, ENG.
GARY LONG, OPERAT.
KEVIN OWEN, MAINT.
JEFF SCHUCHTER, ENG.
MARY CAROL WAGNER, LAB
BILL WULFECK, OPERAT.

TECHNICAL ADVISORS
DOUG OWEN, PIRNIE
SCOTT SUMMERS,
U. of COLORADO

Where We Left Off:

2007 5 Year Capital Budget
Funding Breakdown

Unfunded Mandates/Regulations	$ 96,961,500
Infrastructure Replacement	$ 42,101,000
Security/Redundancy	$ 20,745,000
Customer Growth Needs	$ 18,139,000
Technology	$ 13,104,500
TOTAL	$ 191,051,000

Water District

MALCOLM PIRNIE

2007 5-Year Capital Budget Unfunded Mandates/Regulations Breakdown

FTTP

$ 8.7 million	Actiflo®
$ 52.5 million	GAC
$ 11.5 million	UV

MPTP

$ 12.6 million	GAC/UV

TMTP

$ 11.6 million	GAC

GRAND TOTAL: $96.9 million

Water District

MALCOLM PIRNIE

5-YEAR CAPITAL BUDGETS (9/20/07)

2007		2008 Preliminary	
FTTP		FTTP	
$ 8.7 million	Actiflo®	~~$ 8.7 million~~	~~Actiflo®~~
$ 11.5 million	UV	$ 11.5 million	UV
$ 52.5 million	GAC	$ 52.5 million	GAC
MPTP		MPTP	
$ 12.6 million	GAC/UV	$ 12.6 million	GAC/UV
TMTP		TMTP	
$ 11.6 million	GAC	$ 11.6 million	GAC
GRAND TOTAL: $96.9 million		GRAND TOTAL: $88.2 million	

Water District

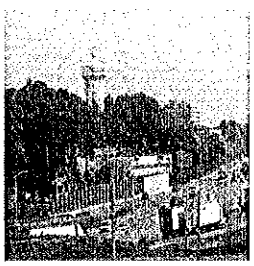
MALCOLM PIRNIE

Need for Project

- LT2ESWTR
  - Enacted 2005
  - Compliance by 2012
  - NKWD will comply
  - Monitor for Crypto in raw water
- Stage 2 DBPR
  - Enacted 2005
  - Compliance by 2012
  - NKWD will not comply
  - Identify locations with highest readings of disinfection by-products in distribution system

WHAT IS A DISINFECTION BY-PRODUCT (DBP)?

- Chlorine + naturally occurring organic matter (aka TOC) (dirt, leaves, animal waste)
- Examples: Total Trihalomethanes (TTHMs) and Total Haloacetic Acids (THAAs)
- TTHMs and THAAs increase with water age and with amount of disinfectant added



NKWD Example Results

2006 THMS

14 of 16 sample points $\neq$ 2012 compliance

2007 THMs

3 of 16 sample points $\neq$ 2012 compliance

Hasco Tag, Dayton	109 ppb
Flagg Springs	89 ppb
Dixie Highway & York	82 ppb

Timeline

- 1976 Safe Drinking Water Act
- 2001 Regulatory Assessment
- 2004 Asset Management Plan
- 2005 Disinfection By-Production Rule/Long Term 2 LT2ESWTR
- 2006 Malcolm Pirnie/GRW selected
- 2007 Preliminary design complete
- 6/1/2008 Select consultant for design
- 6/1/2009 Complete design
- 12/1/2009 Bids and PSC approval
- 6/1/2011 New processes on-line
- 2012 DBP Rule and LT2 Rule Compliance required

Water District MALCOLM PIRNIE

Schedule for Construction of New Processes

Activity	2007	2008	2009	2010	2011
Prelim Design					
Detailed Design					
Bid & Award					
Construction					

Water District MALCOLM PIRNIE

Compliance Strategies – Organics Removal All 3 Plants

TREATMENT TYPE	DESCRIPTION	NKWD RESULT	WILL IT WORK?
RIVERBANK INFILTRATION	Drill well near river – natural filtration	Geology not right in our area – also very $	No
POWDERED CARBON	Add chemical	Cannot add enough to be effective	No
ACTIFLO	Sand aids organic removal	Process alone does not remove enough	No
ENHANCED COAGULATION pilot 7/07, CDM	Lower pH to aid in organics removal	Process alone does not remove enough – study completed in 2007	No
MEMBRANES $128 million ($2/gallon) pilot 1999 - 2001, B & V	Tightly woven mesh in large cartridges	Very expensive – past pilot studies show bacteriological build up – study completed in 2004	Yes

Water District MALCOLM PIRNIE

Compliance Strategies – Organics Removal (continued)

TREATMENT TYPE	DESCRIPTION	NKWD RESULT	WILL IT WORK ?
GRANULAR ACTIVATED CARBON $64 million ($1/gallon) Pilot ongoing, Malcolm Pirnie	Additional filters in treatment process filled with carbon	Needs to be regenerated - has a big footprint – proven technology – study completed in 2007	Yes
MIEX $48 million ($0.75/gallon) Pilot 2001 B & V, 2007 Malcolm Pirnie	Use resin to take out organics – like actiflo	Few locations in US – discharge a problem – proprietary process – was not effective at TMTP	No

Water District

MALCOLM PIRNIE

TREATMENT OPTIONS – DISINFECTION ALTERNATIVES

(NKWD = chlorine = used by 68% of surface water utilities in US)

CHLORINE DIOXIDE/CHLORAMINES $ 7 million ($0.09/gallon)	Chlorine dioxide = sodium chlorite and chlorine Chloramines = mixture of ammonia and chlorine	Not as effective as chlorine – can increase lead and copper leaching – has its own DBPs – adverse effect on kidney dialysis patients – does not reduce manganese – system shock required – only used by 10% of surface water utilities	?
OZONE/CHLORINE $19 million ($0.30/gallon) Pilot 1993, B & V	Oxygen and electricity = O_3	Process alone does not reduce organics enough – also has its own DBPs	No

Water District

MALCOLM PIRNIE

Summary: Reasons for Recommending GAC

- Pilot programs show GAC to be effective at all 3 plants
- GAC removes wide variety of contaminants
  - TOC (causes disinfection by-products)
  - Chemical spills (fuels, pesticides, etc.)
  - Emerging contaminants
    - Endocrine disruptors
    - Pharmaceutically-active compounds
    - Personal care products
- GAC considered best available technology by EPA

Water District

MALCOLM PIRNIE

GAC Overview

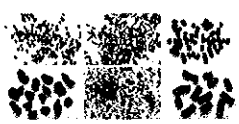
What is TOC?

- Definition: Total organic carbon (TOC) is the amount of naturally occurring carbon in a water source.
- TOC is used to measure precursors to disinfection by-product formation (TTHMs, HAA5).

River Source – Total Organic Carbon (TOC) + ***Chlorine Disinfection*** = ***- Pathogens + TTHMs + HAA5***

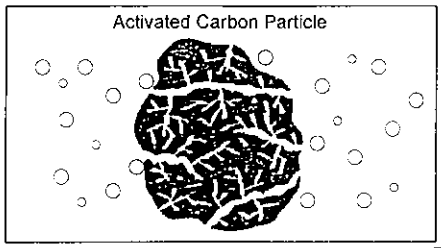
What is Activated Carbon?

- Definition: A highly porous charcoal that effectively removes organic contaminants from and air and water
- Available as a powdered (PAC) or granular (GAC) material



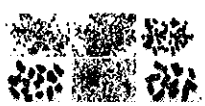
Why Activated Carbon?

- Adsorptive capacity



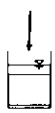
What is Saturation?

- Adsorption sites are limited – once they are filled the carbon is "saturated"
- influenced by water quality characteristics
- govern the design/operation of activated carbon systems (i.e., carbon change-out frequency)

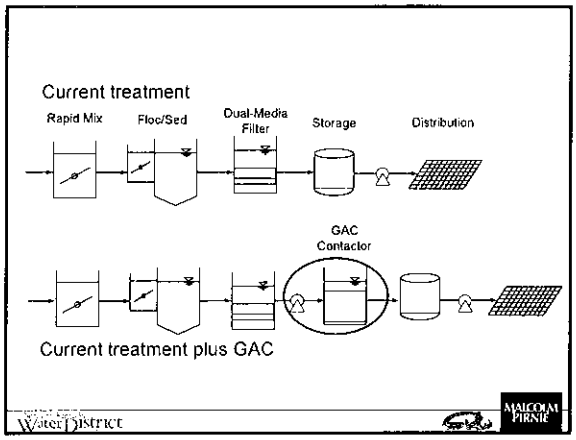


What are GAC Applications?

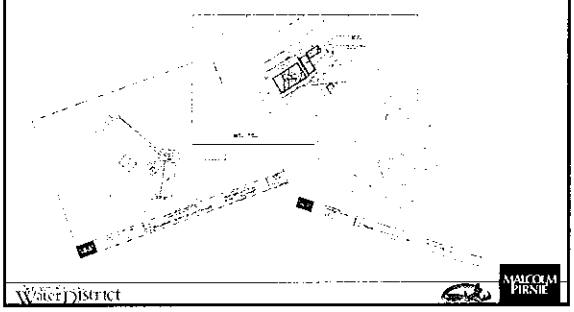
- water flows through a container or basin filled with GAC



- Adsorption occurs while the water is in contact with the carbon bed (contact time)
- Empty Bed Contact Time (EBCT)



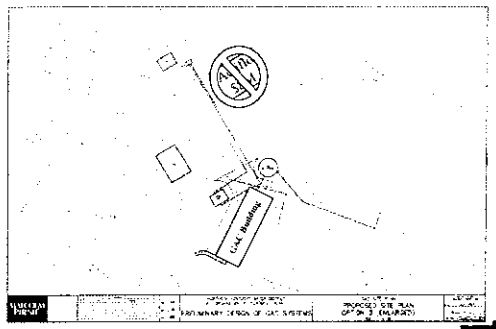
Project Specifics



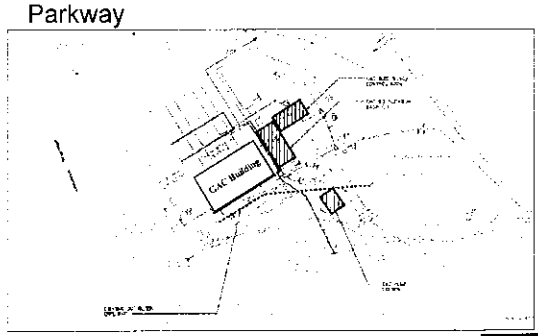
Plant Overview

Treatment Plant	Water Source
Fort Thomas	Ohio River
Memorial Parkway	Ohio River
Taylor Mill	Licking River

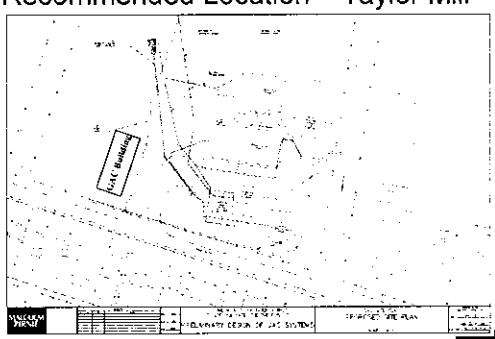
Recommended Location – Fort Thomas



Recommended Location – Memorial Parkway



Recommended Location – Taylor Mill

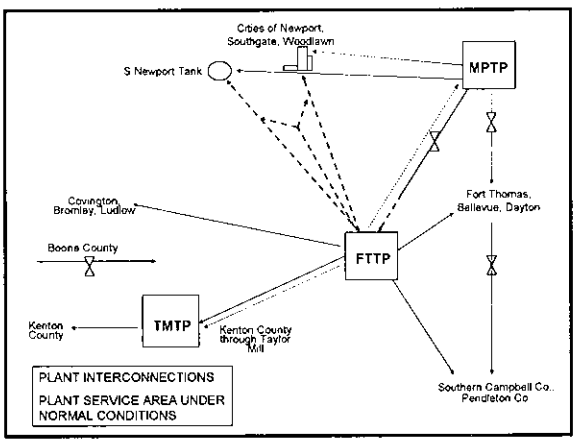


Approaches that May Help Reduce Costs

- Minimum, moderate, aggressive
- Blending

GAC Treatment Strategies
(full design capacity)

Approach	Minimal	Moderate	Aggressive
Percent of MCL Permitted for LRAA	100%	80%	60%
Maximum TTHM Value on LRAA Basis (mg/L)	80	64	48
Maximum HAA5 Value on LRAA Basis (mg/L)	60	48	36
EBCT (min)	15	20	25
TOC Target (mg/L)	1.4	1.25	1.0



5-YEAR CAPITAL BUDGETS (9/20/07)

2007		2008	
FTTP		FTTP	
$ 8.7 million	Actiflo®	~~$ 8.7 million~~	~~Actiflo®~~
$ 11.5 million	UV	$ 11.5 million	UV
$ 52.5 million	GAC	$ 52.5 million	GAC
$ 72.7 million	TOTAL	$ 64.0 million	TOTAL
MPTP		MPTP	
$ 12.6 million	GAC/UV	$ 12.6 million	GAC/UV
TMTP		TMTP	
$ 14.9 million	Basins/GAC	$ 14.9 million	Basins/GAC
GRAND TOTAL: $100.2 million		GRAND TOTAL: $91.5 million	

Water District

MALCOLM PIRNIE

Work Still to Come
(complete by December 1, 2007)

- Finalize blending scenarios
- Finalize minimum, moderate, and aggressive approaches
- Develop O & M and CIP costs
- Make recommendation on best approach
- Develop estimated rate impact

Water District

MALCOLM PIRNIE

Northern Kentucky Water District
Board of Commissioners Meeting
July 31, 2008

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on July 31, 2008 at the District's facility located at 2835 Crescent Springs Road in Erlanger, Kentucky. All Commissioners were present. Also present were Ron Lovan, Bari Joslyn, Richard Harrison, Jack Bragg, Mark Lofland, Don Gibson, Amy Kramer, Bill Wulfeck, Jim Dierig, Bob Buhrlage, Jeff Schuchter, Mary Carol Wagner, John Schmiade, Chris Couch, Scott Shepherd, Lori Simpson and Charles Pangburn.

Commissioner Macke called the meeting to order.

Mr. Gibson of the District staff led those in attendance in the Pledge of Allegiance.

Mr. Harrison, Ms. Kramer and Mr. Schuchter, all of the District staff, delivered a training presentation to the Board on moving from a reactive to a proactive main replacement program.

The Board reviewed correspondence received and articles published since the last regular Board meeting on June 19, 2008.

On motion of Commissioner Koester, seconded by Commissioner Sommerkamp, the Board unanimously approved the minutes for the regular Board meeting held on June 19, 2008.

On motion of Commissioner Collins, seconded by Commissioner Wagner, and after discussion, the Board unanimously approved the expenditures of the District for the month of June, 2008.

On motion of Commissioner Wagner, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the Fourth Street Water Main Replacement Project to RFH Construction and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to award the Eleventh Street, Wheeler Street, Prospect Street, Bush Street and Bush Alley Water Main Replacement Project to Jack Gemmer & Son's, Inc. and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Jackson, seconded by Commissioner Koester, and after discussion, the Board unanimously agreed to award the Breckenridge Drive Reconstruction Project to M&W Excavation and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Wagner, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to authorize the District staff to enter into an

agreement with the City of Fort Mitchell for the District's participation in the reconstruction and water main replacement of Lawrence Drive by paying a total amount of $30,750.00 for work to be performed by JPS Construction.

On motion of Commissioner Koester, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to award the North Miller Lane Water Main Replacement Project to Coomer Contractors and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Collins, seconded by Commissioner Wagner, and after discussion, the Board unanimously agreed to award the Rogers Road Water Main Replacement Project to Jack Gemmer & Son's, Inc. and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Wagner, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to award the Winkler Drive Water Main Replacement Project to Coomer Contractors and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Koester, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the purchase of flowable fill to Ideal Supplies and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Collins, seconded by Commissioner Koester, and after discussion, the Board unanimously agreed to approve the purchase of the following vehicles and equipment from the vendors indicated:

One (1) Bobcat 442 Hydraulic Excavator	Bobcat Interprises
Two (2) Ford F550 Trucks	Woody Sander Ford

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, and after discussion, the Board unanimously agreed to award the purchase of caustic soda to JCI Jones Chemicals, Inc. and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Collins, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to retain the firm of Business Benefits, Inc. as the broker of record for the District for a three year period and authorized the District staff to execute any documents necessary to implement the Board's decision.

On motion of Commissioner Wagner, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to defer the award of contracts for Value Engineering, Sludge Treatment at the Fort Thomas Treatment Plant and Construction Management until a later time, to award a contract for engineering services related to the Fort Thomas Treatment Plant and the Memorial Parkway Treatment Plant Advanced Treatment Process Improvements to CH2MHILL/HDR, to award a contract for engineering services related

to the Taylor Mill Treatment Plant Advanced Treatment Process Improvement to Malcolm Pirnie/GRW, and to authorize the District staff to execute appropriate contract documents with CH2MHILL/HDR and Malcolm Pirnie/GRW.

The Board reviewed the District's financial reports and Department reports.

The Board recognized the District communications and education committee for it receipt of the Public Information 2008 Award of Excellence from the Kentucky/Tennessee Section of the American Water Works Association.

Other matters of a general nature were discussed.

There being no further business to come before the Board, upon motion of Commissioner Collins, seconded by Commissioner Wagner, the Board unanimously agreed to adjourn the meeting.

CHAIRMAN

SECRETARY

ADVANCED TREATMENT PROCESSES ENGINEERING SELECTION

NKWD Commission Meeting

July 31, 2008

North Kitsap Water District

Presentation Outline

- Background
- Budget and Timeline
- Description of Projects
- Procurement Process
- Staff Recommendation

North Kitsap Water District

Our Team

- Jack Bragg
- Chris Couch
- Steve Glass
- Jim Haas
- Richard Harrison
- Bari Joslyn
- Amy Kramer
- John Schmiade
- Scott Shepherd
- Laura Talarek
- Bill Wulfeck

From left to right: Jim Haas (Plant Operator), John Schmiade (Equipment Serviceman), Chris Couch (Equipment Serviceman), Steve Glass (Instrumentation Technician), Laura Talarek (Laboratory Technician)

North Kitsap Water District

What is Included in This Project and Why

GAC at FTTP, TMTP, MPTP:	meet 2012 regulations
UV at FTTP, MPTP:	additional microbiological barrier
Basin replacement at TMTP	address decaying infrastructure
Value engineering	ensure best project at best price
Reservoir sludge disposal at FTTP	address storage and water quality concerns in reservoirs
Construction Management	represent NKWD interests during construction

Northern Kentucky Water District

Timeline

1976	Safe Drinking Water Act
2001	Regulatory Assessment (B & V)
2004	Asset Management Plan (B & V)
2005	Disinfection By-Product Rule (DBPR) and Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
2/2006	Board education session on new regulations
8/2006	Board education session on new regulations
10/2006	Board approved "advanced" treatment processes vs "basic" and approved 2007 5 year capital improvement budget
10/2007	Board education session on new regulations and Board approved 2008 5 year capital improvement budget

Northern Kentucky Water District

Timeline continued

2008	GAC Preliminary Design Report (Malcolm Pirnie)
2008	Sludge Evaluation (GRW)
7/31/2008	Recommend consultant(s) for design
7/2009	Complete design
12/2009	Bids and PSC approval
8/2011	New processes on-line
2012	DBP Rule and LT2 Rule Compliance required

Northern Kentucky Water District

Where We Left Off:

5 Year Capital Budget Funding Breakdown

	2007	2008
Unfunded Mandates/Regulations	$ 96,961,500	$ 87,388,534
Infrastructure Replacement	$ 42,101,000	$ 80,375,000
Security/Redundancy	$ 20,745,000	$ 20,357,000
Customer Growth Needs	$ 18,139,000	$ 12,494,000
Technology	$ 13,104,500	$ 12,004,000
TOTAL	$ 191,051,000	$ 212,618,534

Water District

5 year Capital Project Budget v Engineering Estimate (millions)

	2008 BUDGET	Preliminary design (Malcolm Pirnie) ESTIMATE
▪ MPTP Advanced Treatment	$13	$27*
▪ FTTP Advanced Treatment	$64	$46
▪ TMTP Advanced Treatment and Basin Replacement	$16	$26
▪ TOTAL	$93	$99

* includes upsizing plant to 20 MGD

Water District

Projected Rate Impact

	2009	2011	2013	Total
Capital	11%	17%	7%	35%
O & M	8%	8%	11%	27%
Depreciation	1%	1%	1%	3%
Rate increase total	20%	26%	19%	65%
Current average bill/ quarter	$32.90			
Projected average bill/quarter	$39.57	$48.03	$54.19	

Water District

Project Was Divided into Several Categories for Engineering Proposal

- NKWD could spread out the work
  - Engineer could propose on 1 category or all categories
- Potentially get best costs
- Project Categories:
  - GAC and UV at FTTP
  - GAC and UV at MPTP
  - GAC and basin replacement at TMTP
  - Value engineering (VE)
  - Reservoir sludge disposal at FTTP
  - Construction management (CM)

Water District

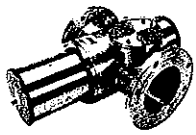
Reasons for Recommending GAC

- NKWD will not comply with 2012 Stage 2 DBP regulation
- Pilot programs show GAC to be effective at all 3 plants at DBP removal
- GAC removes wide variety of other contaminants
  - Chemical spills
  - Emerging contaminants
    - Endocrine disruptors
    - Pharmaceutically-active compounds
    - Personal care products
- GAC considered best available technology by EPA

Water District

Reasons for Recommending UV

- Additional disinfection barrier
- Relatively low costs compared to other disinfection options
- UV does not form disinfection by-products
- Easy operation
- Small footprint, easy retrofit

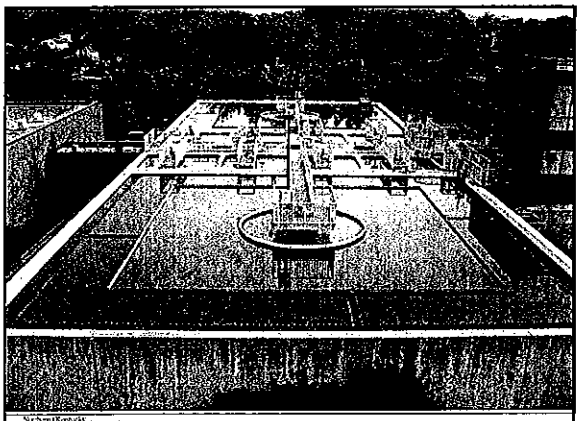


Water District

Reasons for Recommending Basin Replacement at TMTP

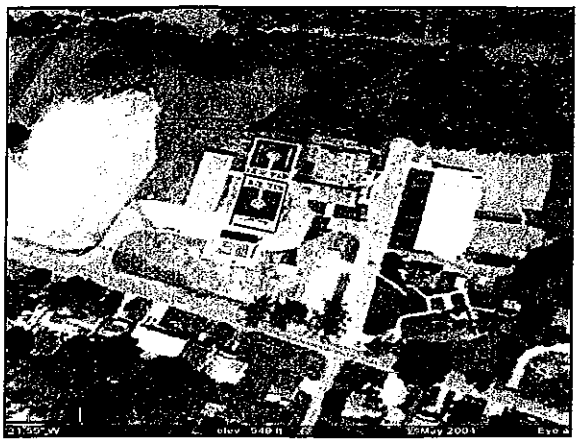
- 8asins are original with plant = 1955
- Testing and evaluation by CH2MHill (2003), B & V (2006) CTL (concrete specialists, 2006):
  - Basins have already undergone 2 major repairs
  - Visible leaking cracks at construction joints and in exterior walls
  - Leaking on underside of exposed elevated slabs
  - Top of walls exhibit exposed aggregate
  - "remove and replace existing basins"
- New basins will provide enhanced settling through more efficient lamella process
- Replace in different location
  - Design and construct together to facilitate construction and minimizing plant downtime

Water District



Water District

Water District



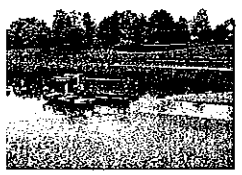
Reasons for Recommending Value Engineering

"An organized process to achieve the best balance among function, cost and performance"

- Identifies unnecessary cost
- Offers alternatives while assuring that quality, reliability, life cycle costs, meet owner's expectations
- Takes place at 30% and at 70%
- Savings in form of deferrals, phasing, better processes, different unit locations
- Industry "rule of thumb": VE always at least pays for itself

Reasons for Recommending Reservoir Sludge Removal Facilities at Fort Thomas

- Significant amount of dry tons of solids in north and south reservoirs
  - Water quality problems
  - Lack of storage
- Recommendation:
  - Add on to existing sludge facilities



Construction Management

- Consultant is responsible for overseeing contractor and contract
  - permits
  - work sequencing
  - review of submittals
  - payment applications
  - review change orders
  - record documents and photographs
- Inspection must be supervised by a professional engineer registered in the state of KY according to the PSC and KDOW

Our Engineering Procurement Process

1. "Cast the big net"
2. Evaluate qualifications
   - Comprehensiveness of proposal
   - Innovation/technical strengths, tools
   - Meet schedule
   - Necessary experience
   - Flexible and compatible
3. Other considerations
   - spread work around
     - risk avoidance
     - keep diverse expertise in play
     - capacity to handle all work
4. Evaluate proposals
5. Interview
6. Check references
7. Interview again
8. Reevaluate
9. Check references (19)
10. Prepare recommendation

Qualifications and Proposals

- Request For Qualifications (RFQ)
  - Issued January 20, 2008
  - 9 firms responded
    - 3 for treatment
    - 8 for VE and CM
- Request for Proposals (RFP)
  - Issued March 10, 2008
  - 9 firms responded
  - Interviews: May 8 – 16, 2008
  - Additional interviews with 4 firms : July 7 - 18, 2008

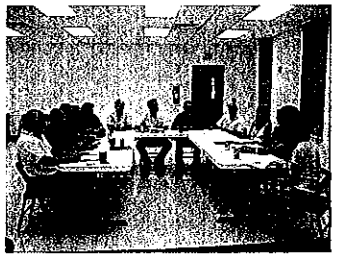
Decision-making for Engineering Services

- Numerous possibilities
  - Cost range $6.9 million - $15.9 million
- 10 approaches considered carefully
- Narrowed to 3 approaches
- Considered deferring 3 parts of the project
- Eventually arrived at 1 recommended approach

Water District

10 Possibilities

Microsoft Excel Worksheet



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Recommendation to Defer 3 Parts of Project

1. Value engineering
   - Proposal range $0.3 – $1.3 million
   - Will not be needed for several months
   - Some firms indicated that they would have lower costs once design firms were selected
2. Reservoir sludge disposal at FTTP
   - Proposal range $0.9 - $1.6 million
   - Process has provided staff with more education on reservoir sludge removal
   - Need more information on type of sludge and volume of sludge
   - Work with EE&T on contingency basis to investigate unknowns more thoroughly
   - Will keep board informed

Water District

Recommendation to Defer 3 Parts of Project (continued)

3. Construction management
   - Proposal range $1.5 - $4.5 million
   - Will not be needed for 12 - 14 months
   - Looking at more cost efficient methods

Water District

Project Recommendation for July 31, 2008 Board Meeting

- Project Categories:
  - GAC and UV at FTTP
  - GAC and UV at MPTP
  - GAC and basin replacement at TMTP
  - ~~Value engineering (VE)~~ DEFER
  - ~~Reservoir sludge disposal at FTTP~~ DEFER
  - ~~Construction management (CM)~~ DEFER

Water District

Approach 1: *Choose Firms Ranked Highest*

FT MP
MP MP
TM MP

- Advantages
  - Malcolm Pirnie has best basic understanding of our needs based on preliminary design work
  - Only working with one design firm so ease of communication
- Disadvantages
  - Costs
  - No experience with Malcolm Pirnie building any big projects
  - "All eggs in one basket" with MP
  - Can one firm do all the work and meet deadline?

Water District

Approach 2: *Choose Firms That Are Lowest Cost*

FT CH
MP CH
TM CH

- Advantages
  - Costs are lowest
  - Only working with one design firm so ease of communication
  - We are familiar with CH2's SCADA and architects
  - We have built big projects with CH2 before
- Disadvantages
  - Risk: "all our eggs in one basket" with CH2
  - Most recent project with CH2 (Lockwood Green) has been problematic
  - Can one firm do all the design work and still meet compliance deadline?

Water District

Approach 3: *Choose Lowest Cost Firm for FTTP and MPTP except Choose Highest Ranked Firm (Malcolm Pirnie) for TMTP*

FT CH
MP CH
TM MP

- Advantages
  - 2nd lowest cost approach
  - Keeps two firms in design of project: not all our "eggs in one basket"
  - Malcolm Pirnie has most knowledge of project through preliminary design work
  - Best value: optimizes cost and qualifications
- Disadvantages
  - About $50,000 more than lowest cost

Water District

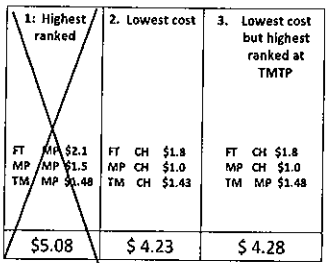
Summary of 3 Approaches ($ in millions)

1: Highest ranked	2. Lowest cost	3. Lowest cost but highest ranked at TMTP
FT MP $2.1 MP MP $1.5 TM MP $1.48	FT CH $1.8 MP CH $1.0 TM CH 1.43	FT CH $1.8 MP CH $1.0 TM MP $1.48
$5.08	$ 4.23	$ 4.28

Difference between these two options is $850,000

Water District

Summary of 3 Approaches ($ in millions)



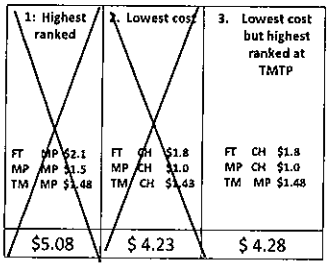
Why eliminate approach 1?

Highest cost "all eggs in one basket" with MP

Can one firm do all work and finish within deadline?

Southern Nevada Water District

Summary of 3 Approaches ($ in millions)



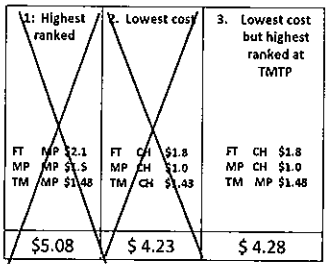
Why eliminate approach 2?

"all eggs in one basket" with CH

Can one firm do all work and finish within deadline?

Southern Nevada Water District

Summary of 3 Approaches ($ in millions)



Why is approach 3 the best approach?

Lowest cost approach that still keeps two design firms in play

Southern Nevada Water District

Staff Recommendation

3. Lowest cost but highest ranked at TMTP
FT CH $1.8 MP CH $1.0 TM MP $1.48
$ 4.28

Advantages

- 2nd lowest cost approach
- Keeps two firms in design of project: not all our "eggs in one basket"
- Malcolm Pirnie has most knowledge of project through preliminary design work over past 18 months

$50,402 higher than lowest cost

Water District

Engineering Costs

Anticipated: 10% or $10 million

Budgeted: $13 million (Malcolm Pirnie)

Historical perspective

- 1990 – 2000 average 20%
- 2001 – 2008 average 10%
  - $1.6 million savings

Water District

Summary: Proposed Engineering Costs

	Project	$ (millions)	Percent of Project
Staff recommendation	GAC/UV FTTP and MPTP, GAC/basins TMTP	4.3	4.3%
Anticipated future costs	Value engineering	0.5	0.5 %
	Construction management	2.0	2.0%
	Reservoir sludge removal	1.0	1.0%
Total engineering costs		7.8	7.8 %
Engineering budget		13.0	13%

Staff Recommendation

- Defer value engineering, sludge treatment at FTTP, construction management
- Accept proposal for/from:

▪ FTTP GAC/UV	CH2MHill/HDR	$1,772,700
▪ MPTP GAC/UV	CH2MHill/HDR	$1,011,018
▪ TMTP GAC/basins	Malcolm Pirnie/GRW	$1,475,000
TOTAL		$4,258,718

Water District

Water District

Proposals tabulation

original

revised

Water District

Summary of 3 Approaches ($ in millions)

1: Highest ranked	2. Lowest cost	3. Lowest cost but highest ranked at TMTP
FT MP $2.1 $2.5 MP MP $1.5 $1.8 TM MP $1.48 $1.54	FT CH $1.8 MP CH $1.0 TM CH 1.43	FT CH $1.8 MP CH $1.0 TM MP $1.48
$5.08	$ 4.23	$ 4.28

Difference between these two options is $850,000

Water District