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September 1, 2006

RECEIVED
SEP 0 1 2006
PUBLIC SERVICE COMMISSION

Beth O'Donnell
Executive Director
Public Service Commission
211 Sower Blvd.
Frankfort, KY 40601

Case No. 2006-00400

Dear Beth:

Attached for filing is the application of Northern Kentucky Water District for approval of the construction of facilities related to the upgrading of the chemical feed facilities at the Memorial Parkway Treatment Plant and for financing of a portion of the cost of that project.

The District received approval to issue Bond Anticipation Notes for approximately $500,000 of the cost in the last rate case and will issue approximately $2.4 million of BANS in 2007. However, $4,000,000 of the cost is predicated on a loan from the State Drinking Water Revolving Loan Fund. All information has been submitted to the Division of Water and the Kentucky Infrastructure Authority for approval of the loan. It was expected that the loan would be approved at KIA's September, 2006 meeting. However, that meeting has been cancelled. The loan review is now scheduled for the October 5, 2006 KIA meeting.

The District believes that it has filed all required information for approval of the project and financing with the exception of the KIA letter. Because bids for the project expire November 6, 2006, time becomes an issue. The District would like to have Commission approval prior to the expiration of the bids to avoid the possibility of having to re-bid the project, which may result in higher costs due to increased costs of materials and labor.

The District has requested as part of the application a deviation from the filing requirements to allow the application to be accepted for filing and for it to be reviewed for approval. As soon as the KIA letter of commitment is received it can be filed and the Commission's review completed. If the filing of the application is delayed until after

receipt of the KIA approval, it is likely that the Staff will not have adequate time to complete its review and issue an order prior to the November 6, 2006 bid expiration date.

For these reasons, the District requests that the application be accepted for filing.

Very truly yours,

John N. Hughes
Attorney for Northern Kentucky
Water District

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PUBLIC SERVICE COMMISSION

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF NORTHERN KENTUCKY WATER DISTRICT FOR APPROVAL OF IMPROVEMENTS TO THE MEMORIAL PARKWAY TREATMENT PLANT, ISSUANCE OF A CERTIFICATE OF CONVENIENCE AND NECESSITY AND APPROVAL OF FINANCING	)	CASE NO. 2006- 00400

APPLICATION FOR APPROVAL OF CONSTRUCTION AND FINANCING

Northern Kentucky Water District (NKWD), by counsel, petitions for an order approving modifications to the Memorial Parkway Treatment Plant pursuant to KRS 278.020 and approval of financing pursuant to KRS 278.300.

In support of the application, the following information is provided:

1. NKWD's office address is 2835 Crescent Spring Rd., Erlanger, KY 41018-0640. Its principal officers are listed in its current Annual Report on page 6, which is filed with the Commission as are its prior years Reports;

2. NKWD is a non-profit water district organized under Chapter 74 and has no separate articles of incorporation;

3. A description of NKWD's water system and its property stated at original cost by accounts is contained in its Annual Report, which is attached as Exhibit E.

4. NKWD serves retail customers in Kenton, Boone and Campbell Counties and

sells water at wholesale to non-affiliated water distribution systems in Kenton, Boone, Pendleton and Campbell Counties.

5. NKWD proposes to modify the existing chemical storage and feed facilities at the treatment plant as described in Exhibit A (Two copies of the Maps, Plans, Specifications and Bid Documents are provided as a separate bound document). The District proposes to finance the project with $500,000 from the 2005 BAN approved in Case No. 2005-00148, $2,365,000 from a BAN to be issued in 2007 and $4,000,000 from the Drinking Water State Revolving Loan Fund.

6. The construction is in the public interest and is required to allow NKWD to continue to provide adequate service to its customers. The project, its cost, need and other details are contained in Exhibit A.

7. The total financing for which approval is sought is approximately $4,000,000. See Exhibits C and D.

8. Easements and rights of way are not required, see Exhibit B.

9. This service will not compete with any other utility in the area.

10. The proposed construction project, identified in Exhibit A, is scheduled to begin construction in the fall of 2006 and be completed in November, 2007. Board approval of the project was given on August 17, 2006, attached as Exhibit C. Bid information is included with Exhibit C. Bids expire on November 6, 2006.

11. No new franchises are required. A copy of the DOW letter approving the Plans and Specifications for the proposed improvements is attached as Exhibit B.

12. Construction descriptions are in Exhibit A and Bid Documents. Facts relied on to justify the public need are included in the project descriptions in Exhibit A.

13. Maps of the area showing location of the proposed facilities are in Exhibit A.

14. The construction costs will be funded by the issuance of approximately $2.8 million of BANS and $4,000,000 loan from the DWSRF.

15. Estimated operating costs for operation and maintenance, depreciation and debt service after construction to the extent that there are any are shown in Exhibit D.

16. A description of the facilities and operation of the system are in Exhibit A.

17. A full description of the route, location of the project, description of construction and related information is in Exhibit A.

18. The start date for construction; proposed in-service date; and total estimated cost of construction at completion are included in Exhibits A and B.

19. CWIP at end of test year is listed in Exhibit E.

20. Plant retirements are listed in Exhibit B and E. No salvage values are included as booked.

21. The use of the funds and need for the facilities is justified based on a the engineering report included as Exhibit A

22. No rate adjustment is being proposed.

23. The following information is provided in response to 807 KAR 5:001 (8):

a. Articles of Incorporation – None. NKWD is a statutorily created water district under KRS Chapter 74;

24. The following information is supplied pursuant to 807 KAR 5:001(9):

a. Facts relied upon to show that the application is in the public interest: See Exhibit A.

25. The following information is provided as required by 807 KAR 5:001 (11):

a. A general description of the property is contained in the Annual Report, Exhibit E.

b. No stock is to be issued; No bonds are to be issued in this case;

c. There is no refunding or refinancing;

d. The proceeds of the financing are to construct the property described in Exhibit A

e. The par value, expenses, use of proceeds, interest rates and other information is not applicable because no bonds are being issued at this time.

26. The following exhibits are provided pursuant to 807 KAR 5:001 (11)(2):

a. There are no trust deeds. All notes, indebtedness and mortgages are included in Exhibit E.

b. Property is to be constructed is described in Exhibit A.

27. The following information is provided pursuant to 807 KAR 5:001(6):

a. No stock is authorized.

b. No stock is issued.

c. There are no stock preferences.

d. Mortgages are listed in Exhibit F.

e. Bonds are listed in Exhibit F.

f. Notes are listed in Exhibit F.

g. Other indebtedness is listed in Exhibit F.

h. No dividends have been paid.

i. Current balance sheet; income statement and debt schedule are attached as Exhibits F and G.

The District has received all approvals from the DOW for the Plans and Specifications for these improvements. However, because a loan from the DWSRF has been applied for, the District needs the approval from the DOW and the Kentucky

Infrastructure Authority (KIA) to finalize the financing. All applications, forms and information related to the DWSRF loan have been submitted to DOW and KIA. The next KIA board meeting is scheduled for October 5, 2006. The District anticipates approval of the loan. However, because the bids expire November 6, 2006, it is important for the PSC to begin its review of the project so that the final order can be issued prior to the expiration of bids.

The District requests a deviation pursuant to 807 KAR 5:001(14) from filing the approval letters of the DWSRF until received from DOW and KIA and that the application be accepted for filing without those approvals. The District believes all other information and approvals have been included with the application and that delaying the review of the project until receipt of the DWSRF will unnecessarily delay the project and may result in the loss of bids and additional costs to the District for re-bidding and increased material and labor expenses.

For these reasons, the District requests issuance of an order granting authority to construct the facilities, incur the debt, and for any other authorization that may be necessary.

SUBMITTED BY:

John N. Hughes
124 W. Todd St.
Frankfort, KY 40601

Attorney for Northern
Kentucky Water District

NORTHERN KENTUCKY
WATER DISTRICT

Project
Memorial Parkway Treatment Plant Improvements

Campbell County
184-435

NORTHERN KENTUCKY WATER DISTRICT
Memorial Parkway Treatment Plant Improvements
184-435

TABLE OF CONTENTS

80000 SERIES
30% P.C.W.

Case No. 2006-____
Exhibit ____A____

NORTHERN KENTUCKY WATER DISTRICT

Project
Memorial Parkway Treatment Plant Improvements

Campbell County
184-435

ENGINEERING REPORTS AND INFORMATION

Project Map

Preliminary Design Memorandum

Engineer's Opinion of Probable Total Construction Cost

Plans prepared by Quest titled "Memorial Parkway Treatment Plant Improvements" dated July, 2006

Specifications prepared by Quest titled "Memorial Parkway Treatment Plant Improvements" dated July, 2006

Case No. 2006-____
Exhibit ____A____

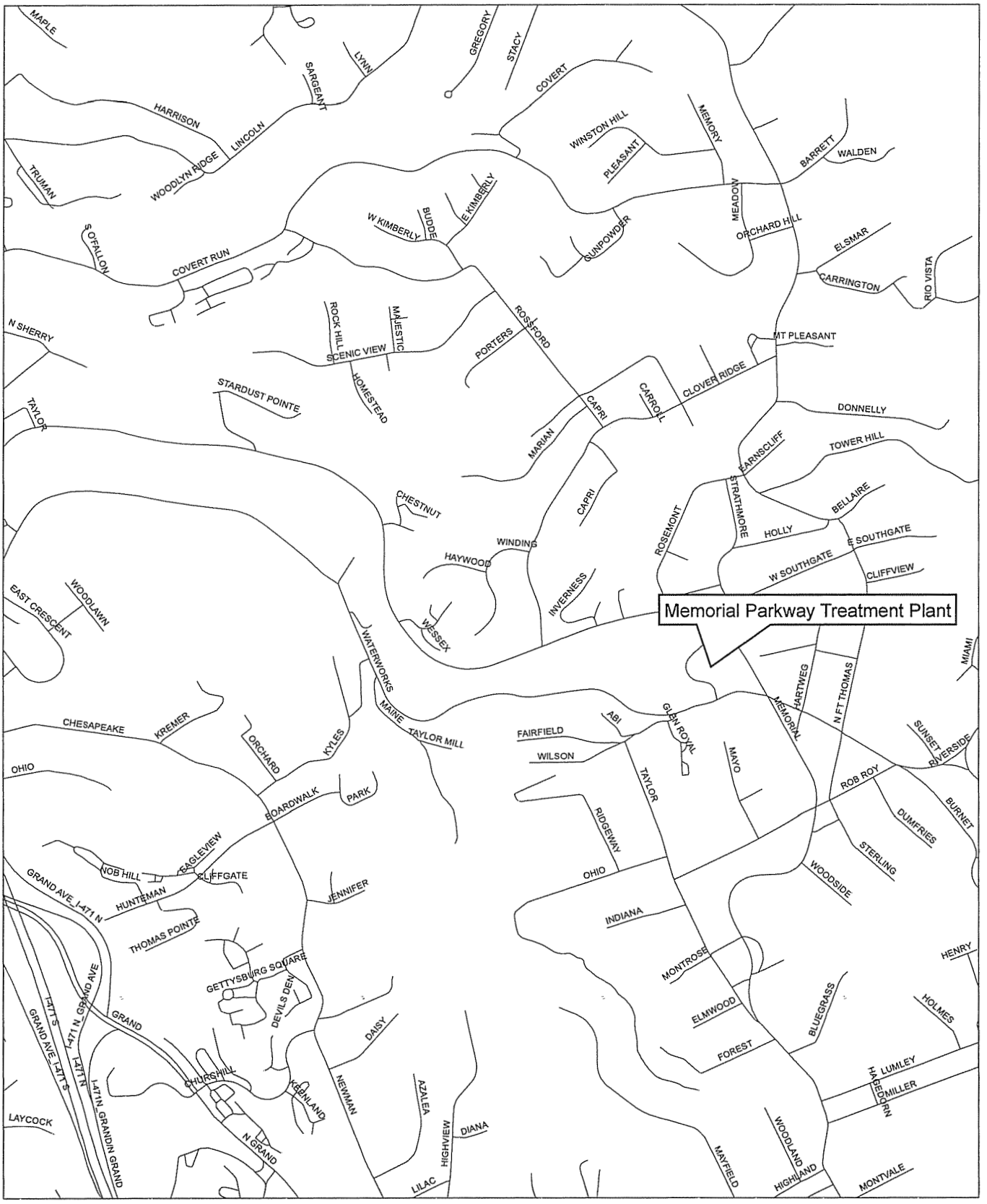
NORTHERN KENTUCKY WATER DISTRICT

Project
Memorial Parkway Treatment Plant Improvements

Campbell County
184-435

Project Map

Northern Kentucky Water District
Memorial Parkway Treatment Plant Improvements
Project Map



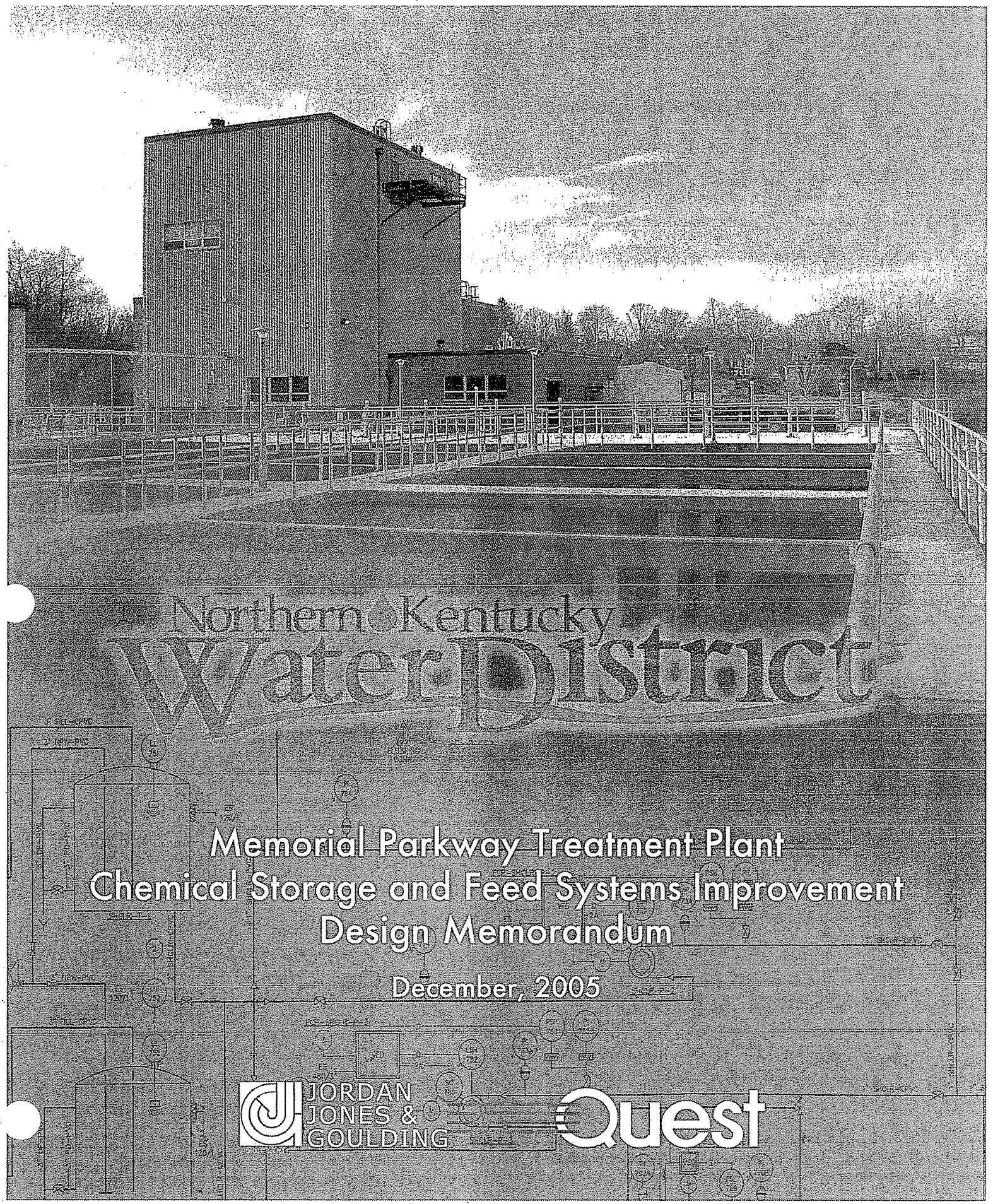
Case No. 2006-____
Exhibit ____A____

NORTHERN KENTUCKY WATER DISTRICT

Project
Memorial Parkway Treatment Plant Improvements

Campbell County
184-435

Preliminary Design Memorandum



Northern Kentucky Water District

Memorial Parkway Treatment Plant
Chemical Storage and Feed Systems Improvement
Design Memorandum

December, 2005

JORDAN JONES & GOULDING

Quest

Table of Contents

SECTION 1
Background and Purpose

The Northern Kentucky Water District (NKWD) owns and operates three treatment plants: the 44-MGD Fort Thomas Treatment Plant (FTTP), the 10-MGD Taylor Mill Treatment Plant (TMTP), and the 10-MGD Memorial Parkway Treatment Plant (MPTP). The MPTP feeds water by gravity to Newport and surrounding areas through two 20-inch lines, plus the Waterworks Road Pump Station can pump water from the 3-million gallon clearwell to Fort Thomas, Bellevue, and Dayton in northern Campbell County. Due to projected increases in demand in the remaining portions of Campbell County, it is anticipated that either the MPTP will be expanded or a new plant will be constructed and in service by 2018.

The MPTP, with most facilities dating to the original construction in 1961, stores and feeds chemicals from systems housed in multiple buildings. However, many of the systems lack proper containment, adequate storage volumes, and the capability for automation. NKWD previously conducted an engineering evaluation of the MPTP to explore options for improving chemical storage and feed systems as well as raw water transfer pumping from the reservoirs to the head of the plant.

Options that were evaluated for housing chemical storage and feed systems included rehabilitating the existing chemical building, constructing a new stand-alone chemical building, and retrofitting the abandoned sedimentation basins to house chemical feed systems. The purpose of this project is to expand on the initial evaluation and carry the selected approach through design and construction.

This report summarizes the evaluations that were performed as part of the Preliminary Engineering phase of this project. The report is organized as follows:

Section 2 – Plant Evaluations

- Chemical Storage and Feed Systems Evaluation
- Raw Water Tunnel Evaluation
- Powdered Activated Carbon Evaluation
- Raw Water Transfer Station Evaluation
- On-Site Generation of Sodium Hypochlorite Evaluation

Section 3 – Recommended Design Criteria

SECTION 2
Plant Evaluations

Chemical Storage and Feed Systems

This evaluation included further development of two chemical storage and feed system options presented in the September 2004 CH2M Hill report to approximately the 30% complete level, including:

Option 1 – Conversion of Existing Sedimentation Basins

Option 2 – Renovation of Existing Chemical Building

The design was based on providing bulk storage and feed systems for the existing MPTP capacity of treating 10 MGD with ability to easily expand to 20 MGD in the future. The following list of chemicals were included in this project:

- Ferric sulfate
- Sodium hypochlorite
- Caustic soda (50% strength)
- Polyaluminum chloride
- Copper sulfate
- Corrosion inhibitor
- Hydrofluorosilicic acid (fluoride)
- Coagulant aid polymer
- Filter aid polymer
- Ballast sand

To develop the design for the new chemical storage and feed systems at MPTP, the chemical use data for the time period of January 2002 through May 2005 was reviewed and is summarized in Table 2-1. Upon reviewing these historical dosages with NKWD, a consensus dosage was developed for design of each chemical feed system. This basis is included in Section 3, Recommended Design Criteria.

Table 2-1
MPTP Historical Chemical Dosages, mg/L (Jan 2002 - May 2005)

	Raw Flow (MGD)	Ferric Sulfate	PAC-XL9*	Hyperion 1750*	CIBA LT22S (Actiflo)	Pre-Caustic	Pre-Chlorine	Post-Chlorine
Min Day	1.84	2.7	7.4	1.8	0.24	0.7	0.8	0.3
Average Day	3.48	36.0	26.2	6.0	0.42	11.6	3.3	1.4
Max Day	8.10	66.5	33.8	27.7	0.78	25.5	8.9	7.1

	Pre+ Post Chlorine	Fluoride	PAC	Post-Caustic	KMnO4	Corrosion Inhibitor	Copper Sulfate
Min Day	0.8	0.4	1.1	0.6	0.3	0.4	0.4
Average Day	4.6	1.4	0.2	2.9	1.0	0.7	1.0
Max Day	11.0	5.5	17.9	16.7	2.2	1.2	6.2

* NKWD utilizes either PAC-XL9 or Hyperion 1750 at any one time.

Comparison of Two Options

Plans were developed to approximately 30 percent complete level for both options. These drawings are included as a separate attachment to this report. The following describes a general comparison of the two options followed by a summary of the estimated construction cost.

Option 1 –Conversion of Existing Sedimentation Basins

Option 1 consists of converting existing Sedimentation Basin Nos. 1 and 2 into a new Chemical Building. Figure 2-1 shows the proposed layout for this option. It is generally described to include the following elements:

- Installation of approximately 3,300 cubic yards of structural fill in Sedimentation Basin Nos. 1 and 2 in order to construct new containment and operating floor levels for the new Chemical Building. Installation of approximately 1,425 cubic yards of structural fill in Flocculation Basin No. 1 to construct a new operating floor and loading dock area.

- Erection of a new masonry building around existing Sedimentation Basins No. 1 and 2. The building would have space for 11 chemical feed areas including a space for a future feeder.

- New chemical storage and feed equipment as identified in the design criteria in Section 3. A detailed equipment list is included in Appendix A.

- Access roadway from Memorial Parkway to existing Waterworks Road entrance with a loading dock adjacent to existing Sedimentation Basin No. 1.

- Installation of a membrane type roof at a similar elevation to the adjoining Actiflo building.

- Electrical, instrumentation, access control, and heating, ventilation, and air conditioning (HVAC) components as described in the design criteria in Section 3.

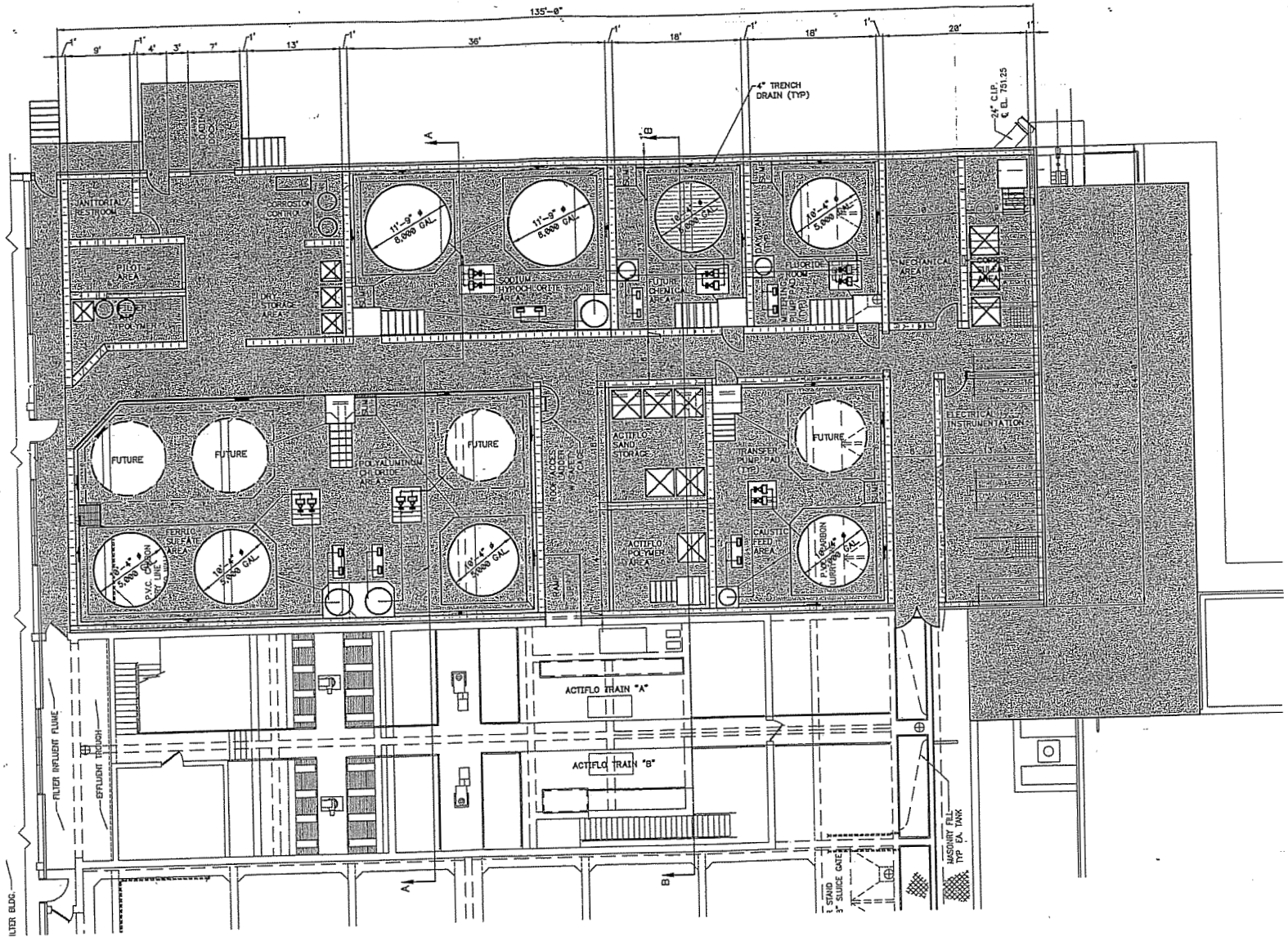


FIGURE 2-1

JORDAN JONES & GOULDING

Quest Engineers, Inc.
Lexington, Kentucky Louisville, Kentucky
Cincinnati, Ohio

NORTHERN KENTUCKY WATER DISTRICT

NOT RELEASED FOR CONSTRUCTION

MEMORIAL PARKWAY TREATMENT PLANT
CHEMICAL STORAGE AND FEED SYSTEM IMPROVEMENTS

PLAN
CONVERSION OF SEDIMENTATION BASINS 1 & 2

DESIGNED:	CHECKED:	DATE: SEPTEMBER 2005	N-2	
DRAWN:	JOB NO. 02406.001	SCALE: 1/8"=1'-0"	SHEET	REV

RIPTION OF REVISION

Option 2 –Renovation of Existing Chemical Building

Option 2 consists of renovating the existing Chemical Building. Figure 2-2 shows the proposed layout for this option. It is generally described to include the following elements:

- Removal of the skin of the existing Chemical Building and disposal of the asbestos material.
- Demolition of approximately the top 22 feet of the existing building including the chemical tanks, roof system, and support beams.
- Construction of new containment areas within the existing building to accommodate 11 new chemical feed systems, including a future feed system.
- New chemical storage and feed equipment as indicated in the design criteria in Section 3. A detailed equipment list is included in Appendix A.
- Installation of approximately 1,425 cubic yards of structural fill in Flocculation Basin No. 1 to construct a new loading dock area.
- Access roadway from Memorial Parkway to existing Waterworks Road entrance with a loading dock adjacent to the existing Chemical Building.
- Electrical, instrumentation, access control, and HVAC components as described in the design criteria in Section 3.

This option would utilize the existing structural system to erect the new Chemical Building within the same footprint as the existing building. Exterior walls would be masonry; a new roof deck would be pre-cast concrete with a membrane roof. This option would have chemical storage and feed areas located on both the basement and operating floor levels.

As part of evaluating Option 2, testing was performed on the building for lead and asbestos. The results of this analysis are included in Appendix B and show a presence of asbestos in the siding that would need to be removed if modifications are made to the building.

It was noted in the development of this option that it would be desirable to utilize the area currently occupied by the flash mixers on the lower level for chemical feed systems to provide additional space for plant personnel to work. However, to remove these basins would be very costly. Therefore, the recommended plan for this option is to leave the flash mix basins in place and fit the storage and feed systems in the remaining area.

Construction Cost Comparison

The plans for the two options were reviewed with a contractor to develop a comparison of construction costs and identify potential constructability issues. Table 2-2 summarizes the preliminary construction cost opinion of the two options (September 2005 dollars).

Table 2-2
Comparison of Preliminary Construction Cost
MPTP Chemical Feed System Improvements

Item	Option 1 (Sed Basin)	Option 2 (Chemical Bldg)
Site Work	$103,000	$103,000
PAC Facility	$205,000	$205,000
Chemical Building	$2,723,000	2,960,000
Miscellaneous*	$940,000	1,014,000
Contingency (10%)	$397,000	$428,000
Total Est. Construction Cost	$4,368,000	$4,710,000

NOTE: Miscellaneous line item includes miscellaneous construction items not shown on the 30-percent complete drawings, contractor mobilization/demobilization, and contractor overhead and profit.

A detailed summary of the assumptions that were used in preparing these opinions of construction cost is included in Appendix D.

These costs were based on vendor budgetary quotations (September 2005 dollars) and manpower requirements as estimated by the contractor assisting in the analysis.

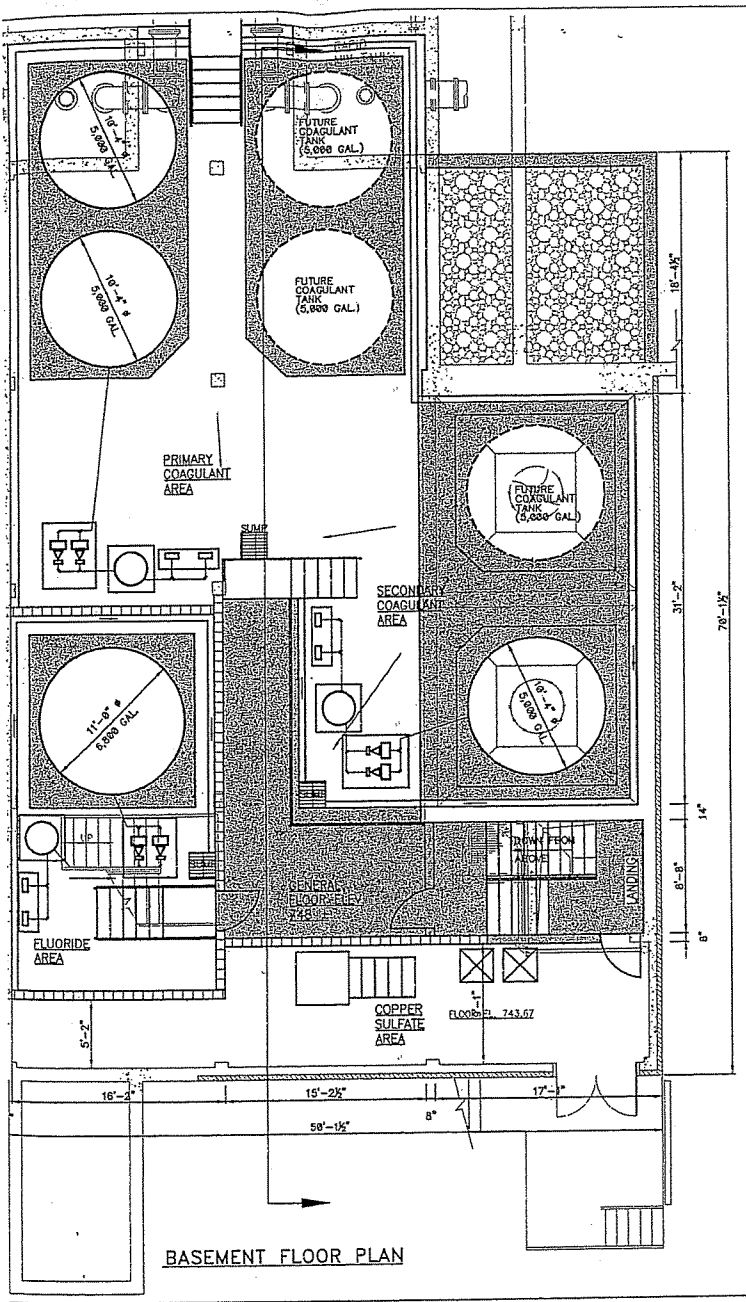
Constructability Review

The following provides a summary of constructability issues that were identified for the two options.

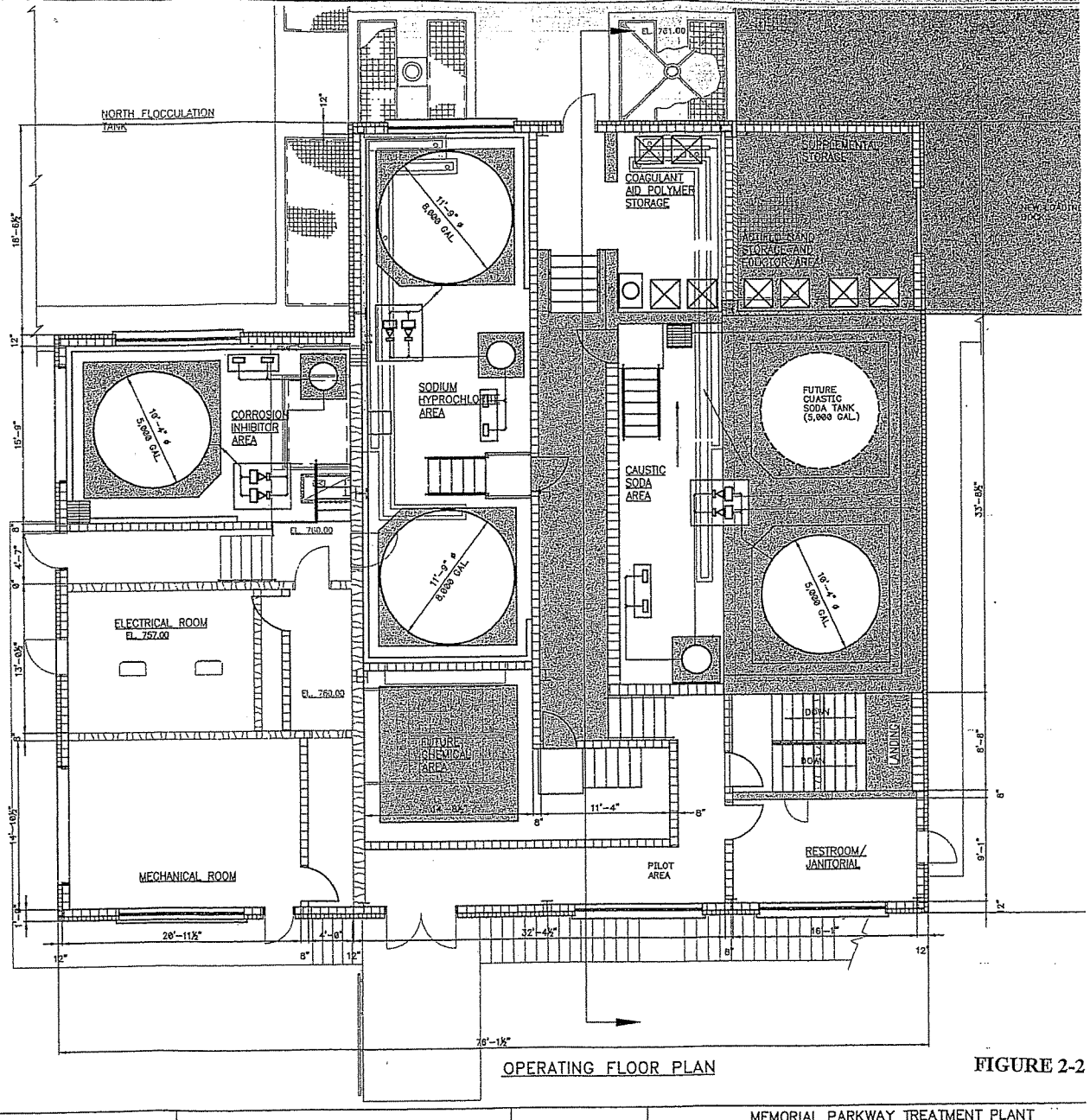
Option 1 – Conversion of Existing Sedimentation Basins

- The constructability of this option is good. There is good access from outside Sedimentation Basin No. 1 and no interruption of current operation is expected with the exception of re-routing the Acti-flo effluent.

- Several challenges do exist including some confined space work, demolition of areas around Sedimentation Basin Nos. 1 and 2 (e.g., ledge adjacent to Acti-flo and top slab adjacent to flocculation basin) and roof integration with existing structures.



BASEMENT FLOOR PLAN



OPERATING FLOOR PLAN

FIGURE 2-2

JORDAN JONES & GOULDING

Quest Engineers, Inc.
Lexington, Kentucky Louisville, Kentucky
Cincinnati, Ohio

NORTHERN KENTUCKY WATER DISTRICT

NOT RELEASED FOR CONSTRUCTION

MEMORIAL PARKWAY TREATMENT PLANT
CHEMICAL STORAGE AND FEED SYSTEM IMPROVEMENTS

PLAN–OPERATING FLOOR
PLAN–BASEMENT FLOOR

DESIGNED:	CHECKED:	DATE: SEPTEMBER 2005	M-4
DRAWN:	JOB NO. 02406.001	SCALE: 3/16"=1'-0"	SHEET

DESCRIPTION OF REVISION

- Holes should be cut in the floor of each existing basin to offset hydrostatic forces and prevent floating of the basins.

- Some of the concrete material scheduled for removal through demolition in the existing basins could be left as part of the fill. This would alleviate some of the cost of disposal and reduce the fill volume necessary.

- A "flat" membrane roof would be very cost-effective method of roofing for new building. A pitched roof would be very difficult to flash or support properly.

- Sedimentation Basins Nos. 5 and 6 were considered as alternatives for conversion to the new Chemical Building; however, less site work would be required with Basin Nos. 1 and 2.

Option 2 -- Renovation of Existing Chemical Building

- The constructability of this option is more difficult than Option 1. Access by crane to the building is acceptable, but other access needs are not good.

- Interruption of service is more likely at this location. The temporary facilities are manageable, but not desirable.

- Asbestos skin removal should be considered for a separate contract using a specialized contractor. Several different possibilities exist for removal ranging from non-containment to full containment of the material (and structure) based on whether the asbestos material becomes friable or not. The cost difference between these methods is approximately $100,000.

- The existing rapid mix basin area should not be included in the lower level footprint due to structural concerns and extreme cost of the demolition of these basins.

- Lower level access could be improved by using more vertical wall cuts than floor cuts (e.g., existing carbon hoppers). Vertical walls cuts are significantly less expensive than floor cuts. This could change the method of installation on bulk tanks.

- Demolition associated with the elevator shaft will be easier with the roof taken off. Weather would be more of a concern with this option (existing operations).

Raw Water Tunnel Evaluation

As part of this project, the buried suction and discharge piping for the Raw Water Transfer Station (RWTS) was inspected to determine necessary improvements. On June 28, 2005, an inspection was performed on the brick arch tunnel and twin 24-inch cast iron raw water mains. A report summarizing this evaluation is included in Appendix D.

Powdered Activated Carbon Evaluation

This study included a comparison of a new bulk powdered activated carbon (PAC) silo to a new semi-bulk bag system. Potential locations for the new system were reviewed, including potential use of the existing Chemical Building or a new stand-alone building located in the vicinity of the raw

water lines near the reservoirs. A separate technical memorandum was prepared summarizing this evaluation and is included in Appendix E.

Raw Water Transfer Station Evaluation

The interior suction and discharge piping of the Raw Water Transfer Station (RWTS) was evaluated for both the 10- and 20-MGD plant capacity. New pumps were selected for the 10-MGD rate. In addition, an assessment of options was made for air conditioning needs for variable-speed drives that would be installed with the new RWTS pumps. An electrical evaluation was performed to determine needed electrical upgrades and whether the existing transformer is adequate. A detailed report summarizing this evaluation is included in Appendix F.

On-Site Generation of Sodium Hypochlorite Evaluation

Two approaches for chlorine were reviewed for all three of NKWD's treatment plants: bulk liquid sodium hypochlorite as currently employed and on-site generation (both dilute 0.8% and 12% sodium hypochlorite). This review included:

- Present worth cost comparison
- Review of advantages and disadvantages of the systems
- Alternative procurement methods (lease or purchase)

A technical memorandum summarizing this evaluation is included in Appendix G.

Existing Electrical Service

Currently MPTP has three electrical services from Cinergy. All three services are fed from the same overhead primary distribution circuit that runs along Water Works Road. The three services are:

1. Plant - The feed to the plant is underground 12,470 volt primary with primary metering. The underground primary feeds the outdoor switchgear enclosure and a 750-kVA pad mounted transformer adjacent to the enclosure. NKWD owns/maintains the underground primary, switchgear and transformer. Underground primary from the outdoor switchgear also feeds the RWTS via a 225 kVA transformer outside the transfer station.

2. Water Works Rd PS - The feed to this pump station is underground 12,470 volt primary to a pad mount transformer with secondary metering. Cinergy owns/maintains the underground primary and transformer.

3. Sludge Building - The feed to this building is underground 12,470 volt primary to a pad mount transformer with secondary metering at an outdoor switchgear enclosure. Cinergy owns/maintains the underground primary and transformer. A 480-volt feeder from the outdoor switchgear to the RWTS serves as a backup feeder for the transfer station.

Electrical demand history is summarized in Table 2-3 based on preliminary information obtained from Cinergy:

Table 2-3
MPTP Historical Electrical Demands

Month/Year	Plant		Sludge Bldg	
	Demand (kW/kVA)	Capacity (kVA)	Historical Demand (kW)	Capacity (kVA)
June/04	270/338	975	16	1,000
July/04	372/465	975	16	1,000
Aug/04	276/345	975	16	1,000
Sept/04	246/308	975	18	1,000
Oct/04	264/330	975	18	1,000
Nov/04	270/338	975	17	1,000
Dec/04	258/323	975	14	1,000
Jan/05	252/313	975	17	1,000
Feb/05	222/278	975	18	1,000
Mar/05	240/300	975	15	1,000
April/05	240/300	975	15	1,000
May/05	222/278	975	12	1,000

* Plant kW demand adjusted for power factor (80%) to get kVA rating.
** Plant capacity based on the sum of two pad mounted transformers; 750 kVA at the plant and 225 kVA at RWTS.
*** An additional 120 kW demand would be added if sludge handling facilities were operated.

SECTION 3
Recommended Design Criteria

Chemical Storage and Feed Systems

Based on the cost comparison and constructability review, Option 1, Conversion of Existing Sedimentation Basin Nos. 1 and 2, is recommended with the design criteria as summarized in Table 3-1.

The following provides an overview of the recommended design criteria:

General Considerations

- MPTP has present capacity of 10 MGD and this remains the initial design capacity. However, provisions should be made for future potential expansion to 20 MGD.
- Include at least one extra containment area and space for the incorporation of an additional chemical in the future. This may also be used for chemical trials, etc.
- Ideal accessibility to the new chemical facility would be from interior of existing buildings. Ramps are not ideal. At grade entrances are preferred.
- As part of the conversion of the sedimentation basin option, NKWD would like to change the routing of the Actiflo effluent to travel through only a single extra detention basin prior to entering the filters. This would be reviewed with KDOW prior to finalizing the design.
- The access roadway submitted in the preliminary plans needs to be re-worked to include a new access controlled entrance/exit on Memorial Parkway. This will facilitate a better delivery route for trucks.
- Erosion control measures will need to be included during construction. If additional impervious area is created on the site, additional storm water improvements will be required.

Process Mechanical Considerations

NKWD indicated that process mechanical features of new or modified structures at the MPTP should include:

- Number of pumps should include an in-service spare (N+1) for each chemical. A spare pump on the shelf is desirable if money is available.
    a. Peristaltic pumps should be used for sodium hypochlorite (Watson-Marlowe preferred). Consider if existing pumps can be reused.
    b. Mechanical diaphragm pumps (Milton-Roy MaxRoy B preferred) for coagulant feed, corrosion control, pH adjustment, polymer feeds, etc. Speed and stroke control are necessary.

Table 3-1
Basis of Design - Chemical Feed Rates and Storage Requirements
Project No. 2406.001

Design Flow Rates:

Phase 1 Water Pumped		Phase 2 = Future Build Out (additional flow trains)	
Min Day	2.0 MGD	Min Day	4.0 MGD
Avg Day	6.7 MGD	Avg Day	13.3 MGD
Max Day	10.0 MGD	Max Day	20.0 MGD
Storage Requirements:	30 days at average flow rate	Storage Requirements:	30 days
Phase 1 Raw Water Flow		**Phase 2 = Future Build Out (additional flow trains)**	
Min Day	2.0 MGD	Min Day	4.0 MGD
Avg Day	6.7 MGD	Avg Day	13.4 MGD
Max Day	10.0 MGD	Max Day	20.0 MGD
Storage Requirements:	30 days at average flow rate	Storage Requirements:	30 days

Coagulant Feed System	Feed Point # 3	Proposed Equipment				
Ferric Sulfate		Unit	Capacity (gph)		Unit	Capacity (gals)
		COAG1-P-1,2	40 gpm		COAG1-DT-1	775
		COAG1-MP-1	42 gph		COAG1-T-1,2	5,000 Phase one
		COAG1-MP-2	42 gph		COAG1-T-3,4	5,000 Phase two
		COAG1-MP-3	42 gph	Phase two		
Density:	6.42 lb./gal	Feedrate (gph)			Required Storage (gals)	
		Phase 1	Phase 2	Total	Phase 1	Total
Min Dosage:	6.0 mg/L	0.65	0.65	1.3	9,410	18,810
Avg Dosage:	36.0 mg/L	13.1	13.1	26.1		
Max Dosage:	66.5 mg/L	36.0	36.0	72.0		
Note:						
Secondary Coagulant	Feed Point # 4	Proposed Equipment				
(XL9)		Unit	Capacity (gph)		Unit	Capacity (gals)
		COAG2-P-1,2	15 gpm		COAG2-DT-1	255
		COAG2-MP-1	16 gph		COAG2-T-1	5,000 Phase one
		COAG2-MP-2	16 gph		COAG2-T-2	5,000 Phase two
		COAG2-MP-3	16 gph	Phase two		
Density:	10.03 lb./gal	Feedrate (gph)			Required Storage (gals)	
		Phase 1	Phase 2	Total	Phase 1	Total
Min Dosage:	7.4 mg/L	0.5	0.5	1.0	4,370	8,750
Avg Dosage:	26.2 mg/L	6.1	6.1	12.2		
Max Dosage:	33.8 mg/L	11.7	11.7	23.4		
Tanks size based on min truck delivery						

Table 3-1
Basis of Design - Chemical Feed Rates and Storage Requirements
Project No. 2406.001

Design Flow Rates:

Phase 1 Water Pumped			Phase 2 = Future Build Out (additional flow trains)	
Min Day	2.0	MGD	Min Day	4.0 MGD
Avg Day	6.7	MGD	Avg Day	13.3 MGD
Max Day	10.0	MGD	Max Day	20.0 MGD
Storage Requirements:	30	days at average flow rate	Storage Requirements:	30 days
Phase 1 Raw Water Flow			Phase 2 = Future Build Out (additional flow trains)	
Min Day	2.0	MGD	Min Day	4.0 MGD
Avg Day	6.7	MGD	Avg Day	13.4 MGD
Max Day	10.0	MGD	Max Day	20.0 MGD
Storage Requirements:	30	days at average flow rate	Storage Requirements:	30 days

Secondary Coagulant (ALT)		Feed Point # 4	Proposed Equipment				
(Hyperion 1750)			Unit	Capacity (gph)		Unit	Capacity (gals)
			Same as above			Same as above	
Density:	10.84	lb./gal	Feedrate (gph)			Required Storage (gals)	
			Phase 1	Phase 2	Total	Phase 1	Total
Min Dosage:	1.8	mg/L	0.12	0.1	0.2		
Avg Dosage:	6.0	mg/L	1.3	1.3	2.6	930	1,860
Max Dosage:	27.7	mg/L	8.9	8.9	17.8		
Chlorine (Pre) (12.5% bulk)			Proposed Equipment				
		Feed Point # 7	Unit	Capacity		Unit	Capacity (gals)
			SHCLR-P-1,2	25 gpm		SHCLR-DT-1	425
			SHCLR-MP-1	42 gph		SHCLR-T-1	8,000 Phase one
			SHCLR-MP-2	42 gph		SHCLR-T-2	8,000 Phase two
			SHCLR-MP-3	42 gph	Phase two		
Density (12.5%)	1.0	lb/gal	Feedrate (gph)			Required Storage (gals)	
			Phase 1	Phase 2	Total	Phase 1	Total
Min Dosage:	0.8	mg/L	0.55	0.55	1.11		
Avg Dosage:	3.3	mg/L	7.8	7.8	15.54	5,600	11,190
Max Dosage:	8.9	mg/L	31.7	31.7	63.39		
Chlorine (Post) (12.5% bulk)		Treated water	Proposed Equipment				
		Feed Point # 10	Unit	Capacity			
			SHCLR-MP-4	30 gph*		See above	
			SCHLR-MP-5	30 gph*			
Density (12.5%)	1.0	lb/gal	Feedrate (gph)			Required Storage (gals)	
			Phase 1	Phase 2	Total	Phase 1	Total
Min Dosage:	0.3	mg/L	0.21	0.2	0.41		
Avg Dosage:	1.4	mg/L	3.3	3.3	6.56	2,360	4,720
Max Dosage:	7.1	mg/L	25.3	25.3	50.57		

Note: * replace post SCHLR-P-4,5 next phase with capacity=60 gph

Table 3-1
Basis of Design - Chemical Feed Rates and Storage Requirements
Project No. 2406.001

Design Flow Rates:

Phase 1 Water Pumped		Phase 2 = Future Build Out (additional flow trains)	
Min Day	2.0 MGD	Min Day	4.0 MGD
Avg Day	6.7 MGD	Avg Day	13.3 MGD
Max Day	10.0 MGD	Max Day	20.0 MGD
Storage Requirements:	30 days at average flow rate	Storage Requirements:	30 days
Phase 1 Raw Water Flow		**Phase 2 = Future Build Out (additional flow trains)**	
Min Day	2.0 MGD	Min Day	4.0 MGD
Avg Day	6.7 MGD	Avg Day	13.4 MGD
Max Day	10.0 MGD	Max Day	20.0 MGD
Storage Requirements:	30 days at average flow rate	Storage Requirements:	30 days

Carbon Feed System	Feed Point #2	Proposed Equipment					
		Unit	Capacity			lbs/day	
		C-EJ-1	4 gpm		C-PE-1	1,680	Phase one
		C-EJ-2	4 gpm		C-PE-2	1,680	Phase two
		C-EJ-3	4 gpm	Phase two			
Norit Hydrodarco W (lignite coal)					* Big Bag dosing systems w/ 900 lb bags		
		(Liquid ejectors)			Space to store 10 - 900 lb bags		
Capacity at 60°F:	39.0 lb./cf	Feedrate (lb./day)			Required Storage (lbs) *15 days		
		Phase 1	Phase 2	Total		Phase 1	Total
Min Dosage:	1.0 mg/L	16.7	16.7	33.4			
Avg Dosage:	5.0 mg/L	279	279	559		4,191	8382
Max Dosage:	20.0 mg/L	1,668	1,668	3,336			
Note: No back-up is shown since carbon is feed intermediately, (solution str.= assumed 2 gal/lb)							
Corrosion Inhibitor System	Feed Point #12	Proposed Pumps			Proposed Storage		
Alternate Material (K-5)		Unit	Capacity (gph)		Unit	Capacity (gals)	
		CORN-P-1,2	3.5 gpm				
Used now		CORN-MP-1	1.7 gph		Totes		
		CORN-MP-1	1.7 gph				
Density:	11.4 lb./gal	Feedrate (gph)			Required Storage (gals)		
		Phase 1	Phase 2	Total		Phase 1	Total
Min Dosage:	1.0 mg/L	0.1	0.1	0.1			
Avg Dosage:	1.2 mg/L	0.2	0.2	0.5		170	350
Max Dosage:	1.3 mg/L	0.4	0.4	0.8			
Tanks size based on min truck delivery							
Corrosion Inhibitor System (ALT)	Feed Point #12	Proposed Pumps			Proposed Storage		
Alternate Material (536)		Unit	Capacity (gph)		Unit	Capacity (gals)	
Used in past; consider as alternate to K-5		see above					
Density:	11.3 lb./gal	Feedrate (gph)			Required Storage (gals)		
		Phase 1	Phase 2	Total		Phase 1	Total
Min Dosage:	0.6 mg/L	0.0	0.0	0.1			
Avg Dosage:	1.1 mg/L	0.2	0.2	0.5		160	330
Max Dosage:	1.9 mg/L	0.6	0.6	1.2			

Table 3-1
Basis of Design - Chemical Feed Rates and Storage Requirements
Project No. 2406.001

Design Flow Rates:

Phase 1 Water Pumped		Phase 2 = Future Build Out (additional flow trains)	
Min Day	2.0 MGD	Min Day	4.0 MGD
Avg Day	6.7 MGD	Avg Day	13.3 MGD
Max Day	10.0 MGD	Max Day	20.0 MGD
Storage Requirements:	30 days at average flow rate	Storage Requirements:	30 days
Phase 1 Raw Water Flow		**Phase 2 = Future Build Out (additional flow trains)**	
Min Day	2.0 MGD	Min Day	4.0 MGD
Avg Day	6.7 MGD	Avg Day	13.4 MGD
Max Day	10.0 MGD	Max Day	20.0 MGD
Storage Requirements:	30 days at average flow rate	Storage Requirements:	30 days

Fluoride Feed System — Feed Point #13

Calculated as H2SiF6
Density (@23% to 25%): 2.5 lb./gal

	Dosage		Feedrate (gph)			Required Storage (gals)	
			Phase 1	Phase 2	Total	Phase 1	Total
Min Dosage:	0.4	mg/L	0.1	0.1	0.2	660	1,320
Avg Dosage:	1.0	mg/L	0.9	0.9	1.8		
Max Dosage:	1.2	mg/L	1.6	1.6	3.3		

Proposed Pumps		Proposed Storage	
Unit	Capacity (gph)	Unit	Capacity (gals)
FL-P-1,2	3.5 gpm	FL-DT-1	55
FL-MP-1	4 gph	FL-T-1	6,800
FL-MP-2	4 gph		

Note: Tanks size based on min truck delivery

Pre-Caustic (50%) Feed System — Feed Point #9

Density @ 50%: 6.3 lb./gal

	Dosage		Feedrate (gph)			Required Storage (gals)	
			Phase 1	Phase 2	Total	Phase 1	Total
Min Dosage:	0.7	mg/L	0.08	0.1	0.15	3,070	6,140
Avg Dosage:	11.6	mg/L	4.3	4.3	8.5		
Max Dosage:	26.0	mg/L	14.3	14.3	28.5		

Proposed Pumps			Proposed Storage		
Unit	Capacity (gph)		Unit	Capacity (gals)	
SH-P-1,2	15 gpm		SH-DT-1	225	
SH-MP-1	19.4 gph		SH-T-1	5,000	Phase one
SH-MP-2	19.4 gph		SH-T-2	5,000	Phase two
SH-MP-3	19.4 gph	Phase two			

* expressed as fluoride ion.

Post-Caustic (50%) Feed System — Feed Point #11

Density @ 50%: 6.3 lb./gal

	Dosage		Feedrate (gph)			Required Storage (gals)	
			Phase 1	Phase 2	Total	Phase 1	Total
Min Dosage:	0.6	mg/L *	0.1	0.1	0.1	710	1,430
Avg Dosage:	2.7	mg/L *	1.0	1.0	2.0		
Max Dosage:	8.0	mg/L *	4.4	4.4	8.8		

Proposed Pumps		Proposed Storage	
Unit	Capacity (gph)	Unit	Capacity (gals)
SH-MP-4	6.2 gph *	See above	
SH-MP-5	6.2 gph *		

Note: * replace SH-P-4,5 next phase with pump = 9 gph

Copper Sulfate Feed System (Dry) — Feed Point #1	Proposed Pumps	Proposed Storage * 15 days

Table 3-1
Basis of Design - Chemical Feed Rates and Storage Requirements
Project No. 2406.001

Design Flow Rates:

Phase 1 Water Pumped		Phase 2 = Future Build Out (additional flow trains)	
Min Day	2.0 MGD	Min Day	4.0 MGD
Avg Day	6.7 MGD	Avg Day	13.3 MGD
Max Day	10.0 MGD	Max Day	20.0 MGD
Storage Requirements:	30 days at average flow rate	Storage Requirements:	30 days
Phase 1 Raw Water Flow		**Phase 2 = Future Build Out (additional flow trains)**	
Min Day	2.0 MGD	Min Day	4.0 MGD
Avg Day	6.7 MGD	Avg Day	13.4 MGD
Max Day	10.0 MGD	Max Day	20.0 MGD
Storage Requirements:	30 days at average flow rate	Storage Requirements:	30 days

		Unit	Capacity (CFH		Unit	Capacity (lbs)	
Calculated as dry product		CUS-FDR-1	0.29		15-50lb bags	900	Phase one
		CUS-FDR-1	0.60	Phase two*	15-50lb bags	900	Phase two
Density	75.0 lb./cf	Feedrate (lb./day)			Required Storage (lbs) *15 days		
		Phase 1	Phase 2	Total		Phase 1	Total
Min Dosage:	0.4 mg/L	6.8	6.8	13.7			
Avg Dosage:	1.0 mg/L	56.5	56.5	113.0		847	1,695
Max Dosage:	6.2 mg/L	517.1	517.1	1034.2			

Note :Provide two augars one to feed 0.11 cf/h , second to feed 0.29 cf/h
* expand (new auger) in the next phase

Flocculation Aid Feed System (Dry)	Feed Point #6	Proposed Pumps			Proposed Storage		
Actiflo polymer- Magnafloc LT-22S		Unit	Capacity (CFH		Unit	Capacity (lbs)	
Calculated as dry product		PY-FDR-1	0.06		13-55lb bags	700	Phase one
		PY-FDR-1	0.12	Phase two*	26-55lb bags	1400	Phase two
Density	45.0 lb./cf	Feedrate (lb./day)			Required Storage (lbs)		
		Phase 1	Phase 2	Total		Phase 1	Total
Min Dosage:	0.2 mg/L	3.3	3.3	6.7			
Avg Dosage:	0.4 mg/L	23.5	23.5	46.9		704	1,408
Max Dosage:	0.8 mg/L	66.7	66.7	133.4			

Note:* expand (new auger) in the next phase

Filter Aid Feed System (Dry)	Feed Point #8	Proposed Pumps			Proposed Storage		
		Unit	Capacity (CFH		Unit	Capacity (lbs)	
Calculated as dry product		PY-FDR-1	0.06		13-55lb bags	700	Phase one
		PY-FDR-2	0.12	Phase two	26-55lb bags	1400	Phase two
Density	45.0 lb./cf	Feedrate (lb./day)			Required Storage (lbs)		
		Phase 1	Phase 2	Total		Phase 1	Total
Min Dosage:	0.2 mg/L	3.3	3.3	6.7			
Avg Dosage:	0.4 mg/L	23.5	23.5	46.9		704	1,408
Max Dosage:	0.8 mg/L	66.7	66.7	133.4			

Note : Assumed density, not data sheets

c. Match pumps at existing plants to minimize spare parts inventory as much as possible.

- Calibration columns should be included with each pump and read in milliliters (not ounces or gallons). Make considerations for flushing of the feed pumps during cleaning. Include in-line strainers. Flooded suction for all pumps is preferred.

- Chemical transfer pumps should be able to pump product between bulk tanks as well as to the day tank. Manual isolation ball valves will be installed before and after all tanks and pumps (transfer and metering). Ball valves are not preferred for sodium hypochlorite environment (diaphragm valves will be used).

- Discharge piping from the blowoff lines should have a valve and turned down fitting to empty into a bucket. Same for oil lubricated equipment (oil drain line to have a similar fitting).

- Day tanks should be included for all tanks in accordance with 10 State Standards. Discussions held with KDOW on subject indicate that day tanks are needed when multiple bulk tanks are present. In the case of sodium hypochlorite if on-site generation is selected, day tanks for the generated hypochlorite solution would not be required (this does not apply to bulk hypochlorite). Day tanks may need to be short and wide to accommodate accurate level indication to the SCADA system. Level indicators on tanks shall be non-contact, Magnatrol, Milltronics, or Hydroranger.

- Bulk chemical storage tanks are preferred to be fiberglass with 4' of headroom on top of tank for service (also handrails on top of tank). Separate fill lines for each tank. Site tubes (visible from doorway) for each tank. Site tubes need to be rigid and resistant to etching. Consider teeing tank vent lines together (where appropriate) to minimize roof penetrations.

- Fill lines should be rigid and not prone to sag when full of chemical. Fill station spill containment should not be subject to rainwater. Include a stoop area or the like. Keyed lock-outs should be included on the fill lines. One key for each chemical with the color codes similar to FTTP. Fill valves should be ball valves.

- Typical sump pump arrangement should include a pump that can pump to sanitary disposal, back to an outside truck and into another bulk tank. If one pump can't perform all tasks, two pumps should be installed. Level indicator should be included to identify when material is in the sump pit. Sump pump(s) and any isolation valves should be capable of operation from the room entrance.

- Sump discharges should be located away from fill areas. Consider including the option to recycle spill material to back-up tank or pump to truck. Provide multiple hose bibs around fill and sump discharge areas.

- Channel or trench in floor is acceptable to direct chemical leaks to sump. Chemically-resistant coating should be put on containment area and top of tank pad.

- Consider a self-priming system for any floor drains that are installed. Alternative would be to locate drain next to eyewash/shower so that the monthly check of shower kept traps full.

- Consider including trays below overhead feed and drain lines to catch any drips and empty into containment area.

- Sodium hypochlorite, caustic soda and fluoride should have their own isolated rooms.

- Confirm compatible materials of discharge gauges, valves, meters, and piping associated with caustic soda system. Hot and cold hose bibs in the caustic area. Heat blanket on caustic soda bulk tanks. 50% caustic soda is fed.

- No scales required for day tanks per KDOW.

- NKWD prefers concrete containment area. Double-wall tanks could be considered but are not desired based on past experience.

- Totes may be considered in lieu of bulk storage for corrosion inhibitor. Bulk tanks should be sized for full load deliveries. No half-load deliveries of chemicals desired.

- No special seismic requirements are anticipated.

- Sodium hypochlorite system needs to also be constructed of compatible materials. Sodium hypochlorite system should be capable of feeding the product at 3 locations (pre-coagulation, pre-filtration and post-filtration). Threaded joints in the chemical piping should be avoided. Glued joints are preferred with a chemically-resistant glue. Include a pH probe in the sodium hypochlorite system to monitor strength.

- An eductor should be considered for Actiflo ballast sand feed. In addition, the Actiflo polymer will stay at its present location.

- Fluoride tanks should have external vents.

- The issue of a flooded suction for all chemical transfer pumps was identified early in discussions with NKWD operations and maintenance personnel. Chemical transfer systems at other WTPs were designed based on a partially flooded suction for the pumps. This has created a situation where pump flow is reduced (sometimes severely) as the bulk tank is emptied. As a result, JJG/Quest was asked to evaluate the impact of installing the bulk tank and transfer pumps in a manner that would insure a flooded suction at all times. Several key considerations were identified on this topic including capital cost, operations during a spill event and the resulting height of the chemical building to accommodate taller pads. Upon the conclusion of the discussion, NKWD staff felt the best solution was the place the bulk tanks on a small pad and place the transfer pumps on the floor of the containment area.

- Based on information discussed at the August 2005 project meeting, the following are identified as minimum storage requirements:

  - Copper Sulfate – 3 skids

  - Actiflo Sand – 5 skids

- Corrosion inhibitor feed rates indicate that bulk storage facilities may be an area that space savings could be found if NKWD desires. Bulk storage and feed will remain as the base

design, but drum feed and a reduced containment area may be suitable if space problems become apparent.

- Heat trace caustic supply and feed lines in specific areas located outside controlled environment.

- Re-evaluate location of coagulant system area in Option 1 after selection of final design option (if selected) in order to minimize length between chemical feed pumps and injection points (i.e., consider flipping the location of the containment areas in the floor plan).

Structural Considerations

The structural considerations for the new Chemical Feed Building are substantially different for the each of the options. These are detailed below for each:

Option No. 1 – Conversion of Existing Sedimentation Basins

- Fill the existing Sedimentation Basin Nos. 1 and 2 and Flocculation Basin No. 1 with structural fill (304 stone) and demolition debris up to elevation 756.0 feet. Use that as the containment floor level and build operational floor level at elevation 760.0 feet.

- Core holes in floor of existing basins to equalize hydrostatic pressure. Utilize drain lines in existing basins for moisture removal under the new containment floor slab.

- Fill existing flocculation basin in like manner to establish additional operating floor area.

- Exterior walls to be masonry and roof materials to include pre-cast concrete deck with membrane roofing material.

Option No. 2 – Renovation of Existing Chemical Building

- Remove existing chemical feed systems, containment and bulk storage.

- Remove any electrical components associated with the existing feed systems.

- Demolish and remove exterior skin of existing building including the asbestos material. Remove the top 22 feet of the building including the existing storage tanks.

- Lower the roof of the structure using the existing structural support system and incorporate new pre-cast concrete deck with membrane roof material.

- Erect new masonry walls for exterior and interior of building.

- Fill existing Flocculation Basin No. 1 to establish loading dock area.

Architectural Considerations

NKWD indicated that architectural features of new or modified structures at the MPTP should include:

- Flat membrane roof is acceptable if it is determined to be architecturally pleasing and cost-effective. Modified bitumen roof or other cost effective material may be considered.

- Masonry block/ brick exterior finish will be specified if it is cost-effective. Commercial brick veneers may be used as alternate if the masonry block is not cost-effective.

- No windows/sunlight in fluoride or sodium hypochlorite areas. May use a product like an insulated translucent sandwich panel.

- Modest amount of windows in a new facility, generally in work spaces. Make them accessible for cleaning.

- Skylights are not favored.

- Roof access from inside of structure is desirable.

- Roll-up doors should have a standard access door adjacent to them for safety and access reasons. Another option is a double door arrangement in lieu of the roll-up door.

A summary of the architectural design criteria, is included in Appendix H.

Safety Considerations

NKWD indicated that safety features of new or modified structures at the MPTP should include:

- Provide access to eye wash and emergency shower facilities at each chemical. Showers and eye washes tied to SCADA to indicate if the facilities are in use. Shower pit should have level indicator to identify flow. This information should be sent to SCADA.

- Provide temper water for all eyewash/shower systems.

- Provide audio and visual alarms on chemical bulk tanks to identify overflow. Alarm to be common high tank level. Include alarm in SCADA and do not provide a driver re-set. Consider implementing a visual level indication (not LED) outside the facility.

- Individual quick-connect with locks for each chemical fill line. Lock will prevent cross-fill.

- Include a camera to monitor truck deliveries.

- Panic hardware on the doors need to be bar type not paddle type/no motion sensors. Need to identify panic alarm (for evacuation) requirements and existing capabilities. Fire alarm may serve as back-up.

- Panic alarm/fire suppression system should not be proprietary. Simplex should not be specified for this reason. Guardian or Silent Knight are considered acceptable.

Building Mechanical Considerations

NKWD indicated that building mechanical features of new or modified structures at the MPTP should include:

- Building mechanical (especially ventilation) should be generously sized. Fluoride room and sodium hypochlorite area are very corrosive and needs special attention. HVAC duct work should be non-corrosive (Schedule 80/rigid PVC or fiberglass).

- Sprinkler system should be simple to operate and maintain. Make sure that the chemicals are compatible with wet suppression. Include floor drains in sprinkler-covered areas.

- Fire alarm will not be tied to the fire department.

- Air condition areas for sodium hypochlorite, electrical controls, VFD's and restrooms. Other rooms are ventilated only. Heat trace the caustic soda line similar to FTTP project.

- No sanitary drains and no hose down drains should be routed to North Reservoir basin. Segregate lines out to sanitary sewer.

- Under Option 2, the existing boiler could be re-used since it is approximately 1 year old.

Electrical Considerations

This section describes the guidelines for the design of electrical systems for the Chemical Storage and Feed Systems. The objective of the design is to maintain a safe, reliable and maintainable electrical distribution system. In general, the following basic guidelines shall apply:

- All electrical components, including transformers, conductors, and overcurrent devices will be sized for the existing, new, and known future loads per NEC.

- The fault current will be calculated at any specific point on the system and equipment will be rated for that fault current.

- Reliability is the ability of equipment to perform its function for its service life. For electrical equipment, reliability is established by several factors, including surrounding conditions, maintenance, and operating the equipment within its ratings.

- Maintenance and operation will be considered during design. This includes standardizing the type of equipment specified to ease operations, minimize maintenance time, and minimize maintenance parts; providing equipment and design that is safe, operable, and easily maintainable; and minimizing capitol, operations, and maintenance costs.

- The applicable standards and codes include the following:

  - National Electrical Code (NEC)
  - Kentucky Building Code (KBC)
  - Life Safety Code (NFPA 101)
  - National Electrical Safety Code (NESC)
  - National Fire Protection Association (NFPA)

- Insulated Cable Engineers Association (ICEA)
- National Electrical Manufacturers Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
- American National Standards Institute (ANSI)
- The Occupational Safety and Health Act (OSHA)
- American Society for Testing and Materials (ASTM)
- Underwriters Laboratory (UL)

- Exposed conduits in chemical areas will be PVC Schedule 80. Other areas including exterior locations will be aluminum. Underground conduit shall be PVC Schedule 40, concrete encased. Final connections to motors and other vibrating equipment will be with flexible conduit.

- Provide spare conduits where appropriate for future use.

- Conductors will be NEC Type THHN/THWN for sizes #14 through #1 AWG.; NEC Type XHHN for sizes #2 and larger.

- Use separate conduits for power, control and dc circuits.

- System voltage will be 208Y/120 for lighting and miscellaneous small loads; 480Y/277 for motors and feeder circuits.

- NEMA 1, gasketed enclosures will be used in locations where the area is relatively dry and clean; NEMA 4X stainless steel or plastic enclosures for electrical equipment outside and in corrosive areas; NEMA 7/9 enclosures for hazardous areas.

- Surge/lightning protection will be provided at main switchgears, loadcenters, VFDs and MCCs. For control and power distribution panels, follow the principle of "single point grounding" within each enclosure.

- Motors will be energy-efficient type. For motors used with variable frequency drives, inverter duty motors in accordance with NEMA MG 1, Part 31 will be utilized.

- In any space within the building, adequate lighting levels will be maintained. The footcandle level for maintained illumination will be as recommended by IES, Lighting Handbook.

- Fluorescent fixtures will be used in interior spaces. Consider placing these fixtures on the walls rather than hanging from the ceiling. Exterior lighting will be high pressure sodium. All fixtures must be accessible for re-lamping and maintenance.

- Provide night lighting in each chemical area (one light stays on in each room).

- Provide emergency lighting and exit light in each area as required by the current Kentucky Building Code.

NKWD indicated that electrical features of new or modified structures at the MPTP should include:

- Back-up power was scheduled for 2019. Check with Jim Dierig on any changes to schedule.
- Valve operators on transfer pumps in chemical building should not be Hayward or Asahi. Nibco is preferred.
- Leave space for CCTV cameras in electrical room. Extra conduits may be incorporated during design.
- Provide support structure for control panels along walkways so that the front of the panel is flush with the handrail and does not protrude out into the walkway.
- The existing 300 amp, Chemical Building circuit breaker in the outdoor switchgear enclosure will be re-used for the new chemical facility. A new feeder will be provided from this breaker to a new 480 volt distribution panel in the new chemical area.
- The new 480 volt distribution panel will be used to feed large package units employing motors greater than ¾ hp (with some exceptions in the case of chemical feed equipment) and for building service equipment, such as large HVAC units.
- A 480 – 208Y/120 volt transformer will be used to step-down the voltage for smaller miscellaneous loads and lighting.
- Emergency power for lighting and miscellaneous critical loads will be provided through a new automatic transfer switch (ATS) connected to the existing 250 kW generator.

Access Control

NKWD indicated that access control features of new or modified structures at the MPTP should include:

- Access control in new chemical area shall be a slave off the master. All exterior doors shall have keypad with proximity reader for building access. For exiting buildings, provide a pushbar.
- Access control should be included on new electrical room.
- Swipe card access with PIN codes on all exterior doors.
- Overhead doors that are not near a door will be operated from the outside with keyed access similar to door access.

I&C/SCADA

NKWD indicated that I&C features of new or modified structures at the MPTP should include:

- Provide a computer with HMI in Electrical Room.

- Provide extra conduit into new facility for future purposes (CCTV). If fiber is used, provide spare fibers for future use.
- All interior conduits should be PVC.
- PLC for new chemical area shall be Allen-Bradley Contrologix. Computer should be Dell, HP, or IBM. Specification requirements can be obtained from the original SCADA project.
- Consider replacing A/B 5/04 at Actiflo with A/B 5/05. Also replace Panelview with computer and monitor.
- Conduit for telephones will be installed as part of this project; NKWD will contract separately to have telephone wire installed and tied into MPTP system.
- Use fiber optic cables for data connections between PLCs. Provide spare (dark) fibers for future use.
- Level indicators on chemical storage tanks and day tanks will be non-contact, ultrasonic devices.
- The control strategy for PAC will be fully automatic with manual override.
- A pH probe will be included with the sodium hypochlorite system to monitor strength.
- No scale weights are required for day tanks as per KDOW.
- Level alarms will be included to identify when liquid is present in each chemical containment area sump pump pit. These alarms will be tied to SCADA.
- Speed and stroke control will be required for chemical feed pumps. Chemical feed pumps will be set up to receive run and speed commands from the SCADA system.
- Electrically-actuated valves in each chemical feed system will be monitored for open/close status.
- SCADA tag names must be consistent with NKWD's existing system. Each tag must include reference to MPTP.
- Provide "no flow" alarms tied to SCADA for each chemical feed system.
- Provide high pressure alarms tied to SCADA on each chemical feed pump discharge.
- All devices and drivers for the new chemical feed equipment will be connected to SCADA.
- All data collection, programs and alarms would reside in the new PLC, which would be connected to the existing SCADA network using a compatible communication link. Several new screens will be required and some will be updated.
- Status/alarm for such items as ambient temperature, flooding, fire, and unauthorized entry would be installed and brought to the PLC for SCADA access.

Support Features

NKWD indicated that support features of new or modified structures at the MPTP should include:

- A single (unisex) restroom/washroom should be provided. No ADA requirements need to be met.
- Janitor Room - Include hot/cold water source and mop bucket floor dump drain similar to FTTP.
- Extra space should be provided in electrical rooms for the possible installation of cameras.
- Hose bibs should be included in each chemical area.
- Access to sanitary sewer at each containment area.

Raw Water Tunnel

Based on the inspection that was performed on the raw water tunnel, the following recommendations are made:

1. Perform a number of non-destructive metallurgical tests at the areas found to have the heaviest corrosion to estimate the remaining wall thickness. After comparing the results to the original specifications, NKWD may consider adding a protective coating on the exterior and interior of the lines or a structural lining using the existing pipelines as conduits for a new system.
2. Plug or cap the open end of the abandoned pipeline.

Prior to entering the tunnel, it should be ventilated to allow safe entry.

Powdered Activated Carbon

A new semi-bulk bag feed system is recommended based on the amount and frequency of PAC fed at MPTP. This system should be housed in a new pre-engineered building and fully automated. The building could be located adjacent to the reservoir or located closer to the existing Chemical Building. A single PAC feed point is desired by NKWD in the raw water pipe, located so either it can be fed to the reservoir or to water that is pumped directly to the treatment plant bypassing the reservoir. The desire is to provide as much detention time in the pipe as is practical.

Additionally, the chemical feed rate of PAC for spills (maximum feed rate) was established at 35 mg/L under a 10 million gallon per day (MGD) design. If the MPTP is expanded beyond that capacity, NKWD will address additional PAC feed capability for treating potential spills at that time.

Raw Water Transfer Station

The design criteria for new pumps at the RWTS for the 10-MGD design capacity is as follows:

Number of pumps: 3
Type: Horizontal split case
Capacity: 2 at 10 MGD; 1 at 5 MGD
Drive: Variable-speed on all pumps
Head: 2 at 75 ft; 1 at 55 ft
Horsepower: 2 at 152 HP; 1 at 56 HP

The design was based on utilizing only the 5-MGD pump when plant flows were no more than 5 MGD; the two larger 10-MGD pumps would be utilized when plant flows are between 5 and 10 MGD. It is not intended that the 5- and 10-MGD pumps would be operated at the same time.

In the future, the 5-MGD pump would be replaced with a third 10-MGD pump to provide the required level of redundancy for a 20-MGD plant capacity.

Piping Modifications

It is recommended that some minor piping modifications be made in the RWTS consisting of removing the 18-inch and 24-inch pump suction manifold in the pipe trench and replacing it with 30-inch pipe. Also, the 14-inch discharge pipe header pipe should be replaced with 18-inch pipe and the 20-inch discharge header pipe should be replaced with 24-inch pipe. The existing pump discharge piping, check and isolation valves will need to be increased in size from 14 inches to 16 inches. The individual pump suction piping will need to be increased from 16 inches to 18 inches.

For the 10-MGD design, no changes are required for the suction piping outside the station. Ultimately, a new suction line will be required when the capacity is increased to 20 MGD. At that time, it is proposed that the new line be connected to the opposite end of the existing suction header in the existing pipe trench.

Electrical

NKWD indicated that I&C features of new or modified structures at the RWTS should include:

- The general guidelines addressed previously for Chemical Storage and Feed Systems shall also apply to the RWTS.

- The existing service from Cinergy at the Sludge Building (Adjacent to the RWTS), has adequate spare capacity for the new raw water pumps. It will serve as the primary source of power for the RWTS. An 800 amp breaker in the existing Sludge Building outdoor switchgear will be added to feed the new raw water VFDs.

- The existing feeder from MPTP to the RWTS will now serve as a back-up to run one pump in the event of a failure of the feeder from the Sludge Building. The existing transformer behind the RWTS will be replaced with a new 300 kVA, outdoor pad mount transformer. Switchover to the back-up power source will be via a new manual transfer switch.

- Removal of the existing transformer may involve hazardous materials (PCBs). This will be considered during design and addressed as required.

- The RWTS VFDs will be located in the Sludge Building laboratory storage area and connected to the RWTS PLC for control via Ethernet. Allen-Bradley DeviceNet will be considered as an alternate means of data transfer.

- The new VFDs will be Allen-Bradley PowerFlex Series 700H. It will include a NEMA 1 enclosure, LCD interface module, Ethernet communication module, input line reactors and output contactor.

- Local safety switches will be provided at each pump to disconnect the power feed to the pump.

- Piping exposed to low temperatures will be heat traced with Raychem XL-Trace system.

Access Control

- No changes are required.

I&C/SCADA

NKWD indicated that I&C features of new or modified structures at the RWTS should include:

- Re-use the existing Allen-Bradley ControLogix PLC at the RWTS to control the new pumps. Provide additional I/O cards as required and programming.

- Flood notification (currently exists).

- Control of the pumps will be local, remote manual, or remote automatic through SCADA. In local mode, each pump may be controlled at the pump or at the VFD. In remote automatic mode, the VFD would be automatically controlled by the PLC. In remote manual mode, the VFD will be operator controlled. Operators will have the ability to start/stop each pump and adjust the speed at the VFD or through SCADA. The VFD will be able to maintain a desired flow rate within a specific range.

- Ancillary equipment such as pump discharge pressure, pump high temperature sensors and pump vibration sensors will be utilized as required to shutdown the pump in the event of a problem. Alarms for each will also be connected to SCADA.

- A Hach turbidimeter will be installed at the RWTS.

On-Site Generation of Sodium Hypochlorite

Based on the cost comparison of alternatives, the existing bulk hypochlorite system has the lowest 20-year present worth value for the MPTP. The annual operating cost of either OSG system is substantially less than the bulk hypochlorite and would be subject to less variations in cost of raw chemicals/consumables (e.g., salt and power), but the initial capital cost would take several years to pay back.

At this time, it is recommended that NKWD remain with the bulk hypochlorite chemical feed system at the MTTP. Should the price of bulk hypochlorite continue to rise or if NKWD desires to eliminate the risk of handling high-strength hypochlorite, a 0.8% sodium hypochlorite on-site generation system has the next lowest present worth and should be considered.

For the TMTP, the same conclusion was reached, because the bulk hypochlorite has the lowest 20-year present worth value. For the FTTP, either OSG system has a lower 20-year present worth value than the existing bulk hypochlorite system. This result is driven by the fact that FTTP uses substantially more chlorine than the other two plants. NKWD has indicated that they will remain with bulk hypochlorite at this time.

Opinion of Project Cost

Table 3-2 provides a summary of the estimated cost of the project. These costs were prepared in September 2005 and assume that the project will be bid as one contract.

Table 3-2
Opinion of Project Cost

1. Sitework	$103,000
2. PAC Facility	$205,000
3. Chemical Building (Option 1)	$2,723,000
4. Raw Water Transfer Station	$892,000
5. Miscellaneous*	$940,000
Subtotal Construction Cost	$4,863,000
Engineering/Resident Representation	$412,000
Project Contingency (10%)	$486,000
Total Project Cost (Sept 2005)	$5,761,000

* Miscellaneous line item includes miscellaneous construction (10%), mobilization/demobilization (3%), and contractor overhead and profit (18%) as percentages of the construction cost of Items 1 - 4.

Future adjustments to construction cost of materials and labor should be considered. For a project that is bid in second quarter 2006, we recommend that the District carry a 5 percent contingency for inflation of material and labor due to the uncertainty of the market. This inflation rate is based on multiple indexes published by ENR, but may not include potential additional impacts on cost increases due to some of the recent events (e.g., Hurricane Katrina). Additional cost estimates will be developed as the project moves through design.

SECTION 4
NKWD Project Scope Decisions

A meeting was held with NKWD on October 24, 2005, to review the draft version of this report and discuss available funding for the project. In this meeting, the following decisions were made:

- Option 1, Conversion of Sedimentation Basin Nos. 1 and 2, will be designed with the planned layout to be reconfigured to keep construction limits confined to the sedimentation basins. By reducing the building size and avoiding filling in the existing flocculation basins, it is anticipated there will be approximately $100,000 in construction cost savings.
- The PAC system will be bid as an additive alternate to allow NKWD the flexibility of choosing whether to construct the facility depending on available funds.
- The smaller 5-MGD RWTS pump will be bid as an additive alternate.
- Access control will be removed from this project and placed in a separate project.
- NKWD will determine which parts of the project will be funded from their capital budget and from their operations and maintenance budget.

Schedule

The anticipated schedule for implementing this work is as follows:

Detailed Design – November, 2005 through March 2006

- Interim Design Review Meetings:
  - December 16, 2005
  - January 2006
  - February 2006
- Design Completion/KDOW Reviews – March 2006

Bid Phase and Award – April 2006 through May 2006

Construction – June 2006 through June 2007 (a 12-months construction contract period is anticipated at this time).

APPENDIX A
Chemical Storage and Feed System Options Equipment List

Equipment List
Northern Kentucky Water District - Memorial Parkway Treatment Plant
Chemical Feed and Storage

Tag	Equipment Name	Chemical	Manufacturer	Horsepower	Cap/Size	Power
MP-FERRIC-T-1	Fiberglass flat bottom tank 10'-0" diameter x 8'-7" high	Ferric Sulfate	Augusta Fiberglass, JustinTanks, Tankinetics		5000 gals	
MP-FERRIC-T-2	Fiberglass flat bottom tank 10'-0" diameter x 8'-7" high	Ferric Sulfate	Augusta Fiberglass, JustinTanks, Tankinetics		5000 gals	
MP-FERRIC-P-1	Mag-Drive Chemical Duty Centrifugal	Ferric Sulfate	ANSI Mag Goulds SP 3298	2 hp	40 gpm	480/3
MP-FERRIC-P-2	Mag-Drive Chemical Duty Centrifugal	Ferric Sulfate	ANSI Mag Goulds SP 3298	2 hp	40 gpm	480/3
MP-FERRIC-DT-1	Fiberglass flat bottom tank 48" diaeter x 99" high	Ferric Sulfate	Augusta Fiberglass, JustinTanks, Tankinetics		775 gals	
MP-FERRIC-MP-1	Metering Pump- mROY-B 100 psi-96 SPM	Ferric Sulfate	Milton Roy	1/2 hp	57 gph	120/1
MP-FERRIC-MP-2	Metering Pump- mROY-B 100 psi-96 SPM	Ferric Sulfate	Milton Roy	1/2 hp	57 gph	120/1
MP-PACL-T-1	Fiberglass flat bottom tank 10'-0" diameter x 8'-7" high	Hyper+Ion 1750	Augusta Fiberglass, JustinTanks, Tankinetics		5000 gals	
MP-PACL-T-2	Fiberglass flat bottom tank 10'-0" diameter x 8'-7" high	Hyper+Ion 1750	Augusta Fiberglass, JustinTanks, Tankinetics		5000 gals	
MP-PACL-TP-1	Mag-Drive Chemical Duty Centrifugal	Hyper+Ion 1750	ANSI Mag Goulds SP 3298	1.5 hp	15 gpm	120/1
MP-PACL-TP-2	Mag-Drive Chemical Duty Centrifugal	Hyper+Ion 1750	ANSI Mag Goulds SP 3298	1.5 hp	15 gpm	120/1
MP-PACL-DT-1	Fiberglass flat bottom tank 42" diameter x 48" high	Hyper+Ion 1750	Augusta Fiberglass, JustinTanks, Tankinetics		255 gals	
MP-PACL-MP-1	Metering Pump- mROY-A 100 psi-117 SPM	Hyper+Ion 1750	Milton Roy	1/2 hp	19.4 gph	120/1
MP-PACL-MP-2	Metering Pump- mROY-A 100 psi-117 SPM	Hyper+Ion 1750	Milton Roy	1/2 hp	19.4 gph	120/1
MP-CAUSTIC-T-1	Fiberglass flat bottom tank 10'-0" diameter x 8'-7" high	Sodium Hydroxide (Caustic Soda)	Augusta Fiberglass, JustinTanks, Tankinetics	2-500 watt tank heaters	5000 gals	120/1
MP-CAUSTIC-TP-1	Mag-Drive Chemical Duty Centrifugal	Sodium Hydroxide (Caustic Soda)	ANSI Mag Goulds SP 3298	1.5 hp	25 gpm	480/3
MP-CAUSTIC-TP-2	Mag-Drive Chemical Duty	Sodium Hydroxide	ANSI Mag	1.5 hp	25 gpm	480/3

Equipment List
Northern Kentucky Water District - Memorial Parkway Treatment Plant
Chemical Feed and Storage

	Centrifugal	(Caustic Soda)	Goulds SP 3298			
MP-CAUSTIC-DT-1	Fiberglass flat bottom tank 42" dimeter x 48" high	Sodium Hydroxide (Caustic Soda)	Augusta Fiberglass, JustinTanks, Tankinetics	heater	255 gals	120/1
MP-CAUSTIC-MP-1	Metering Pump- mROY-A 100 psi-117 SPM	Sodium Hydroxide (Caustic Soda)	Milton Roy	1/2 hp	19.4 gph	120/1
MP-CAUSTIC-MP-2	Metering Pump- mROY-A 100 psi-117 SPM	Sodium Hydroxide (Caustic Soda)	Milton Roy	1/2 hp	19.4 gph	120/1
MP-CAUSTIC-MP-4	Metering Pump- mROY-A 100 psi-117 SPM	Sodium Hydroxide (Caustic Soda)	Milton Roy	1/2 hp	6.2 gph	120/1
MP-CAUSTIC-MP-5	Metering Pump- mROY-A 100 psi-117 SPM	Sodium Hydroxide (Caustic Soda)	Milton Roy	1/2 hp	6.2 gph	120/1
MP-HYPO-T-1	Fiberglass flat bottom tank 11'-0" diameter x 11'-4" high	Sodium Hypochlorite	Augusta Fiberglass, JustinTanks, Tankinetics		8000 gals	
MP-HYPO-TP-1	Peristallic Pump	Sodium Hypochlorite	Watson Marlow PeriFlo	1.5 hp	25 gpm	480/3
MP-HYPO-TP-2	Peristallic Pump	Sodium Hypochlorite	Watson Marlow PeriFlo	1.5 hp	25 gpm	480/3
MP-HYPO-DT-1	Fiberglass flat bottom tank 48" dimeter x 61" high	Sodium Hypochlorite	Augusta Fiberglass, JustinTanks, Tankinetics		425 gals	
MP-HYPO-MP-1	Peristallic Pump	Sodium Hypochlorite	Watson Marlow PeriFlo	1/2 hp -VFD	42 gph	120/1
MP-HYPO-MP-2	Peristallic Pump	Sodium Hypochlorite	Watson Marlow PeriFlo	1/2 hp -VFD	42 gph	120/1
MP-HYPO-MP-4	Peristallic Pump	Sodium Hypochlorite	Watson Marlow PeriFlo	1/2 hp -VFD	30 gph	120/1
MP-HYPO-MP-5	Peristallic Pump	Sodium Hypochlorite	Watson Marlow PeriFlo	1/2 hp -VFD	30 gph	120/1
MP-CORR-MP-1	Metering Pump- mROY-A 100 psi-37 SPM	Sodium Hexametaphosphate Corrosion Inhibitor (AQUA MAG K5)	Milton Roy	1/4 hp	2.8 gph	120/1
MP-CORR-MP-2	Metering Pump- mROY-A 100 psi-37 SPM	Sodium Hexametaphosphate Corrosion Inhibitor (AQUA MAG K5)	Milton Roy	1/4 hp	2.8 gph	120/1
MP-FL-T-1	HD Crosslink Polyethylene Tank	Hydrofluosilicic Acid	PolyProcess, Snyder Nalgen		6800 gals	
MP-FL-P-1	Sealless Thermoplactic Pump	Hydrofluosilicic Acid	Vanton Flex-I-Liner	.25 hp	3.5 gpm	489/3

Equipment List
Northern Kentucky Water District - Memorial Parkway Treatment Plant
Chemical Feed and Storage

MP-FL-P-2	Sealless Thermoplastic Pump	Hydrofluosilicic Acid	Vanton Flex-I-Liner	.25 hp	3.5 gpm	480/3
MP-FL-DT-1	HD Crosslink Polyethylene Tank	Hydrofluosilicic Acid	PolyProcess, Snyder Nalgen		55 gals	

Equipment List
Northern Kentucky Water District - Memorial Parkway Treatment Plant
Chemical Feed and Storage

MP-FL-MP-1	Metering Pump- mROY-A 100 psi-37 SPM	Hydrofluosilicic Acid	Milton Roy	1/4 hp	2.8 gph	120/1
MP-FL-MP-2	Metering Pump- mROY-A 100 psi-37 SPM	Hydrofluosilicic Acid	Milton Roy	1/4 hp	2.8 gph	120/1
MP-CARBON-FDR-1	Dry Feeder/big bag System 1700 lbs/d	Powdered activated carbon	Acrison W105Z-C, W&T Norid	2.5 hp		120/1
MP-COPPER-FDR-1	Dry Feeder System 517 lbs/d	Copper Sulfate	Acrison W105Z-DD, W&T	2.5 hp		120/1
MP-COPPER-MP-1	Metering Pump- mROY-A 100 psi- 144 spm	Copper Sulfate	Milton Roy	1 hp	45 gph	120/1
MP-COPPER-MP-2	Metering Pump- mROY-A 100 psi- 144 spm	Copper Sulfate	Milton Roy	1 hp	45 gph	120/1
MP-ACTPOLY-FDR-1	Dry Feeder System 70 lbs/d	Actiflo Polymer	Acrison, W&T	2.5 hp		120/1
MP-ACTPOLY-MP-1	Metering Pump- mROY-A Existing Pump	Actiflo Polymer	Milton Roy	1/4 hp		120/1
MP-ACTPOLY-MP-2	Metering Pump- mROY-A Existing Pump	Actiflo Polymer	Milton Roy	1/4 hp		120/1
MP-FILTAID-FDR-2	Dry Feeder System 70 lbs/d	Filter aid Polymer	Acrison W105Z-DD, W&T	2.5 hp		120/1
MP-FILTAID-MP-1	Metering Pump- mROY-A	Polymer	Milton Roy	1/4 hp		120/1
MP-FILTAID-MP-2	Metering Pump- mROY-A	Polymer	Milton Roy	1/4 hp		120/1
MP-RES-531-P-1	Horizontal Split Case Centrifugal Pump	Pump Raw Water	Goulds,	100 VSD	3473 gpm	480/3
MP-RES-532-P-2	Horizontal Split Case Centrifugal Pump	Pump Raw Water	Goulds,	200 VSD	6945 gpm	480/3
MP-RES-533-P-3	Horizontal Split Case Centrifugal Pump	Pump Raw Water	Goulds,	200 VSD	6945 gpm	480/3

APPENDIX B
Chemical Storage and Feed System Options
Lead and Asbestos Testing Report

Memorial Parkway Treatment Plant
Chemical Building

Asbestos Inspection and Waste Determination

Prepared For:

Horizon Inspection Services
1638 Cowling Avenue
Louisville, Kentucky 40205

August 15, 2005
Project #5477-AA

Prepared By:

Abatement Solutions Technologies
1252 South 15th Street
Louisville, Kentucky 40210
502-635-5051

ABATEMENT SOLUTIONS TECHNOLOGIES
AST SERVICES

August 15, 2005

Mr. Graham Clark
Horizon Inspection Services
1638 Cowling Avenue
Louisville, KY 40205

RE: Sampling for asbestos containing materials and TCLP waste determination from the Memorial Parkway Treatment Plant Chemical Building.

Dear Graham:

Abatement Solutions Technologies conducted an asbestos inspection and TCLP waste determination at the Memorial Parkway Treatment Plant Chemical Building located in Fort Thomas, Kentucky. The purpose of the inspection was to determine if asbestos containing materials exist prior to future demolition of the Chemical Building and to determine the conditions of the waste stream.

The building is a three-story structure with one main roof. Sampling for asbestos materials took place on each floor and included the roof. A total of nine (9) samples were collected and analyzed from the building. Listed in the table below are the descriptions of sampled materials, the analytical results, and the quantity and location of the materials, which were confirmed to be asbestos containing (greater than 1% asbestos).

Sample S01, Corner of second floor, pipe elbow insulation material in concrete pipe chase	Chrysotile Asbestos 30-40%	20 linear feet within concrete pipe chase on 2nd floor
Sample S01, Corner of second floor, pipe elbow insulation material - on ground	Chrysotile Asbestos 30-40%	7 linear feet on ground on 2nd floor.
Sample S03, Corner of exterior of building, exterior coating material	Chrysotile Asbestos 5-10%	Approximately 10,000 square feet on building exterior

1252 South 15th Street • Louisville, Kentucky 40210 • 502-635-5051 • Fax 502-635-5598
abatementsolutionstech.com

The samples collected were analyzed utilizing polarized light microscopy with dispersion staining as defined in 40 CFR, Part 763, Subpart F, Appendix A at an AIHA accredited laboratory. PLM analysis is a standard analytical method for determining the presence of asbestos. By regulatory definition, only materials containing 1% or greater asbestos are considered being asbestos containing materials.

In accordance with Federal Regulations, identified friable materials or materials that might become friable from demolition activities (the definition of friable means any material that can be crumbled, pulverized, or reduced to powder by hand pressure when dry) containing greater than 1% asbestos should be removed prior to demolition of the structure.

Sub-samples of building components were collected and mixed together to represent the total types and quantities of debris being removed from the building. The representative waste sample was testing using the Toxicity Characteristic Leaching Procedure (TCLP). Laboratory analysis of the waste reported a lead concentration of < 0.5 PPM. This concentration is well below the 5.0 PPM standard; as such this waste stream has a non-hazardous classification.

Included with this report are the asbestos field sample logs, the laboratory sample results, sketches indicating the sample locations. If you have any questions related to the site visit, please contact me at (502) 635-5051.

Sincerely,

Scott Atcheson
Vice President of Sales

Summary of Asbestos Materials
Memorial Parkway Treatment Plant
Ft. Thomas, Kentucky
July, 2005

Summary of Asbestos-Containing Materials

Client: Abatement Solutions

Project Number: 59860 **Date:** July 22, 2005

Facility Location: Memorial Parkway Treatment Plant

Square Feet of Facility: 2,250 1st Floor Plan

Inspector: N. Loow

Sample Number	Material Type	Material Description	Type and Percent of Asbestos Present	Quantity of ACBM Represented
01	TSI	Pipe Elbow Insulation	CHRY 30-40	20 linear feet within concrete pipe chase
01	TSI	Pipe Elbow Insulation	CHRY 30-40	7 linear feet on Ground Floor
03	Surfacing	Exterior Coating	CHRY 5-10	Approximately 10,000 sq. ft.

[1] Thermal System Insulation

MRS Analytical Laboratory, Inc.

Bulk Asbestos Report

Project Number:	59860	Date Received:	07-21-05
Client:	Abatement Solutions	Date Reported:	07-22-05
Facility:	Memorial Pkwy Treatment Plant	Analysis Date:	07-22-05
Sample Type:	Bulk Material	Analyst:	N. Leow
Date Sampled:	07-21-05	Sampled By:	N. Leow

TEST DESCRIPTION: Analysis of Bulk Material for Asbestos.

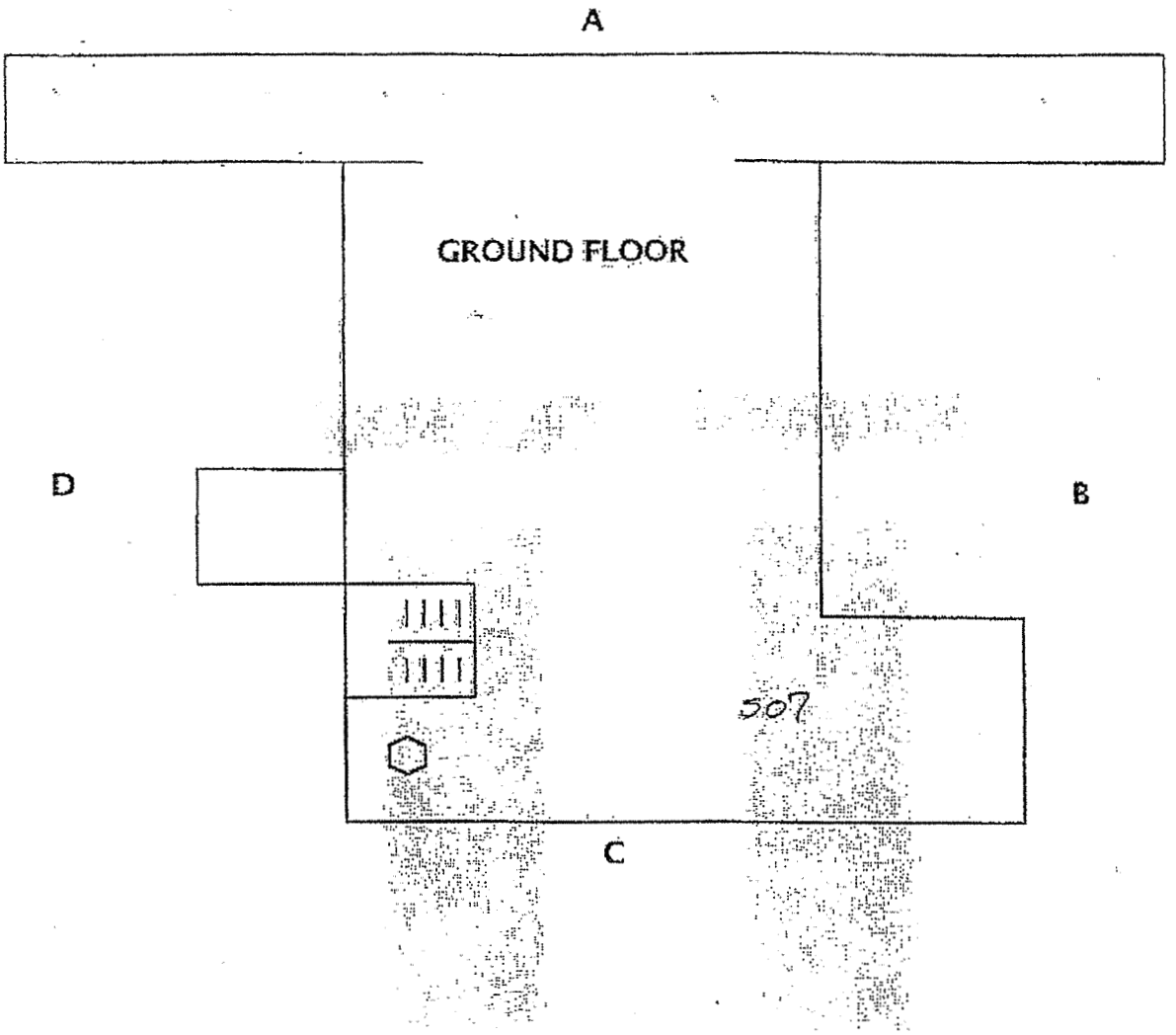
ANALYTICAL METHOD: Polarized Light Microscopy with Dispersion Staining as Defined in 40 CFR, Part 763, Subpart F, Appendix A.

Sample Number	*Laboratory Gross Description*	*Type and Percent Asbestos*
01	Pipe Elbow Insulation	30-40
02	Pipe Insulation	NAD
03	Exterior Coating	5-10
04	Roofing	NAD
05	Mastic	NAD
06	Table Tops	NAD
07	Vibration Damper	NAD
08	Window Caulk	NAD
09	Insulation Wrap	NAD

Reporting Limit 1% Asbestos NAD: No Asbestos Detected

MRS Analytical Laboratory, Inc., is accredited and certified Proficient by the American Industrial Hygiene Association – Accreditation Number: AIHA-102459

Reviewed by Authorized Signatory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D
B
C
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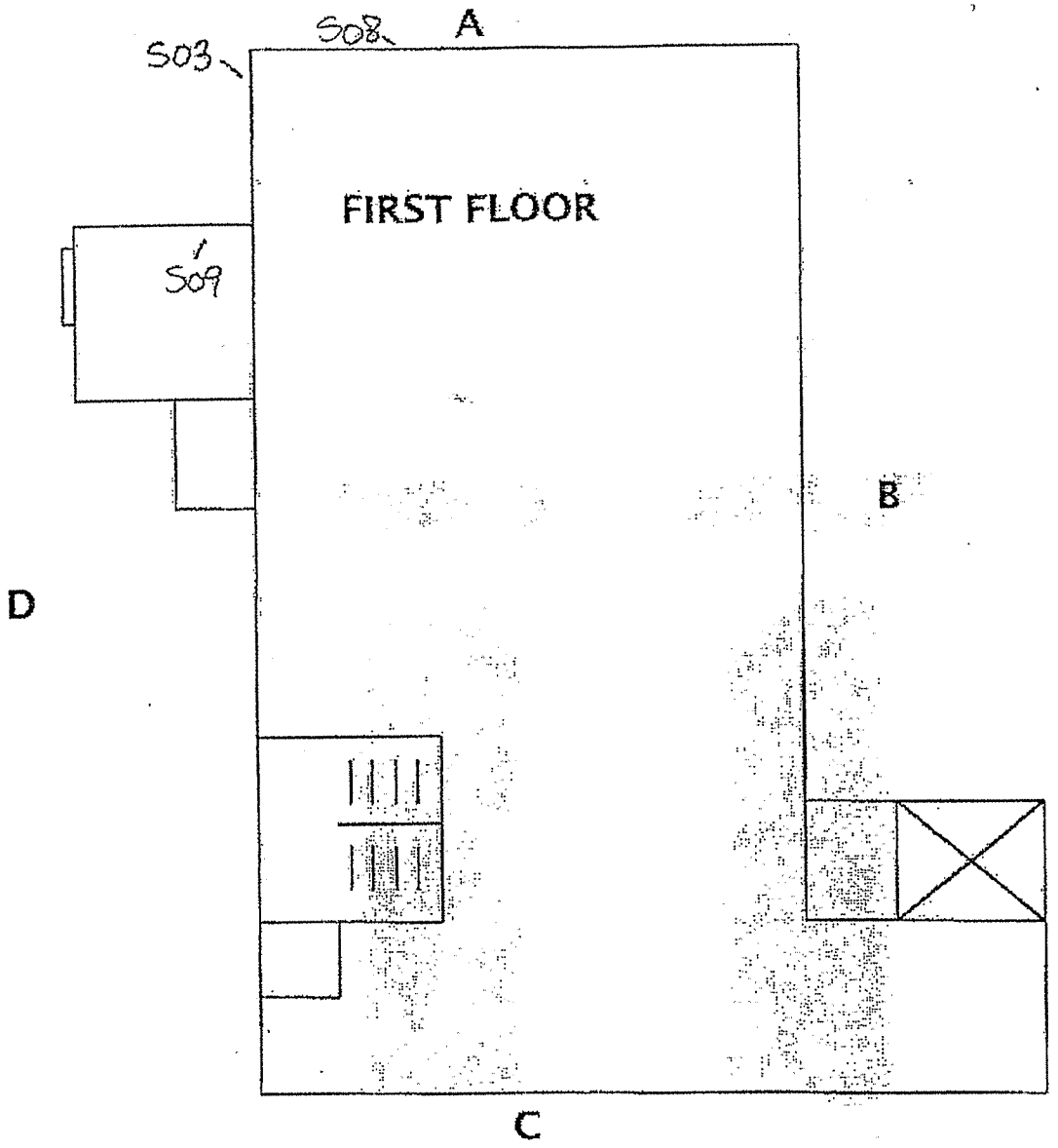
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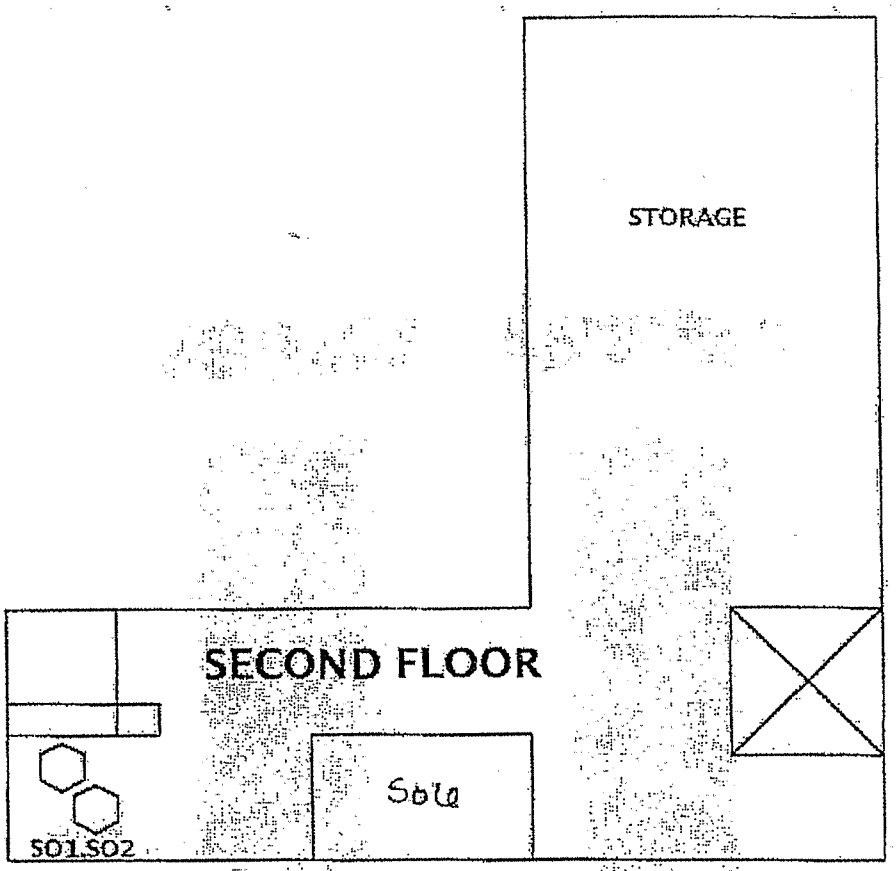

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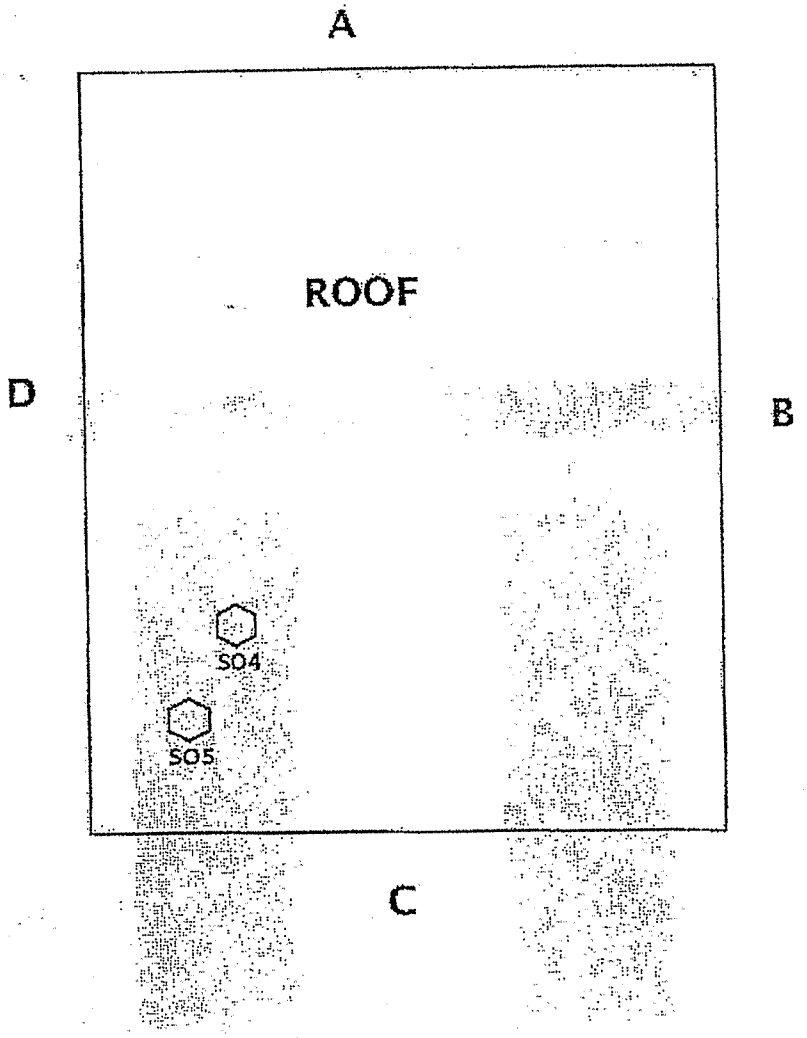
A
ROOF
D
B
SO4
SO5
C

Environmental Lead Compliance
Memorial Pkwy Treatment Plant
Ft. Thomas, Kentucky
July, 2005

To: Abatement Solutions Technologies
1252 South 15th Street
Louisville, Kentucky 40210
Attn: Chuck Russman

From: Micro-Analytics, Inc.
3310 Gilmore Industrial Boulevard
Louisville, Kentucky 40213

Date: August 9, 2005

Subject: Waste Determination

Introduction

The first step in determining if you need to register with the Division as a hazardous waste generator and obtain an EPA Identification Number is to conduct a waste determination.

On July 21, 2005, Micro-Analytics, Inc. collected a representative sample of the projected waste stream (demolition debris) from the following:

Memorial Parkway Treatment Plant, Chemical Building (Tower)
626 Alexandria Pike
Ft. Thomas, KY 41075

In order to facilitate demolition and satisfy RCRA and Kentucky Division of Waste Management regulations Micro-Analytics, Inc. performed the following lead screening and composite waste characterization testing:

1. Sub-samples of building components were collected using a power drill, or by removing portions of the component. Sub-samples were carefully selected to ensure that the resulting composite sample will be truly representative of the component.
2. Sub-samples were mixed together in proportion to their approximate percent by weight in the total quantity of debris being removed.

3. Composite samples were then submitted to Environmental Hazard Services, an accredited laboratory for TCLP lead analysis.

Results

The representative waste sample was tested using the Toxicity Characteristic Leaching Procedure (TCLP). Laboratory analysis of the waste reported a lead concentration of <0.5 PPM. This concentration is well below the 5.0 PPM standard. As such, **this waste stream has a non-hazardous classification.**

Please find attached the TCLP Lead Analysis Summary. If you have any questions or need additional information please feel free to call.

Sincerely,

Nicholas A. Leow, Site Inspector

ENVIRONMENTAL HAZARDS SERVICES, L.L.C.

7469 WHITE PINE ROAD · RICHMOND, VA 23237
804-275-4788 FAX 804-275-4907

TCLP (LEAD) ANALYSIS SUMMARY

CLIENT: Micro-Analytics, Inc.
8810 Gilmore Industrial Blvd., Suite C
Louisville, KY 40213

DATE OF SAMPLING: 21 JUL 2005
DATE OF RECEIPT: 25 JUL 2005
DATE OF ANALYSIS: 27 JUL 2005
DATE OF REPORT: 28 JUL 2005

CLIENT NUMBER: 18-2532 S
EHS PROJECT #: 07-05-8128
PROJECT: 59860

EHS SAMPLE #	CLIENT SAMPLE # / LABORATORY GROSS DESCRIPTION	SAMPLE WEIGHT (g)	INITIAL pH	CONCENTRATION PPM (mg/L)
01	TCLP-1/ Brick; Paint; Concrete; Metal; Glass; Wood; Fiberglass; Fiberboard	100	6.42	<0.50

QUALITY CONTROL DATA

BATCH#:	072705T-1
INCLUSIVE EHS SAMPLE NUMBERS:	01
Initial Calibration Verification (5.00ppm Pb)	102% Recovery
Continuing Calibration Verification 5 (5.00ppm Pb)	101% Recovery
Laboratory Control Standard	101% Recovery
Matrix Spike	113% Recovery
Duplicate Relative Percent Difference	0.00 RPD
Regulatory Limit	5.0mg/L
Reporting Limit	0.50mg/L
Method Detection Limit	0.060mg/L

METHOD: EPA SW846 1311/3010A/7420

ANALYST: Aubrey Simonds

Reviewed By Authorized Signatory:

Michael A. Mueller, MPH, Laboratory Director
Howard Varner, General Manager
Irma Paszewski, Quality Assurance Coordinator
David Xi, MS, Senior Chemist
Fung Jiang, MS, Technical Director

Method EPA SW846 1311 recommends 100g for analysis.

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume etc., was provided by the client. This report shall not be reproduced, except in full, without the written consent of Environmental Hazards Services, L.L.C. California Certification #2318; NY ELAP #11714

LEGEND	g = gram	ug = microgram	ppm = parts per million
	ml = milliliter	Pb = lead	mg/L = milligrams per liter

tclppb2.dot/AA220/07APR2005/REV2/MR

1 Pb TCLP

EHS 07-05-3128

MENTAL HAZARDS SERVICES, L.L.C.
Imond, Virginia 23237 Phone (804) 275-1708 Fax (804) 275-4907

CHAIN OF CUSTODY FORM

Company Name: Micro-Analytics, Inc
Date: 7-22-05
Address: 3310-C Gilmore Industrial Blvd
Contact Name: S. Hardin
City, State, Zip: Louisville, KY 40213
Sampler Name: N. Lean
EHS Client Account #: 18-2532 S
Project #: 5986.0
Phone #: 502-964-8737
Fax #: 502-964-1123
P.O. #:

Sample Number	Sample Date & Time	Asbestos: Bulk ID by PLM	Asbestos: (PCM) Fiber Count	Asbestos: PLM Point Count	Asbestos: PLM Gravimetric	Asbestos: TEM AHERA (Air)	Asbestos: TEM Chatfield (Bulk)	Lead: Air	Lead: Paint (%)	Lead: Paint (PPM)	Lead: Paint (mg/cm²)	Lead: Soil	Lead: Wipe * (See Note)	Lead: TCLP (Pb)	Lead: Waste Water	Other Metals (Specify metals below): TCLP RCRA 8	Other Metals: Welding Fume	Other Metals: Toxic Metal Profile	Indoor Air Quality: Biocassette	Indoor Air Quality: Slide	Indoor Air Quality: Surface Swab	Indoor Air Quality: Surface Tape	Indoor Air Quality: Bulk	Air Volume (L) OR Wipe Area (ft²) OR Scrape Area (cm²)	Comments
TCLP-1	7/21													X											114.5 Grams

Air Cassette Unsuitable for Analysis

* Do wipe samples submitted meet ASTM E1792 requirements? Yes ☐ No ☐

Released by: Nick Lean	Signature:	Date/Time: 7/22/05
Received by:	Signature:	Date/Time: 7/22/05 10:30
Released by:	Signature:	Date/Time:
Received by:	Signature:	Date/Time:

Particulate: Total Nuisance (NIOSH 0500) ☐
Respirable (NIOSH 0600) ☐

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APPENDIX C
Chemical Storage and Feed System Options
Preliminary Construction Cost Opinion

Northern Kentucky Water District

JORDAN JONES & GOULDING

Quest

Preliminary Take-off/Estimate of Construction Costs
Option 1 - Conversion of the Existing Sedimentation Basins
Memorial Parkway WTP Chemical Feed Facility / Raw Water Transfer Station Improvements
Northern Kentucky Water District
September 2005

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost			Unit Price	Total Price
						Manhours	$/MH	Est Cost		
	CHEMICAL FEED FACILITIES									
1.	**Site Work**									
	- Excavation & Regrade	1,400	CY						$ 20	$ 28,000
	- Concrete	15	CY						$ 500	$ 7,500
	- Bituminous Pavement	900	SY						$ 22	$ 19,800
	- Chemical Spill Containment	1	LS						$ 7,500	$ 7,500
	- Access Control System	1	LS		$ 18,100	195	$ 55	$ 10,725	$ 28,825	$ 28,825
	- Site Restoration	1,000	SY						$ 1.40	$ 1,400
	- Erosion Control	1,000	LF						$ 1.00	$ 1,000
	- Fencing	300	LF						$ 30	$ 9,000
									Sitework Sub total	**$ 103,025**
2.	**Powder Activated Carbon (PAC) Facility**									
	- Excavation & Regrade	50	CY						$ 20.00	$ 1,000
	- Foundation	12	CY						$ 450.00	$ 5,400
	- Block/Brick Building	300	SF						$ 135.00	$ 40,500
	- Interior CMU Wall	125	SF						$ 12.00	$ 1,500
	- Doors & Windows	2	EA						$ 3,000.00	$ 6,000
	- Roll-Up Doors	2	EA						$ 5,000.00	$ 10,000
	- Roof	225	SF						$ 15.00	$ 3,375
	- Supersac Equipment	1	LS	$ 90,000		32	$ 35	$ 1,120	$ 91,120.00	$ 91,120
	- Mechanical	1	LS	$ 1,500	$ 2,500	100	$ 35	$ 3,500	$ 7,500.00	$ 7,500
	- HVAC	1	LS	$ 15,000		24	$ 35	$ 840	$ 15,840.00	$ 15,840
	- Instumentation & Control	1	LS		$ 2,500	40	$ 55	$ 2,200	$ 4,700.00	$ 4,700
	- Access Control System	1	LS		$ 3,500	40	$ 55	$ 2,200	$ 5,700.00	$ 5,700
	- Electrical	1	LS		$ 7,100	100	$ 55	$ 5,500	$ 12,600.00	$ 12,600
									PAC Sub total	**$ 205,235**

3.	Chemical Feed Building									
	- Demolition of Sedimentation Basin Equipment	1	LS	$ 5,400		120	$ 35	$ 4,200	$ 9,600.00	$ 9,600
	- Demolition of Concrete in Ex. Sed Basin	1	LS					$ -	$ 24,000.00	$ 24,000
	- Demolition of Flocculation Basin Equipment	1	LS	$ 5,400		120	$ 35	$ 4,200	$ 9,600.00	$ 9,600
	- Demolition of Concrete in Ex. Floc Basin	1	LS						$ 20,000.00	$ 20,000
	- Demolition of Effluent Trough	1	LS						$ 12,000.00	$ 12,000
	- Demolition of Electrical Components	1	LS			80	$ 35	$ 2,800	$ 2,800.00	$ 2,800
	- Miscellaneous Demolition	1	LS						$ 6,000.00	$ 6,000
	- Reroute Actiflo Effluent	1	LS						$ 5,000.00	$ 5,000
	- Core Drill Holes in Floor	24	EA						$ 200.00	$ 4,800
	- Structural Fill of Existing Sedimentation Basin	3,300	CY	$ 9,900	$ 63,500	260	$ 35	$ 9,100	$ 25.00	$ 82,500
	- Structural Fill of Existing Flocculation Basin	1,425	CY	$ 9,900	$ 41,535	114	$ 35	$ 3,990	$ 25.00	$ 35,625
	- Reinforced Concrete Floor	350	CY					$ -	$ 425.00	$ 148,750
	- Reinforced Concrete Walls	105	CY					$ -	$ 475.00	$ 49,875
	- CMU Interior Walls	2,750	SF					$ -	$ 12.00	$ 33,000
	- CMU / Masonry Exterior Walls	5,200	SF					$ -	$ 30.00	$ 156,000
	- Roof System	8,700	SF					$ -	$ 10.00	$ 87,000
	- 12" Precast Concrete Roof Deck	8,700	SF						$ 25.00	$ 217,500
	- Aluminum Doors & Frames	11	EA					$ -	$ 3,000.00	$ 33,000
	- Roll-Up Doors	2	EA						$ 5,000.00	$ 10,000
	- Windows & Frames	8	EA					$ -	$ 1,000.00	$ 8,000
	- Handrails	130	LF					$ -	$ 55.00	$ 7,150
	- Grating	430	SF					$ -	$ 35.00	$ 15,050
	- Stairwell	275	SF					$ -	$ 75.00	$ 20,625
	- Special Containment Coatings	1	LS						$ 50,000.00	$ 50,000
	- Other Coatings	1	LS						$ 120,000.00	$ 120,000
	- Fire Suppression System	1	LS		$ 7,500	70	$ 55	$ 3,850	$ 11,350.00	$ 11,350
	- Lighting	1	LS		$ 18,000	160	$ 55	$ 8,800	$ 26,800.00	$ 26,800
	- Electrical Components	1	LS		$ 65,000	1000	$ 55	$ 55,000	$ 120,000.00	$ 120,000
	- HVAC System	1	LS		$ 135,000	200	$ 55	$ 11,000	$ 146,000.00	$ 146,000
	- Access Control System	1	LS		$ 14,000	100	$ 55	$ 5,500	$ 19,500.00	$ 19,500
	- Instrumentation & Control	1	LS		$ 126,000	400	$ 55	$ 22,000	$ 148,000.00	$ 148,000
	- Mechanical/Feed Water Piping	1	LS		$ 12,000	60	$ 35	$ 2,100	$ 14,100.00	$ 14,100
	- Washroom/Janitorial Facilities	1	LS		$ 15,000	80	$ 35	$ 2,800	$ 5,000.00	$ 5,000
	Ferric Sulfate Chemical Feed Equipment									
	- Bulk Tanks	4	EA	$ 400	$ 10,000	66	$ 35	$ 2,310	$ 12,710.00	$ 50,840
	- Day Tank	1	EA		$ 5,500	8	$ 35	$ 280	$ 5,780.00	$ 5,780
	- Access Ladder to Manway	4	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$ 12,240
	- Transfer Pumps	2	EA	$ 12,000		12	$ 35	$ 420	$ 12,420.00	$ 24,840
	- Chemical Metering Pumps/ Equipment	5	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$ 71,400
	- Level Indicators	5	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 11,400
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420

	Polyaluminum Chloride Chemical Feed Equipment									
	- Bulk Tanks	2	EA	$ 400	$ 10,000	66	$ 35	$ 2,310	$ 12,710.00	$ 25,420
	- Day Tank	1	EA	$ -	$ 5,500	8	$ 35	$ 280	$ 5,780.00	$ 5,780
	- Access Ladder to Manway	2	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$ 6,120
	- Transfer Pumps	2	EA	$ 11,500		12	$ 35	$ 420	$ 11,920.00	$ 23,840
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$ 42,840
	- Level Indicators	3	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 6,840
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420
	Caustic Feed Chemical Feed Equipment									
	- Bulk Tanks	2	EA	$ 500	$ 17,000	66	$ 35	$ 2,310	$ 19,810.00	$ 39,620
	- Day Tank	1	EA	$ -	$ 5,500	8	$ 35	$ 280	$ 5,780.00	$ 5,780
	- Access Ladder to Manway	2	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$ 6,120
	- Transfer Pumps	2	EA	$ 12,000		12	$ 35	$ 420	$ 12,420.00	$ 24,840
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$ 42,840
	- Level Indicators	3	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 6,840
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420
	Fluoride Feed Chemical Feed Equipment									
	- Bulk Tanks	1	EA	$ 500	$ 19,000	66	$ 35	$ 2,310	$ 21,810.00	$ 21,810
	- Day Tank	1	EA		$ 3,000	8	$ 35	$ 280	$ 3,280.00	$ 3,280
	- Access Ladder to Manway	1	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$ 3,060
	- Transfer Pumps	2	EA	$ 4,000		12	$ 35	$ 420	$ 4,420.00	$ 8,840
	- Chemical Metering Pumps/ Equipment	2	EA	$ 12,000		8	$ 35	$ 280	$ 12,280.00	$ 24,560
	- Level Indicators	2	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 4,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420
	Sodium Hypochlorite Chemical Feed Equipment									
	- Bulk Tanks	2	EA	$ 500	$ 13,000	66	$ 35	$ 2,310	$ 15,810.00	$ 31,620
	- Day Tank	1	EA		$ 6,500	8	$ 35	$ 280	$ 6,780.00	$ 6,780
	- Access Ladder to Manway	2	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$ 6,120
	- Transfer Pumps	2	EA	$ 12,000		20	$ 35	$ 700	$ 12,700.00	$ 25,400
	- Chemical Metering Pumps/Equipment	3	EA	$ 13,000		8	$ 35	$ 280	$ 13,280.00	$ 39,840
	- Level Indicators	3	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 6,840
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420

	Future Chemical Feed Area										
	- Bulk Tanks	1	EA	$ 500	$ 13,000	66	$ 35	$ 2,310	$ 15,810.00	$	15,810
	- Day Tank	1	EA						$ -	$	-
	- Access Ladder to Manway	1	EA						$ -	$	-
	- Level Indicators	2	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$	4,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420
	Copper Sulfate Feed Chemical Feed Equipment										
	- Volumetric Feeder & Wetting System	1	LS	$ 45,000		48	$ 35	$ 1,680	$ 46,680.00	$	46,680
	- Chemical Metering Pumps/Equipment	2	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$	28,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420
	Filter Aid Polymer Chemical System										
	- Chemical Metering Pumps/Equipment	1	LS	$ 42,500		48	$ 35	$ 1,680	$ 44,180.00	$	44,180
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Level Indicators	1	LS	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$	2,280
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420
	Corrosion Control Chemical System										
	- Chemical Metering Pumps/Equipment	2	EA	$ 12,000		8	$ 35	$ 280	$ 12,280.00	$	24,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420
	Actiflo Polymer Chemical System										
	- Volumetric Feeder & Wetting System	2	EA	$ 42,500		48	$ 35	$ 1,680	$ 44,180.00	$	88,360
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$	42,840
	- Level Indicators	2	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$	4,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420
									Chemical Feed Facility Sub total	$	**2,722,905**
4.	**Miscellaneous**									$	303,117
	- Miscellaneous Construction (10%)									$	90,935
	- Mobilization/Demobilization (3%)									$	545,610
	- Contractor Overhead & Profit (@18%)									$	939,661
									Miscellaneous Sub total	$	**3,970,826**
	Total Opinion of Construction Costs - Chemical Feed Facilities										

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost			Unit Price	Total Price
						Manhours	$/MH	Est Cost		
	RAW WATER TRANSFER STATION									
1.	**Raw Water Transfer Station**									
	- Demolition	1	LS						$ 12,500.00	$ 12,500
	- 12" DI Suction Piping & Fittings	1	LS		$ 100	30	$ 35	$ 1,050	$ 1,150.00	$ 1,150
	- 18" DI Suction Discharge Piping	1	LS		$ 200	45	$ 35	$ 1,575	$ 1,775.00	$ 1,775
	- 30" DI Suction Piping	24	LF		$ 750	45	$ 35	$ 1,575	$ 2,325.00	$ 55,800
	- 12" Suction Isolation Valves	1	EA		$ 1,500	15	$ 35	$ 525	$ 2,025.00	$ 2,025
	- 18" Suction Isolation Valves	2	EA		$ 3,000	15	$ 35	$ 525	$ 3,525.00	$ 7,050
	- 3,500 GPM Split Case Pump	1	EA	$ 70,000	$ 1,000	48	$ 35	$ 1,680	$ 72,680.00	$ 72,680
	- 7,000 GPM Split Case Pumps	2	EA	$ 125,000	$ 1,000	48	$ 35	$ 1,680	$ 127,680.00	$ 255,360
	- 10" Swing Check Valve	1	EA		$ 2,500	30	$ 35	$ 1,050	$ 3,550.00	$ 3,550
	- 14" Swing Check Valves	2	EA		$ 3,500	30	$ 35	$ 1,050	$ 4,550.00	$ 9,100
	- 10" Discharge Isolation Valve	1	EA		$ 1,250	15	$ 35	$ 525	$ 1,775.00	$ 1,775
	- 14" Discharge Isolation Valves	2	EA		$ 2,000	15	$ 35	$ 525	$ 2,525.00	$ 5,050
	- 24" Discharge Valve	1	EA		$ 4,500	30	$ 35	$ 1,050	$ 5,550.00	$ 5,550
	- 18" DI Discharge Piping	12	LF		$ 200	45	$ 35	$ 1,575	$ 1,775.00	$ 21,300
	- 24" DI Discharge Piping	12	LF		$ 500	45	$ 35	$ 1,575	$ 2,075.00	$ 24,900
	- Miscellaneous Fittings	1	LS		$ 1,500	30	$ 35	$ 1,050	$ 2,550.00	$ 2,550
	- Rework Grating	1	LS		$ 500	32	$ 35	$ 1,120	$ 1,620.00	$ 1,620
	- Variable Frequency Drives	3	EA	$ 35,000		60	$ 55	$ 3,300	$ 38,300.00	$ 114,900
	- Electrical	1	LS		$ 158,000	525	$ 55	$ 28,875	$ 186,875.00	$ 186,875
	- Instrumentation & Control	1	LS		$ 18,800	71	$ 55	$ 3,905	$ 22,705.00	$ 22,705
	- Access Control System	1	LS		$ 2,700	35	$ 55	$ 1,925	$ 4,625.00	$ 4,625
	- HVAC/Mechanical	1	LS	$ 20,000		40	$ 55	$ 2,200	$ 22,200.00	$ 22,200
									RWTS Subtotal	**$ 835,040**
2.	**Miscellaneous**									
	- Miscellaneous Construction (10%)									$ 83,504
	- Mobilization/Demobilization (3%)									$ 25,051
	- Contractor Overhead & Profit (@18%)									$ 150,307
									Miscellaneous Sub total	**$ 258,862**
	Total Opinion of Construction Costs - Raw Water Transfer Station									**$ 1,093,902**

PROJECT COSTS

Item No.	Item	Total Price
1.	Total Opinion of Construction Costs - Chemical Feed Facilties & Raw Water Transfer Station	$ 5,064,729
2.	Engineering/Resident Representation	$ 412,000
3.	Project Contingency (10%)	$ 506,473
	Total Opinion of Probable Project Costs	**$ 5,983,201**

ADDITIONAL COSTS

DEMOLITION/RENOVATION OF EXISTING CHEMICAL FEED BUILDING

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost Manhours	Labor Cost $/MH	Labor Cost Est Cost	Unit Price	Total Price
1.	**Existing Chemical Building**									
	- Demolition of Roof	1	LS	$ 7,150	$ 2,500	200	$ 35	$ 7,000	$ 16,650.00	$ 16,650
	- Remove & Dispose of Asbestos Skin	1	LS	$ 35,000	$ 125,000	1000	$ 35	$ 35,000	$ 195,000.00	$ 195,000
	- Remove Top 22' of Existing Building	1	LS	$ 7,150	$ 2,500	200	$ 35	$ 7,000	$ 16,650.00	$ 16,650
	- Demolition of Operation FloorEquipment	1	LS	$ 33,375	$ 10,000	1360	$ 35	$ 47,600	$ 90,975.00	$ 90,975
	- Demolition of Basement Equipment	1	LS	$ 14,470	$ 1,000	1090	$ 35	$ 38,150	$ 53,620.00	$ 53,620
	- Demolition of Electrical Components	1	LS	$ 2,000	$ 1,000	1060	$ 35	$ 37,100	$ 40,100.00	$ 40,100
	- Reinforced Concrete Floor	25	CY					0	$ 525.00	$ 13,125
	- Reinforced Concrete Walls	25	CY					0	$ 575.00	$ 14,375
	- CMU Interior Walls	9,160	SF					0	$ 12.00	$ 109,920
	- CMU / Masonry Exterior Walls	3,400	SF					0	$ 30.00	$ 102,000
	- Roof System	5,200	SF					0	$ 10.00	$ 52,000
	- Roof Deck	5,280	SF					0	$ 25.00	$ 132,000
	- Aluminum Doors & Frames	16	EA					0	$ 3,000.00	$ 48,000
	- Windows & Frames	8	EA					0	$ 1,000.00	$ 8,000
	- Roll Up Doors	3	EA					0	$ 5,000.00	$ 15,000
									Existing Chemical Building Sub total	**$ 907,415**
2.	**Miscellaneous**									
	- Miscellaneous Construction (10%)									$ 90,742
	- Mobilization/Demobilization (3%)									$ 27,222
	- Contractor Overhead & Profit (@18%)									$ 163,335
									Miscellaneous Sub total	**$ 281,299**
	Total Opinion of Construction Costs - Existing Chemical Building Demolition/Renovation									**$ 1,188,714**
	Engineering/Special Inspections (10%)									$ 118,871
	Total Opinion of Project Costs - Existing Chemical Building Demolition/Renovation									**$ 1,307,585**

-- KBase Modules--

Project Information *Phases*

General Description | Enrollments References | Logs Subconsultants | Phase Summaries | Search Results New Search

02299011 - Beaver Creek WWTF Expansion -
Hallsdale-Powell Utility District

Expand

Phase	Phase Name	Phase Status	Fee Type	Phase Fee	Mult	Tot Phase Effort
01	Project Definition-Contract 2	C	CPM	$75,000	3.16	$74,785
02	Membrane System Eval. & Selection	C	CPM	$52,000	3.16	$81,474
03	Detailed Design-Contract 2	A	CPM	$1,515,720	3.16	$1,605,173
04	Bidding Assist-Contr. 2 Improvement	I	CPM	$67,000	3.16	$0
10	ODC's/Subconsultants	A	CPM	$166,240	3.16	$217,150

Total All Phase Fees: $1,875,960

Tot Hrs Bdgt	Tot Lbr Bdgt	Tot Exp Bdgt	Tot Bdgt	Tot Lbr Hrs	Tot Lbr Eff	Tot Exp Eff	Tot Eff
13,620.00	$1,709,720	$166,240	$1,875,960	15,171.50	$1,761,432	$217,150	$1,978,581

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Northern Kentucky Water District

JORDAN JONES & GOULDING

Quest

Preliminary Take-off/Estimate of Construction Costs
Option 2 - Renovation of Existing Chemical Feed Building
Memorial Parkway WTP Chemical Feed Facility / Raw Water Transfer Station Improvements
Northern Kentucky Water District
September 2005

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost Manhours	Labor Cost $/MH	Labor Cost Est Cost	Unit Price	Total Price
	CHEMICAL FEED FACILITIES									
1.	**Site Work**									
	- Excavation & Regrade	1,400	CY						$ 20	$ 28,000
	- Concrete	15	CY						$ 500	$ 7,500
	- Bituminous Pavement	900	SY						$ 22	$ 19,800
	- Chemical Spill Containment	1	LS						$ 7,500	$ 7,500
	- Access Control System	1	LS		$ 18,100	195	$ 55	$ 10,725	$ 28,825	$ 28,825
	- Site Restoration	1,000	SY						$ 1.40	$ 1,400
	- Erosion Control	1,000	LF						$ 1.00	$ 1,000
	- Fencing	300	LF						$ 30	$ 9,000
									Sitework Sub total	**$ 103,025**
2.	**Powder Activated Carbon (PAC) Facility**									
	- Excavation & Regrade	50	CY						$ 20.00	$ 1,000
	- Foundation	12	CY						$ 450.00	$ 5,400
	- Block/Brick Building	300	SF						$ 135.00	$ 40,500
	- Interior CMU Wall	125	SF						$ 12.00	$ 1,500
	- Doors & Windows	2	EA						$ 3,000.00	$ 6,000
	- Roll-Up Doors	2	EA						$ 5,000.00	$ 10,000
	- Roof	225	SF						$ 15.00	$ 3,375
	- Supersac Equipment	1	LS	$ 90,000		32	$ 35	$ 1,120	$ 91,120.00	$ 91,120
	- Mechanical	1	LS	$ 1,500	$ 2,500	100	$ 35	$ 3,500	$ 7,500.00	$ 7,500
	- HVAC	1	LS	$ 15,000		24	$ 35	$ 840	$ 15,840.00	$ 15,840
	- Instumentation & Control	1	LS		$ 2,500	40	$ 55	$ 2,200	$ 4,700.00	$ 4,700
	- Access Control System	1	LS		$ 3,500	40	$ 55	$ 2,200	$ 5,700.00	$ 5,700
	- Electrical	1	LS		$ 7,100	100	$ 55	$ 5,500	$ 12,600.00	$ 12,600
									PAC Sub total	**$ 205,235**

3.	Chemical Feed Building									
	- Demolition of Roof	1	LS	$ 7,150	$ 2,500	200	$ 35	$ 7,000	$ 16,650.00	$ 16,650
	- Remove & Dispose of Asbestos Skin	1	LS	$ 35,000	$ 125,000	1000	$ 35	$ 35,000	$ 195,000.00	$ 195,000
	- Remove Top 22' of Existing Building	1	LS	$ 7,150	$ 2,500	200	$ 35	$ 7,000	$ 16,650.00	$ 16,650
	- Demolition of Operation FloorEquipment	1	LS	$ 33,375	$ 10,000	1360	$ 35	$ 47,600	$ 90,975.00	$ 90,975
	- Demolition of Basement Equipment	1	LS	$ 14,470	$ 1,000	1090	$ 35	$ 38,150	$ 53,620.00	$ 53,620
	- Demolition of Elevator Shaft	1	LS	$ 850	$ 1,000	64	$ 35	$ 2,240	$ 4,090.00	$ 4,090
	- Demolition of Electrical Components	1	LS	$ 2,000	$ 1,000	1060	$ 35	$ 37,100	$ 40,100.00	$ 40,100
	- Demolition of Flocculation Basin Equipment	1	LS	$ 5,400		120	$ 35	$ 4,200	$ 9,600.00	$ 9,600
	- Install Temporary Coagulant Feed System	1	LS	$ 5,000	$ 4,000	570	$ 35	$ 19,950	$ 28,950.00	$ 28,950
	- Structural Fill of Existing Flocculation Basin	1,425	CY						$ 25.00	$ 35,625
	- Reinforced Concrete Floor	310	CY						$ 525.00	$ 162,750
	- Reinforced Concrete Walls	72	CY						$ 575.00	$ 41,400
	- CMU Interior Walls	9,160	SF						$ 12.00	$ 109,920
	- CMU / Masonry Exterior Walls	2,970	SF						$ 30.00	$ 89,100
	- Roof System	5,200	SF						$ 10.00	$ 52,000
	- Roof Deck	5,280	SF						$ 25.00	$ 132,000
	- Aluminum Doors & Frames	16	EA						$ 3,000.00	$ 48,000
	- Windows & Frames	8	EA						$ 1,000.00	$ 8,000
	- Roll Up Doors	3	EA						$ 5,000.00	$ 15,000
	- Handrails	145	LF						$ 55.00	$ 7,975
	- Grating	175	SF						$ 35.00	$ 6,125
	- Stairwell	450	SF						$ 75.00	$ 33,750
	- Special Containment Coatings	1	LS						$ 50,000.00	$ 50,000
	- Roof Deck Coatings	1	LS						$ 75,000.00	$ 75,000
	- Other Coatings	1	LS						$ 125,000.00	$ 125,000
	- Fire Suppression System	1	LS		$ 7,500	70	$ 55	$ 3,850	$ 11,350.00	$ 11,350
	- Lighting	1	LS		$ 17,000	150	$ 55	$ 8,250	$ 25,250.00	$ 25,250
	- Electrical Components	1	LS		$ 45,000	1000	$ 55	$ 55,000	$ 100,000.00	$ 100,000
	- HVAC System	1	LS		$ 135,000	200	$ 55	$ 11,000	$ 146,000.00	$ 146,000
	- Instrumentation & Control	1	LS		$ 126,000	400	$ 55	$ 22,000	$ 148,000.00	$ 148,000
	- Mechanical/Feed Water Piping	1	LS		$ 12,000	60	$ 35	$ 2,100	$ 14,100.00	$ 14,100
	- Washroom/Janitorial Facilities	1	LS		$ 15,000	80	$ 35	$ 2,800	$ 5,000.00	$ 5,000
	Ferric Sulfate Chemical Feed Equipment									
	- Bulk Tanks	4	EA	$ 400	$ 10,000	66	$ 35	$ 2,310	$ 12,710.00	$ 50,840
	- Day Tank	1	EA		$ 5,500	8	$ 35	$ 280	$ 5,780.00	$ 5,780
	- Access Ladder to Manway	4	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$ 12,240
	- Transfer Pumps	2	EA	$ 12,000		12	$ 35	$ 420	$ 12,420.00	$ 24,840
	- Chemical Metering Pumps/ Equipment	5	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$ 71,400
	- Level Indicators	5	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 11,400
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420

	Polyaluminum Chloride Chemical Feed Equipment										
	- Bulk Tanks	2	EA	$ 400	$ 10,000	66	$ 35	$ 2,310	$ 12,710.00	$	25,420
	- Day Tank	1	EA	$ -	$ 5,500	8	$ 35	$ 280	$ 5,780.00	$	5,780
	- Access Ladder to Manway	2	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$	6,120
	- Transfer Pumps	2	EA	$ 11,500		12	$ 35	$ 420	$ 11,920.00	$	23,840
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$	42,840
	- Level Indicators	3	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$	6,840
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420
	Caustic Feed Chemical Feed Equipment										
	- Bulk Tanks	2	EA	$ 500	$ 17,000	66	$ 35	$ 2,310	$ 19,810.00	$	39,620
	- Day Tank	1	EA	$ -	$ 5,500	8	$ 35	$ 280	$ 5,780.00	$	5,780
	- Access Ladder to Manway	2	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$	6,120
	- Transfer Pumps	2	EA	$ 12,000		12	$ 35	$ 420	$ 12,420.00	$	24,840
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$	42,840
	- Level Indicators	3	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$	6,840
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420
	Fluoride Feed Chemical Feed Equipment										
	- Bulk Tanks	1	EA	$ 500	$ 19,000	66	$ 35	$ 2,310	$ 21,810.00	$	21,810
	- Day Tank	1	EA		$ 3,000	8	$ 35	$ 280	$ 3,280.00	$	3,280
	- Access Ladder to Manway	1	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$	3,060
	- Transfer Pumps	2	EA	$ 4,000		12	$ 35	$ 420	$ 4,420.00	$	8,840
	- Chemical Metering Pumps/ Equipment	2	EA	$ 12,000		8	$ 35	$ 280	$ 12,280.00	$	24,560
	- Level Indicators	2	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$	4,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420
	Sodium Hypochlorite Chemical Feed Equipment										
	- Bulk Tanks	2	EA	$ 500	$ 13,000	66	$ 35	$ 2,310	$ 15,810.00	$	31,620
	- Day Tank	1	EA		$ 6,500	8	$ 35	$ 280	$ 6,780.00	$	6,780
	- Access Ladder to Manway	2	EA		$ 2,500	16	$ 35	$ 560	$ 3,060.00	$	6,120
	- Transfer Pumps	2	EA	$ 12,000		20	$ 35	$ 700	$ 12,700.00	$	25,400
	- Chemical Metering Pumps/Equipment	3	EA	$ 13,000		8	$ 35	$ 280	$ 13,280.00	$	39,840
	- Level Indicators	3	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$	6,840
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$	5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$	8,420

	Future Chemical Feed Area									
	- Bulk Tanks	1	EA	$ 500	$ 13,000	66	$ 35	$ 2,310	$ 15,810.00	$ 15,810
	- Day Tank	1	EA						$ -	$ -
	- Access Ladder to Manway	1	EA						$ -	$ -
	- Level Indicators	2	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 4,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420
	Copper Sulfate Feed Chemical Feed Equipment									
	- Volumetric Feeder & Wetting System	1	LS	$ 45,000		48	$ 35	$ 1,680	$ 46,680.00	$ 46,680
	- Chemical Metering Pumps/Equipment	2	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$ 28,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420
	Filter Aid Polymer Chemical System									
	- Chemical Metering Pumps/Equipment	1	LS	$ 42,500		48	$ 35	$ 1,680	$ 44,180.00	$ 44,180
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Level Indicators	1	LS	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 2,280
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420
	Corrosion Control Chemical System									
	- Chemical Metering Pumps/Equipment	2	EA	$ 12,000		8	$ 35	$ 280	$ 12,280.00	$ 24,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420
	Actiflo Polymer Chemical System									
	- Volumetric Feeder & Wetting System	2	EA	$ 42,500		48	$ 35	$ 1,680	$ 44,180.00	$ 88,360
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 35	$ 280	$ 14,280.00	$ 42,840
	- Level Indicators	2	EA	$ 2,000		8	$ 35	$ 280	$ 2,280.00	$ 4,560
	- Miscellaneous Piping, Fittings and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 2,000	$ 6,000	12	$ 35	$ 420	$ 8,420.00	$ 8,420
									Chemical Feed Facility Sub total	**$ 2,961,260**
4.	**Miscellaneous**									
	- Miscellaneous Construction (10%)									$ 326,952
	- Mobilization/Demobilization (3%)									$ 98,086
	- Contractor Overhead & Profit (@18%)									$ 588,514
									Miscellaneous Sub total	**$ 1,013,551**
	Total Opinion of Construction Costs - Chemical Feed Facilities									**$ 4,283,071**

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost Manhours	Labor Cost $/MH	Labor Cost Est Cost	Unit Price	Total Price
	RAW WATER TRANSFER STATION									
1.	**Raw Water Transfer Station**									
	- Demolition	1	LS						$ 12,500.00	$ 12,500
	- 12" DI Suction Piping & Fittings	1	LS		$ 100	30	$ 35	$ 1,050	$ 1,150.00	$ 1,150
	- 18" DI Suction Discharge Piping	1	LS		$ 200	45	$ 35	$ 1,575	$ 1,775.00	$ 1,775
	- 30" DI Suction Piping	24	LF		$ 750	45	$ 35	$ 1,575	$ 2,325.00	$ 55,800
	- 12" Suction Isolation Valves	1	EA		$ 1,500	15	$ 35	$ 525	$ 2,025.00	$ 2,025
	- 18" Suction Isolation Valves	2	EA		$ 3,000	15	$ 35	$ 525	$ 3,525.00	$ 7,050
	- 3,500 GPM Split Case Pump	1	EA	$ 70,000	$ 1,000	48	$ 35	$ 1,680	$ 72,680.00	$ 72,680
	- 7,000 GPM Split Case Pumps	2	EA	$ 125,000	$ 1,000	48	$ 35	$ 1,680	$ 127,680.00	$ 255,360
	- 10" Swing Check Valve	1	EA		$ 2,500	30	$ 35	$ 1,050	$ 3,550.00	$ 3,550
	- 14" Swing Check Valves	2	EA		$ 3,500	30	$ 35	$ 1,050	$ 4,550.00	$ 9,100
	- 10" Discharge Isolation Valve	1	EA		$ 1,250	15	$ 35	$ 525	$ 1,775.00	$ 1,775
	- 14" Discharge Isolation Valves	2	EA		$ 2,000	15	$ 35	$ 525	$ 2,525.00	$ 5,050
	- 24" Discharge Valve	1	EA		$ 4,500	30	$ 35	$ 1,050	$ 5,550.00	$ 5,550
	- 18" DI Discharge Piping	12	LF		$ 200	45	$ 35	$ 1,575	$ 1,775.00	$ 21,300
	- 24" DI Discharge Piping	12	LF		$ 500	45	$ 35	$ 1,575	$ 2,075.00	$ 24,900
	- Miscellaneous Fittings	1	LS		$ 1,500	30	$ 35	$ 1,050	$ 2,550.00	$ 2,550
	- Rework Grating	1	LS		$ 500	32	$ 35	$ 1,120	$ 1,620.00	$ 1,620
	- Variable Frequency Drives	3	EA	$ 35,000		60	$ 55	$ 3,300	$ 38,300.00	$ 114,900
	- Electrical	1	LS		$ 158,000	525	$ 55	$ 28,875	$ 186,875.00	$ 186,875
	- Instrumentation & Control	1	LS		$ 18,800	71	$ 55	$ 3,905	$ 22,705.00	$ 22,705
	- Access Control System	1	LS		$ 2,700	35	$ 55	$ 1,925	$ 4,625.00	$ 4,625
	- HVAC/Mechanical	1	LS	$ 20,000		40	$ 55	$ 2,200	$ 22,200.00	$ 22,200
									RWTS Subtotal	**$ 835,040**
2.	**Miscellaneous**									
	- Miscellaneous Construction (10%)									$ 83,504
	- Mobilization/Demobilization (3%)									$ 25,051
	- Contractor Overhead & Profit (@18%)									$ 150,307
									Miscellaneous Sub total	**$ 258,862**
	Total Opinion of Construction Costs - Raw Water Transfer Station									**$ 1,093,902**

PROJECT COSTS

Item No.	Item	Total Price
1.	Total Opinion of Construction Costs - Chemical Feed Facilties & Raw Water Transfer Station	$ 5,376,974
2.	Engineering/Resident Representation	$ 412,000
3.	Project Contingency (10%)	$ 537,697
	Total Opinion of Probable Project Costs	**$ 6,326,671**

APPENDIX D
Raw Water Tunnel Evaluation

Northern Kentucky Water District
Brick Arch Tunnel and Twin 24-Inch Main Inspection
August 9, 2005

General

As a part of the Chemical Feed Improvements project at the Memorial Parkway Treatment Plant, the Jordan, Jones, & Goulding (JJG) and Quest team performed an inspection of the brick arch tunnel and twin 24-inch cast iron water mains was conducted on June 28, 2005. Entry into the confined space tunnel was carried out in strict accordance with Occupational Health and Safety Administration (OSHA) rules and regulations which required ventilation of the confined space, constant monitoring the air quality, and the use of respirators (**Figure 1**). Air monitoring results are included in Appendix A. The purpose of the inspection was to gain knowledge relative to the general condition of both the tunnel and the pipes within the space.

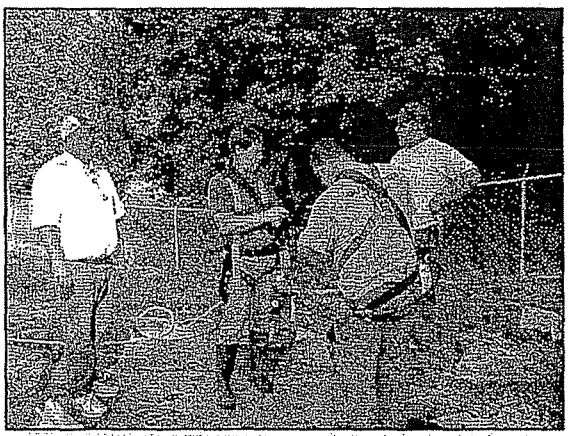


Figure 1 – OSHA mandated safety equipment required for confined space entry

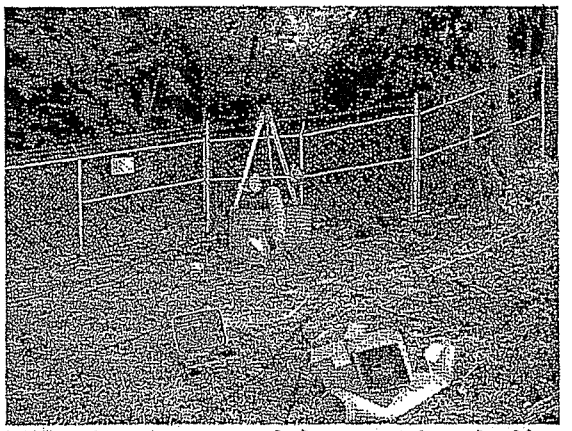


Figure 2 – Access manhole, approximately 30-inches above grade

Brick Arch Tunnel

Access to the tunnel is via a typical cast iron manhole approximately 24-inches in diameter. The manhole frame and cover are positioned on top of a standard concrete manhole section, approximately 48-inches in diameter. The top of the manhole frame is approximately 30-inches above grade (**Figure 2**). The ladder inside the manhole, used to gain access to the pipelines, is a combination of the original wall mounted metal rungs and two sections of aluminum extension ladder.

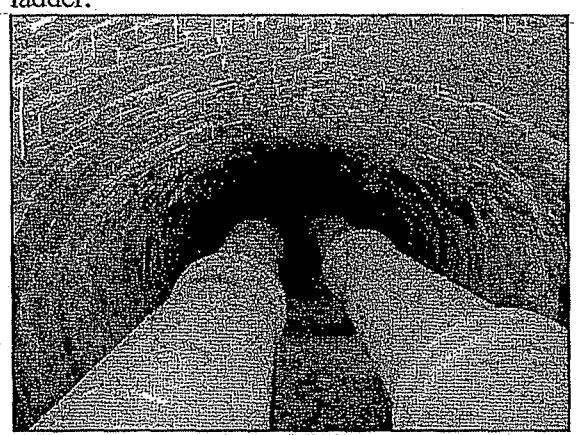


Figure 3 – Interior tunnel arch ceiling, note efflorescence at mortar joints

The tunnel generally appears to be in good condition structurally. The brick arch is intact throughout. There is some degree of what would appear to be seepage of ground water through the mortar joints in some areas causing efflorescence (**Figure 3**).

The pipe support walls, also constructed of brick appear to be in excellent condition. No loose or missing bricks were observed. Each support is approximately 2-feet tall with level top surface on which the pipes rest. Supports also contain an arched opening in the bottom center apparently to act as a drain channel in the event of excessive water (**Figure 4**). Angled metallic brackets are embedded in both sides of each support wall. These may have originally been used to support some type of wooden or metal walkway.

The floor of the tunnel was covered in its entirety with mud which ranged in depth from 6-inches to about 18-inches. Although no running water was observed in the tunnel the mud was fully saturated and difficult to negotiate (**Figure 5**). Due to the degree to which the tunnel floor was obscured with mud a determination of neither the construction material nor condition thereof could be prepared.

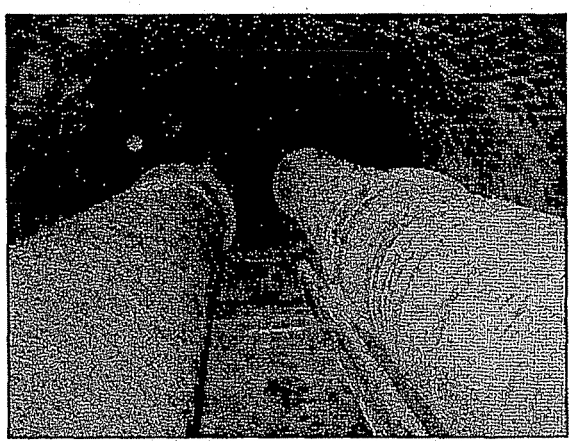


Figure 4 – Brick wall pipe supports with arched opening at bottom center

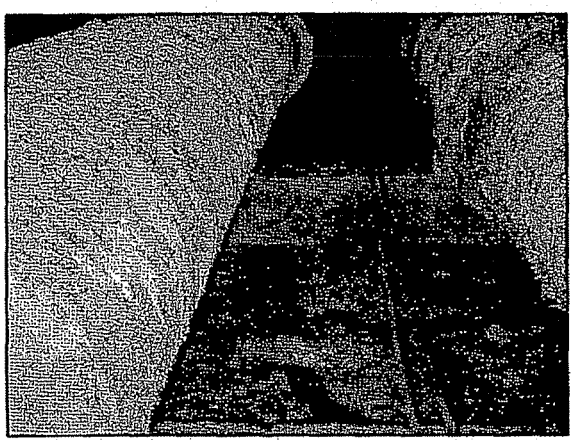


Figure 5 – Entire tunnel floor covered in fully saturated mud

24-Inch Cast Iron Pipelines

The 1920 vintage pipelines are constructed of cast iron. The year of manufacture, general condition, and observed wall thickness of these pipelines would indicate they were manufactured using the sand or pit cast methodology rather than having been centrifugally cast. The pieces are joined with a poured and caulked material composed of either pure lead or a mineral lead-sulfur compound. Each section of pipe is approximately 12-feet in length, with the exception of those sections of pipe which have been cut to accommodate the valves and fittings.

The pipe rest on brick support walls spaced approximately 12-feet apart. There was no visible sign of restraint securing the pipelines to the brick supports. Each pipeline is approximately 300-feet in length, with a 45-degree angle (**Figure 6**) near the midpoint of the length and horizontal gate valves (**Figure 7**) at the entry point. As part of a 1961 project the two pipes were joined together at the south end of the tunnel (**Figure 8**) leaving one of the 24-inch lines abandoned. The abandoned pipeline remains uncapped, stubbed through the tunnel wall (**Figure 9**). This uncapped line allows a fairly constant flow of water into the tunnel. A sample of the water, tested by

NKWD's laboratory, revealed traces of fluoride indicating it is finished, potable water. The newer pipe included a butterfly valve (Figure 10) which enables the lines to be isolated from on another near the connection point.

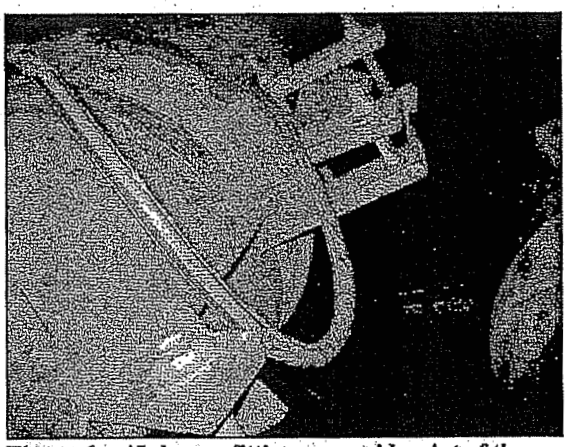


Figure 6 – 45-degree fitting near mid-point of the tunnel, note restraining harness, typical on both ends of each fitting

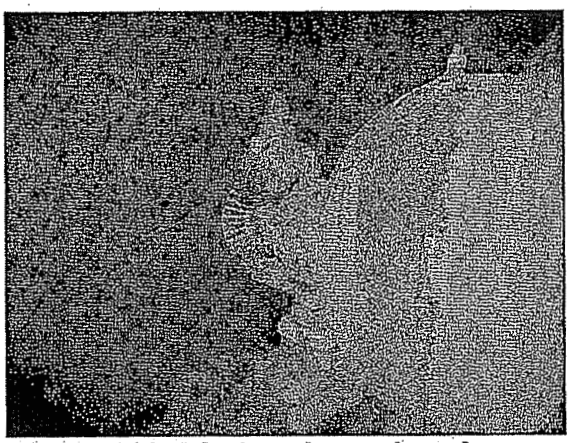


Figure 7 - 24-inch horizontal gate valve and operator

Figure 8 – Connection of the two 24-inch lines, 24" x 24" 45-degree wye in the foreground, tunnel wall penetration patched with concrete

Figure 9 – Abandoned 24-inch line penetrating tunnel wall

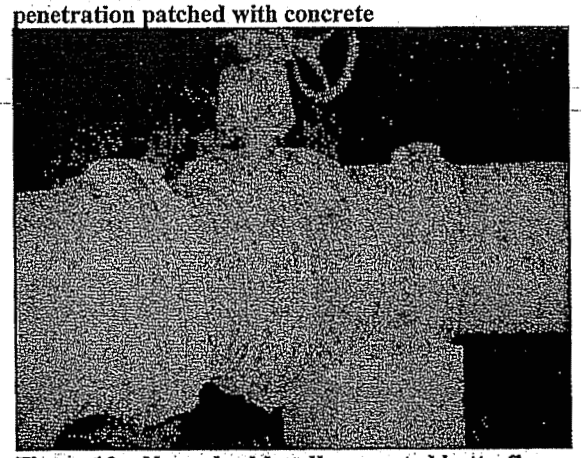


Figure 10 – New wheel-handle operated butterfly valve

Figure 11 – Mineral deposits from apparent ground water penetration of mortar in tunnel arch

The majority of the barrel of both pipelines appears to be in fairly good overall condition. There were no leaks observed at the time of inspection nor was there any evidence of past leak or break repair. There was some moderate to heavy isolated corrosion observed on the older cast iron main primarily at locations of apparent ground water seepage (**Figure 11**) and at bell and spigot joints (**Figures 12, 13, & 14**). The newer main however appears to be corroding more uniformly across its entire surface (**Figure 15**). Internally, the pipe has an average amount of tuberculation for a pipe of this vintage.

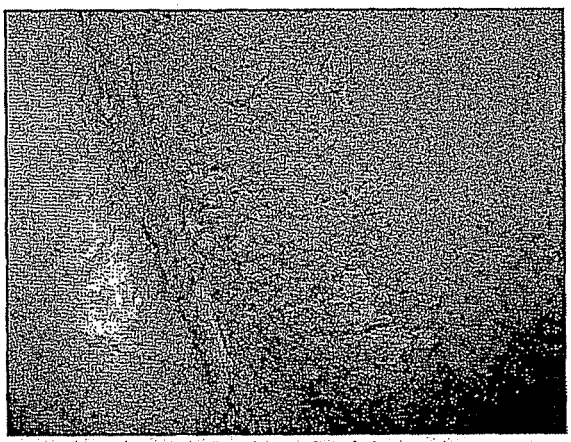


Figure 12 – Bell and spigot pipe joint, note localized corrosion on spigot end

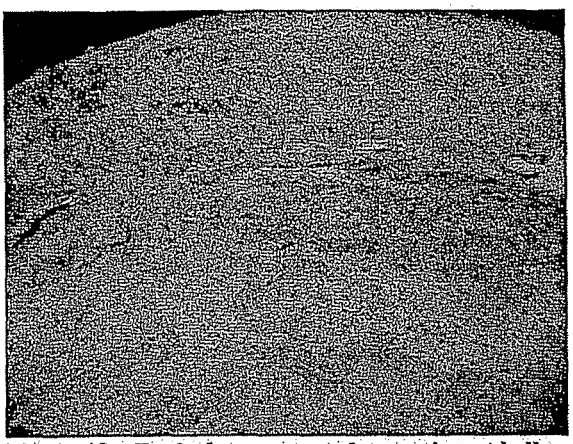


Figure 13 – Typical concentrated corrosion at bell and spigot joint

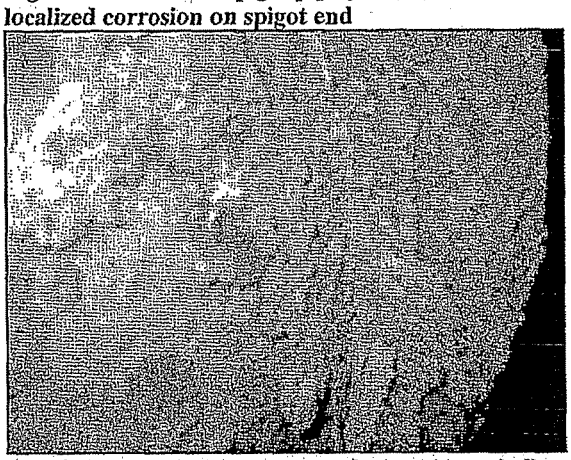


Figure 14 – Typical concentrated corrosion at bell and spigot joint

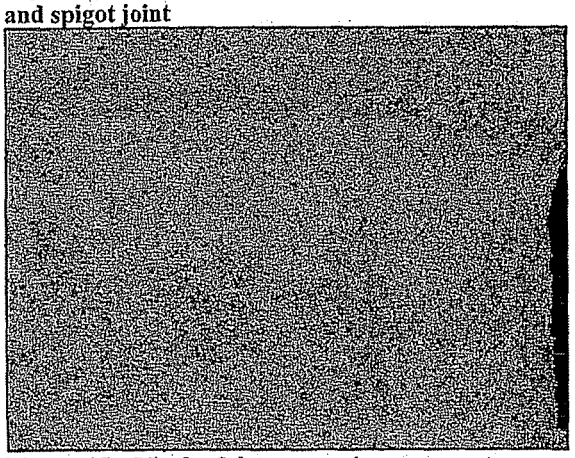


Figure 15 – Much of the newer pipe appears to have corroded evenly over the entire exterior wall

Recommendations

1) Upgrade access ladder to assure compliance with OSHA regulations.

2) Perform a number of non-destructive metallurgical tests at the areas found to have the heaviest corrosion. There are several tests that can be performed from the exterior of the pipe that can estimate remaining wall thickness. This data, when compared with originally specified pipe wall requirements can approximate what amount of metal loss has occurred since installation. Depending on the results of these tests and the long-term plans for the pipelines NKWD may want to consider either simply applying a protective

coating on the exterior and interior of the lines or installing a structural lining using the existing pipelines as conduits for a new system.

3) Plug or cap the open end of abandoned pipeline. This line is allowing water, and possibly mud, to constantly enter the tunnel creating a less than desirable environment.

4) Clean heavy mud and debris from the tunnel floor and make any repairs necessary to prevent infiltration of large volumes of water and silt.

5) Prior to entering tunnel, ventilate to the degree necessary to allow safe entry without the need for respirators. Long range, possibly drill a ventilation shaft at the farthest end of the tunnel to better circulate air.

APPENDIX E
Powdered Activated Carbon Evaluation

TECHNICAL MEMORANDUM

DATE: September 23, 2005

PREPARED FOR: Northern Kentucky Water District

PREPARED BY: Lee Powell

REVIEWED BY: David Haas, P.E.

SUBJECT: Powdered Activated Carbon Feed System – Memorial Parkway WTP

PROJECT: Chemical Feed Storage and Feed System Improvements (02406.001)

This technical memorandum presents an evaluation of a bulk powdered activated carbon (PAC) silo to a semi-bulk bag system and investigates whether the existing chemical building would be suitable to house a PAC feed system. A recommendation for a new PAC system is summarized at the end of this memorandum.

Existing Facilities

Previous engineering evaluations have concluded that the existing feed facilities have the potential of exposure to hazard compounds and therefore a new system complying with local codes is required.

Options Considered

Two options are available for a new PAC storage and feed system:

- One option would include a system that utilizes a bulk storage silo to hold dry PAC the lower portion of the silo would be skirted to provide a location for feed and metering facilities. The dry feed, slurry mixing and feed system would be housed in this building.

- Another option would include a structural frame that would provide provisions to lift and place in service a semi-bulk (900-pound) bag over a volumetric dry feeder. PAC would be metered trough the dry feeder; slurry would be pneumatically mixed and conveyed to the application point.

PAC handling is not problem-free with either system due to the characteristics of PAC, including:

- Dusty when dry

- Difficult to wet
- Slurry tends to plug pipe and equipment

A wet slurry PAC storage and feed system could be used for this application. These systems would need to be continuously mixed. Since PAC is fed infrequently at MPTP, this type of system was not considered.

Alternative Evaluation

Three alternatives were considered for replacement of the PAC feed system at the Memorial Parkway Water Treatment Plant (WTP):

Alternative 1 – A new PAC silo storage system

Alternative 2 – A New semi-bulk bag storage system located in the existing Chemical Building

Alternative 3 – A new semi-bulk bag storage system located in a new building

Summary of PAC Dosing Requirements

Item	Flow Rate (MGD)	Dosage (mg/L)	Feed Rate (lbs/day)
Average Annual	6.7	5	279
Max. Day	10	20	1,668
Future Average Annual	13.3	5	559
Future Max Day	20	20	3,336

Alternative 1 – New PAC Silo Storage System

Alternative 1 would involve demolishing and removal of most of the existing PAC feed equipment and replacement with a new self-contained PAC system to be located on site or near the Raw Water Transfer Station (RWTS) or Reservoir.

For the purpose of this evaluation, the new PAC system would consist of:

- One 28.5-ton dry storage silo sized to accommodate approximately 150 percent of the capacity of a standard delivery truck.
- One volumetric feeder for dry PAC and appurtenant equipment housed under the base of the silo.
- Slurry mixing and feed equipment would be housed under the silo and would include:

- An eductor to create PAC slurry as needed
- Water flow regulation
- Dust collection

Alternative 1 has the following advantages:

- System would be self-contained located in separate structure.
- Would require minimal operator attention with a totally automated system.

The disadvantage of Alternative 1 is that with the infrequent use of PAC, there would be a large inventory of PAC on hand based on prior records, which indicate a need for PAC ranging from no use in a year up to 33 days use per year (year 2002).

Alternative 2 – New Semi-Bulk Storage System Located in Chemical Building

Alternative 2 would include demolishing of the existing elevator, located in the Chemical Building and installing a semi-bulk bag PAC system, separation walls, and explosion proof electrical equipment.

For purposes of evaluation, the new PAC system would consist of:

- A tubular steel support frame
- Electric crane hoist trolley
- Semi-bulk fittings and adapter
- Volumetric feeder
- Pneumatic blower and eductor
- System control panel

Alternative 2 has the following advantages:

- Re-use of the existing Chemical Building (only applicable if re-use of the settling basins is selected as the new chemical building option for other chemicals).

- Limited on site storage requirements store 900lb bags as required.

- Re-use existing chemical feed lines.

Alternative 2 has the following disadvantages:

- The feed area will have to be sealed off from the rest of the building to eliminate the revisions required by fire safety code requirements.

- The feeder zone will have to be re-wired to bring it into compliance with explosion proof requirements.

Alternative 3 – New PAC Storage System Located in New Building

Alternative 3 would include demolishing of the existing PAC feed system, and building a new building to house the Semi-Bulk Bag discharge and metering system.

For purposes of evaluation the new PAC system would include all the items noted for Alternative 2, but would be installed in a new pre-engineered building (approximately 800 square feet in size).

Alternative 3 has the advantage that the new pre-engineered building can be located near the existing RWTS or Reservoir providing the ability to get longer contact time prior to the addition of other chemicals.

Alternative 3 has only one disadvantage in requiring additional cost of a new PAC building to house the equipment and for bag storage. However, this cost is expected to be less than the cost of retrofitting the existing Chemical Building to be able to store PAC there.

Conclusions and Recommendation

Alternative 1 is not recommended, because of the relative low and infrequent use of PAC. Alternative 2 has possibilities except for the limitation that only one feeder can be installed without major structural work on the existing Chemical Building and that the point of application can't be changed; therefore, the possible advantage of providing additional contact time with the raw water would be eliminated.

Alternative 3 is recommended because it provides for storage of only what is required and that it provides additional contact time for PAC prior to the addition of other chemicals.

APPENDIX F
Raw Water Transfer Station Evaluation

TECHNICAL MEMORANDUM

DATE: September 14, 2005

PREPARED FOR: Northern Kentucky Water District

PREPARED BY: Thomas Wynn, P.E.

REVIEWED BY: Lee Powell, David Haas, P.E.

SUBJECT: Raw Water Transfer Pumping System Modifications

PROJECT: Northern Kentucky Water District
Memorial Parkway Treatment Plant
Chemical Feed Storage and Feed System Improvements

The following memo is a summary description of the proposed improvements for the Raw Water Transfer Station (RWTS) for the above noted project.

The proposed improvements require that the firm capacity of the pumping station be increased to 10 MGD and that any improvements made now include the changes within the pumping station necessary for increasing the capacity to 20 MGD in the future.

The existing station has three Worthington horizontal split case centrifugal pumps. According to an analysis conducted by CH2M Hill in September 2004, the station has a reported firm capacity of approximately 8.6 MGD with the largest, Pump No. 1, not in service. The pump performance curves in the CH2M Hill report show the pump performance is less than the factory performance curves for all three existing pumps. There also have been reported problems with cavitation with the existing pumps.

In order to analyze the exiting pumping system, a hydraulic model of the RWTS was constructed using Pipe-Flo. To assess the proposed modifications under different flow conditions, three separate models were constructed. One model was for the present condition to assess the capacity of the existing piping and pumps. The second model was for the interim design condition of this project to achieve 10 MGD. The third model was for modeling the future condition when the capacity is expanded to 20 MGD.

Field testing conducted by CH2M Hill showed significant head loss in the suction piping that most likely was the result of the length of the line, the size relative to the flow, and severe scaling resulting from the age of the pipe. For modeling purposes, it was assumed that the old sections of cast iron suction pipe have a Hazen Williams C Value of 50. This corresponds to an absolute roughness of 3 inches. The extreme roughness of the pipe appears to be warranted based on the age of the pipe and the headloss values shown in the CH2M Hill report. For

comparison, new ductile iron pipe would have an absolute roughness of 0.0102 inches, which equates to a C value of approximately 140.

When the existing system was modeled, the results approached the predicted headloss and pump performance reported for the combined operation of Pumps Nos. 2 and 3 when the following assumptions were made. The first assumption is that only one of the 24-inch suction lines in the tunnel is in service and that the lines are not combined. The second assumption is that the existing piping has a very high friction factor as a result of the pipe age and condition. The third assumption is that the reservoir operated with a water surface elevation that varies between 716.00 and 720.00. Under these conditions, the hydraulic model results approached the field test data in the CH2M Hill report and appear to confirm that the model is a reasonably close approximation of the actual reported field conditions.

Prior to conducting any modeling, the biggest concern was the existing suction piping did not have adequate capacity to supply the new pumps. Due to the proposed flows and the length, age and condition of the suction pipe, enough pressure drop in the suction piping might occur to cause the pumps to cavitate. Should this occur, the new pumps would suffer from reduced performance and might be damaged.

The models show that continued use of the one 24-inch suction line would be acceptable for the 10 MGD flow. Due to the velocities in the pipe, it is recommended that some improvements be made to the suction and discharge piping in the pumping station that are described below.

When the capacity is expanded to 20 MGD, the higher flow will result in a significant pressure drop in the suction piping. Without changes to the suction piping, the pumps would most likely cavitate severely. To resolve this situation, it is recommended that a new 36-inch pipe be installed between the reservoir and the transfer pumping station when the capacity is increased to 20 MGD.

It should be noted that operating the reservoir above the minimum water surface elevation of 716.00 is critical. Operation of the reservoir below this level would most likely result in pumping rates less than design capacity and possible damage to the pumps as a result of cavitation.

Proposed Improvements

It is recommended that the existing Pumps Nos. 2 and 3 be replaced with two new 10-MGD pumps. In addition, it is recommended that a smaller 5-MGD pump be provided for flows between 2 and 5 MGD.

In the future, the speed of the new 10-MGD pumps would be increased using variable frequency drives to achieve 10 MGD at the higher head required for the 20-MGD capacity and the 5-MGD pump would be replaced with a third 10-MGD pump to provide the required level of redundancy. A summary of the required operating conditions is shown below:

	Current Design		Future Design
Number of Pumps	2	1	3
Maximum Flow, gpm	6,495	3,472	6,945
Pump TDH, ft.	75	54.5	86
Shut Off Head, ft.	97.5	83	108.4
Pump speed at design flow, rpm	839	1,185	885
Horsepower at design point, HP	152	56.3	175.1
Pump efficiency at Design Flow, %	86.5	85	85.5
NPSHr at design flow, ft.	9.5	15.6	9.5
Minimum flow, gpm	1,389	1,389	1,389
Pump speed at min. flow, rpm	583	928	583
Horsepower at min. speed, HP	33.1	22.8	33.1
NPSHr at min. flow, ft.	<9	<10	<9
Pump efficiency at min. flow, %	48	71	48
Motor Size, HP	200	75	200

Two selections are recommended for the proposed 10-MGD pumps. The first is a Goulds Model 3409, 14x18-23 L that would use a 900 rpm motor. The second selection is a Goulds Model 3409, 14x16-17 that would use a 1,200 rpm motor. The advantage of the first selection is that it is more efficient and has a lower NPSHr. The data in the table above is based on the more efficient selection.

The proposed pumps and variable frequency drives will have the capability to operate down to minimum flows of 2 MGD. Due to the lower efficiency when operating the 10-MGD pump at low flows, we recommend that a smaller third pump be installed initially. The smaller pump would be capable of operating one treatment train at 5 MGD and could be turned down to lower flows (e.g., 2 MGD) at a higher efficiency than would be provided with the 10-MGD pump. Performance data for a Goulds Model 3410, 10x12-15 is provided as a possible selection for this pump. This pump would have to be replaced in the future with the larger 10-MGD pump when the capacity is expanded to 20 MGD.

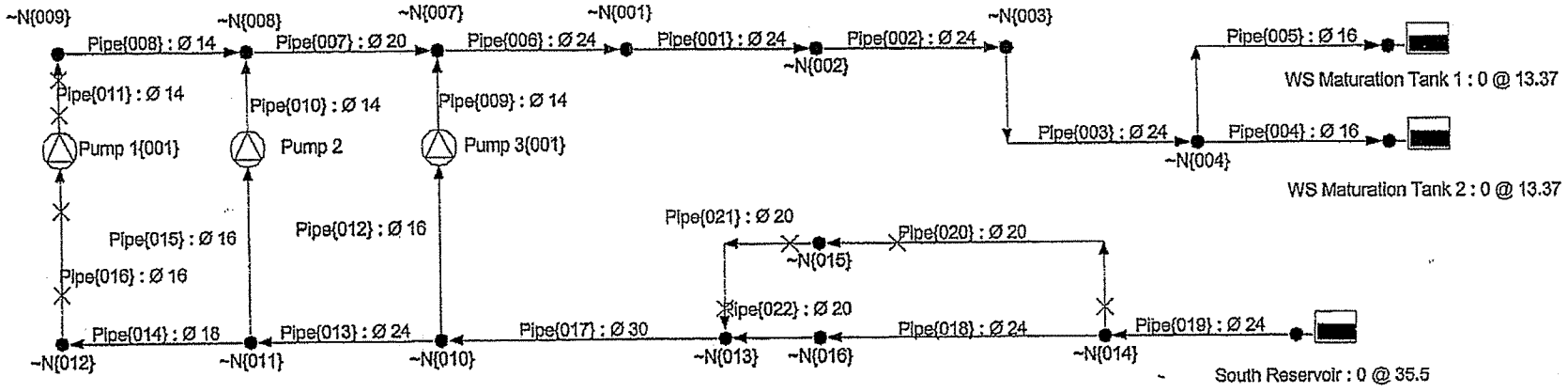
It is recommended that the new pumps be provided with variable frequency drives to vary pump output. The pumps selected require changes in speed from 583 rpm to 885 rpm. This range is well within the capability of most variable frequency drives. The existing flow control valves need to remain in service to vary the flow to each train in the treatment process. The existing flow meters would remain in service to measure flow.

Preliminary cut sheets and performance curves for the pump selections are attached. Also attached is a preliminary layout showing the approximate foundation outline for the largest of the new pumps. It will easily fit in the space that is available as it is only slight longer that the existing pumps.

It is proposed that some minor piping modifications be made in the pumping station consisting of removing the 18-inch and 24-inch pump suction manifold in the pipe trench and replacing it with 30-inch pipe. Also, the 14-inch discharge pipe header pipe should be replaced with 18-inch pipe and the 20-inch discharge header pipe should be replaced with 24-inch pipe. The existing pump discharge piping, check and isolation valves will need to be increased in size from 14 inches to 16 inches. The individual pump suction piping will need to be increased from 16 inches to 18 inches.

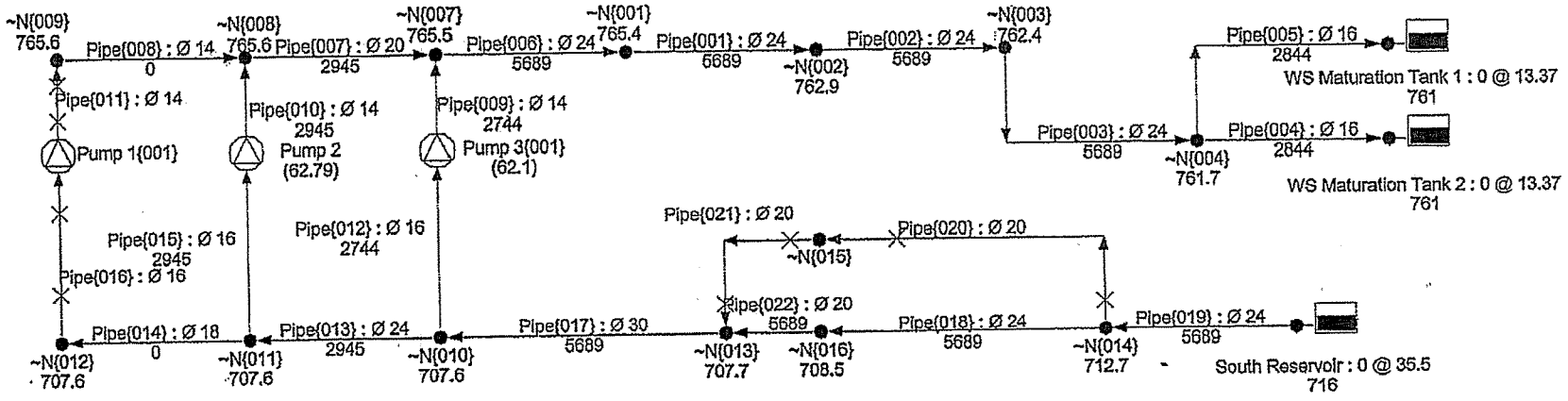
For the 10-MGD design, no changes are required for the suction piping outside the station. Ultimately, a new suction line will be required when the capacity is increased to 20 MGD. It is proposed that the new line be connected to the opposite end of the existing suction header in the existing pipe trench.

A preliminary sketch noting the proposed station piping improvements is attached.



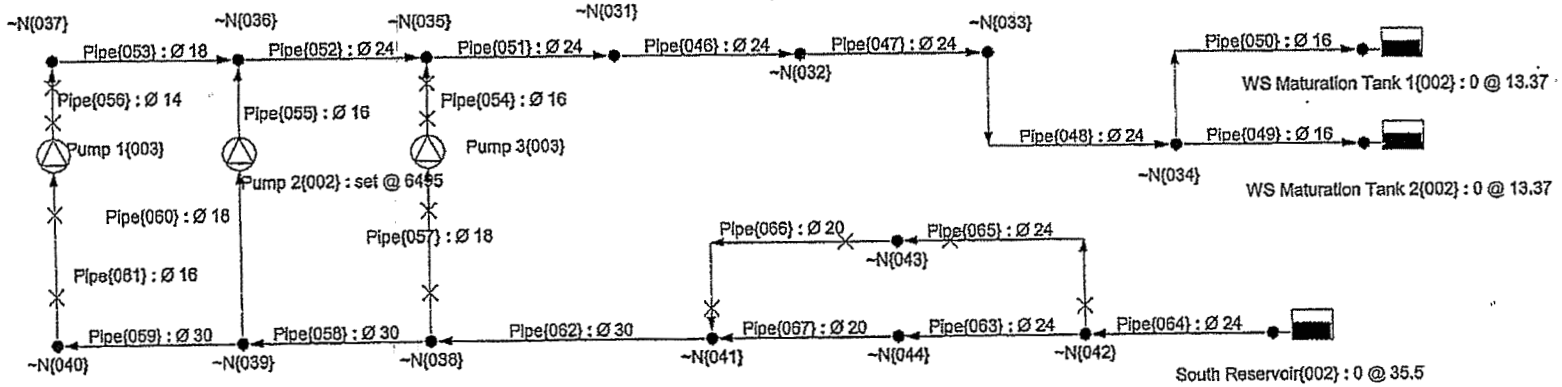
Existing Raw Water Transfer System

Lineup:	<Design Case>	PIPE-FLO 8.0	09/16/05 1:23 pm
System:	NKWD RW Pumping Station		Pipes: US gpm
Company:	Jordan, Jones and Goulding, Inc.		Nodes: ft
Project:	MPTP Chemical Storage and Feed System		Pumps: ft
by:	TWW		Components: ft
			Controls: psi
			Level: ft



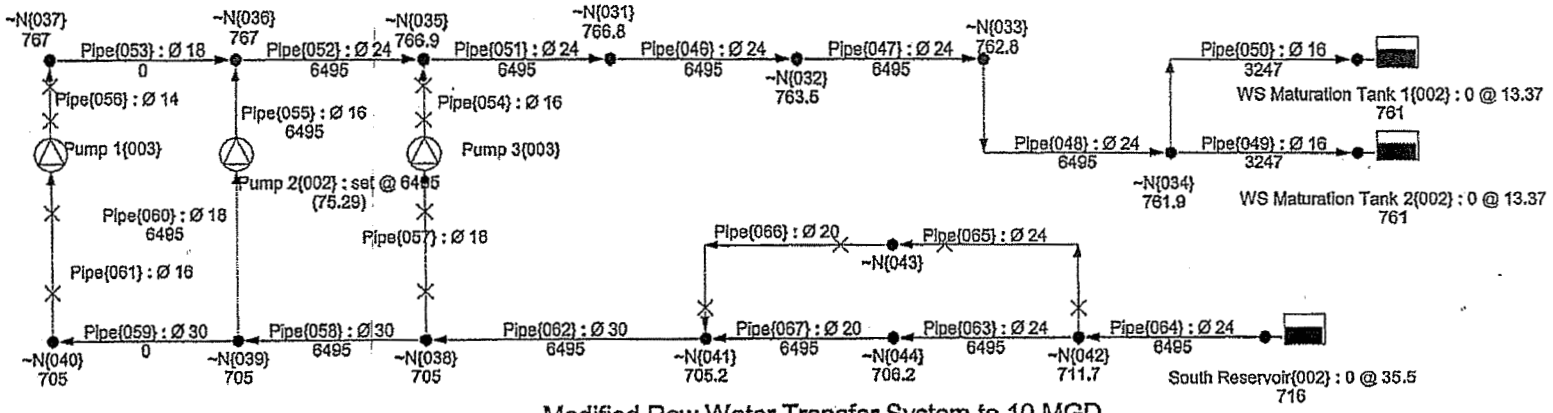
Existing Raw Water Transfer System

Lineup:	<Design Case>	PIPE-FLO 8.0	09/16/05 1:23 pm
System:	NKWD RW Pumping Station		Pipes: US gpm
Company:	Jordan, Jones and Goulding, Inc.		Nodes: ft
Project:	MPTP Chemical Storage and Feed System		Pumps: ft
by:	TWW		Components: ft
			Controls: psi
			Level: ft



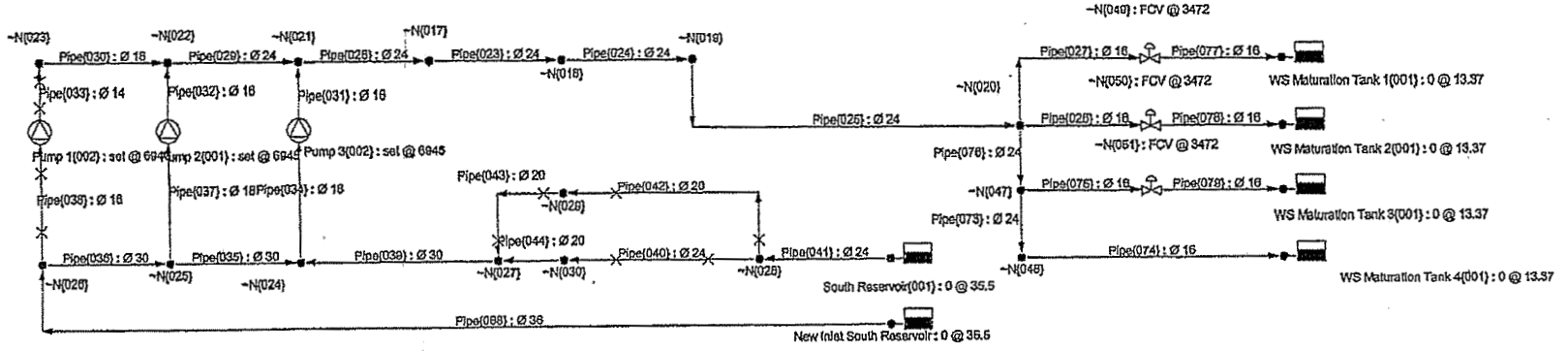
Modified Raw Water Transfer System to 10 MGD
-2 pumps at 10 MGD each(1 duty, 1 standby)
-Existing 24" suction line used

Lineup:	<Design Case>	PIPE-FLO 6.0	09/16/05 1:26 pm
System:	NKWD RW Pumping Station	Pipes:	US gpm
Company:	Jordan, Jones and Goulding, Inc.	Nodes:	ft
Project:	MPTP Chemical Storage and Feed System	Pumps:	ft
by:	TWW	Components:	ft
		Controls:	psi
		Level:	ft



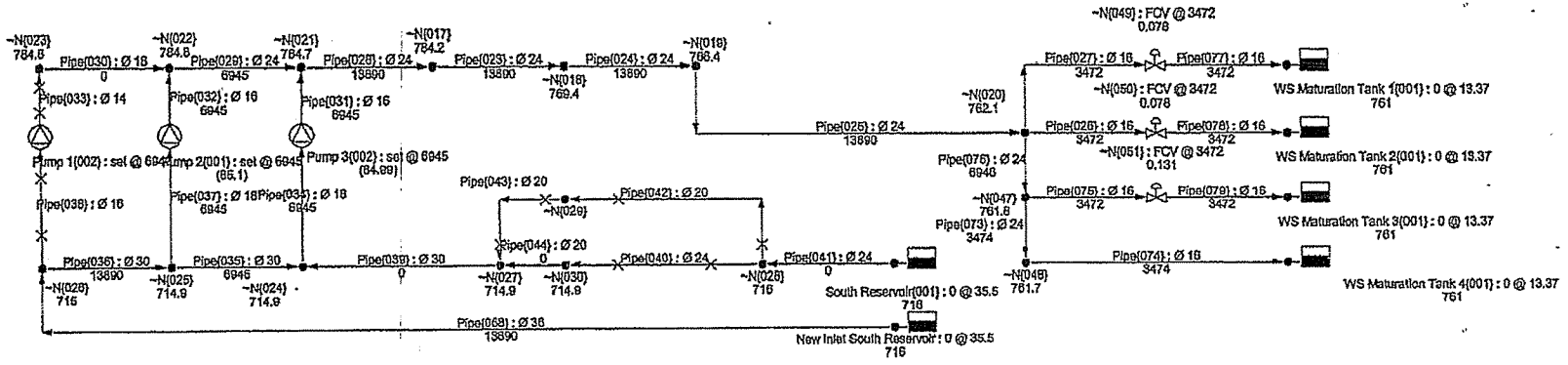
Modified Raw Water Transfer System to 10 MGD
-2 pumps at 10 MGD each(1 duty, 1 standby)
-Existing 24" suction line used

Lineup:	*<Design Case>*	PIPE-FLO 8.0	09/16/05 1:26 pm
System:	NKWD RW Pumping Station		Pipes: US gpm
Company:	Jordan, Jones and Goulding, Inc.		Nodes: ft
Project:	MPTP Chemical Storage and Feed System		Pumps: ft
by:	TWW		Components: ft
			Controls: psi
			Level: ft



Modified Raw Water Transfer System for 20 MGD
- 3 pumps at 10 MGD each(2 duty, 1 standby)
- New 36" suction line provided

Lineup: <*Design Case*>	PIPE-FLO 6.0	09/16/05 1:27 pm
System: NKWD RW Pumping Station		Pipes: US gpm
Company: Jordan, Jones and Goulding, Inc.		Nodes: ft
Project: MPTP Chemical Storage and Feed System		Pumps: ft
by: TWW		Components: ft
		Controls: psi
		Level: ft



Modified Raw Water Transfer System for 20 MGD
-3 pumps at 10 MGD each(2 duty, 1 standby)
- New 36" suction line provided

Lineup: <Design Case>	PIPE-FLO 8.0	09/16/05 1:28 pm
System: NKWD RW Pumping Station		Pipes: US gpm
Company: Jordan, Jones and Goulding, Inc.		Nodes: ft
Project: MPTP Chemical Storage and Feed System		Pumps: ft
by: TWW		Components: ft
		Controls: psi
		Level: ft

10 MGD PUMP

Goulds Pumps
ITT Industries

GPM ENVIRONMENTAL INC

GPM Environmental, Inc.
1000 Holcomb Woods Parkway
Building 400, Suite 418
Roswell, GA 30076

Telephone: 770-643-4859
Facsimile: 770-552-0319
Cell: 404-218-4675
E-mail: jimn@gpmind.com

Jordan, Jones & Goulding, Inc.

Proposal No: RWTPS

Item No: 2-10 MGD Pump-Alternate

Attn: Tom Wynn

MODEL:3409 L SIZE: 14x18-23 QTY: 1

14 September 2005

Operating conditions

SERVICE	
LIQUID	Water Temp. 70.0 deg F, SP.GR 1.000, Viscosity 1.000 cp
CAPACITY	6,944.0 gpm
HEAD	86.0 (ft)

PRICE in USD	
Pump Unit	Incl
Driver	Incl
Boxing	
Testing	Incl
Freight	
Accessories	
Total 1 Unit	**55,851**

Performance at 885 RPM

PUBLISHED EFFY	86.5% (CDS)
RATED EFFY	86.5%
RATED POWER	174.3 hp (Run out 187.2 hp)
NPSHR	9.5 (ft)
DISCH PRESSURE(R)	37.6 (46.9 @ Shut off) (psi g)
PERF. CURVE	A-7876-8 (Rotation CW viewed from coupling end)
SHUT OFF HEAD	108.4 ft
MIN. FLOW	Continuous Stable: 2,588.7 gpm Hydraulic: 2,588.7 gpm Thermal: N/A

Materials

CONSTRUCTION	Cast Iron-bronze fitted
CASING	Cast iron max.casing.pres. @ rated temp. 175.0 psi g
CASING WEAR RING	Bronze
IMPELLER	Silicon Brass - Enclosed (20.0000 rated (in) max=23.0000 min=14.0000)
CASING GASKETS	Vellumoid 505
SHAFT MATERIAL	Steel-AISI 4140
SHAFT SLEEVE	Bronze
LUBRICATION	Grease
GLAND	By Seal Vendor Plain
COUPLING	Falk - T10 1090T
COUPLING GUARD	Steel
BASEPLATE	Channel steel Base # 11

Sealing Method

MECHANICAL SEAL: John Crane - 5610Q - XF(55)-1O(58)H - (Cartridge - Single)

Flanges

125# flat face

Liquid end features

Impeller two-plane balanced to ISO G6.3

Frame features

Inpro VBX Labyrinth Seal

Piping

Copper bypass tubing

Proposal No: RWTPS Item No: 2-10 MGD Pump-Alternate MODEL: 3409 L 14x18-23

Testing

Non witnessed running performance test
Non witnessed casing hydrostatic-test
Performance Curve Approval Required Before Shipment

Baseplate Features

Drip Pan with NPT drain connection

Painting

Goulds Blue Epoxy primer (4.0 mils) - pump and baseplate

Sandblast

Pump and base (top of bedplate) SSPC-SP6

Driver : Electric motor Manufacturer : Pump mfg's Choice

FURNISHED BY	Pump mfg	MOUNTED BY	Pump mfg
RATING	200.0 hp (149.1 KW)	ENCLOSURE	ODP - Inverter Duty
PHASE/FREQ/VOLTS	3/60 Hz/460	SPEED	900 RPM
INSULATION/SF	F/1.15	FRAME	449T

Weights and Measurements

TOTAL NET UNIT WEIGHT / VOLUME	6,366.0 lb / 193.3 ft³
TOTAL GROSS UNIT WEIGHT / GROSS VOLUME	7,755.0 lb / 277.7 ft³

Program Version 1.12.0.0

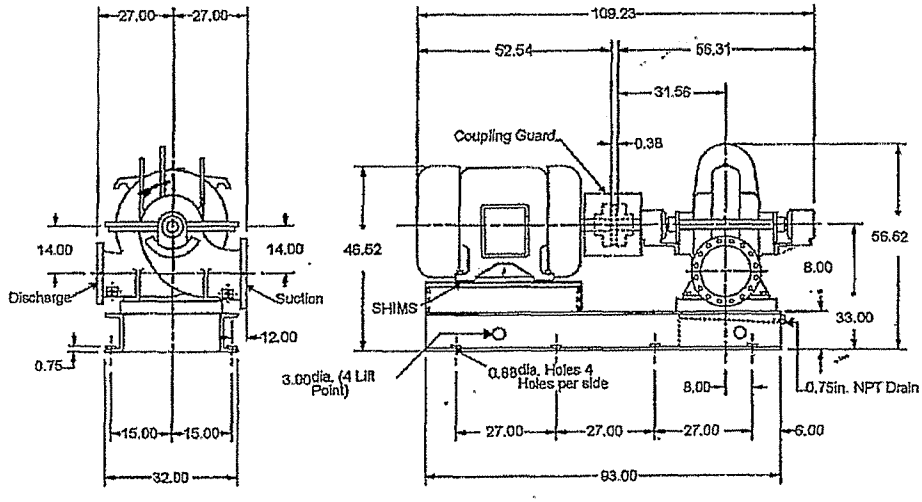
Our offer does not include specific review and incorporation of any Statutory or Regulatory Requirements and the offer is limited to the requirements of the design specifications. Should any Statutory or Regulatory requirements need to be reviewed and incorporated then the Customer is responsible to identify those and provide copies for review and revision of our offer.

Our quotation is offered in accordance with our comments and exceptions identified in our proposal.

Goulds Pumps
ITT Industries

OUTLINE DRAWING

Model 3409 L
14x18-23



Pump specification

SUCT.FLANGE SIZE *18"*	DRILLING *ANSI 125#*	FACING *FF*	FINISH *SMOOTH*		
DISCH.FLANGE SIZE *14"*	DRILLING *ANSI 125#*	FACING *FF*	FINISH *SMOOTH*		
PUMP ROTATION (LOOKING AT PUMP FROM MOTOR)	*CW*				
TYPE OF LUBRICATION *GREASE*				COOLED *NO*	
TYPE OF STUFFING BOX *N/A*				COOLED *NO*	
TYPE OF SEALING *MECHANICAL SEAL*					

Weights and Measurements

PUMP	2,940.0 lb
MOTOR/CPLG	2,550.0/57.0 lb
BASEPLATE	819.0 lb
TOTAL	6,366.0 lb
GR.VOLUME w/BOX	277.7 ft³
GR.WEIGHT w/BOX	7,755.0 lb

Motor specification

MOTOR BY *PUMP MFG*	MOUNT BY *PUMP MFG*	MFG. *PUMP MFG'S CHOICE*			
FRAME *449T*	POWER *200.0 hp*	RPM *900*			
PHASE *3*	FREQUENCY *60 HZ*	VOLTS *460*			
INSULATION *F*	S.F. *1.15*				
ENCLOSURE *ODP - INVERTER DUTY*					

Auxiliary specification

COUPLING BY *PUMP MFG*	CPLG TYPE *FALK T10 1090T*		
CPL GUARD BY *PUMP MFG.*	CPLG GUARD MATL *STEEL*		
BASEPLATE *CHANNEL STEEL Base # 11*			
MECH.SEAL *JOHN CRANE 5610Q XF(55)-10(58)H*			

Notes and References

- MTR DIMENSIONS ARE APPROXIMATE
*Tolerance is +-0.25 in.
For the rest of the dimensions tolerance is +-0.13 in. unless otherwise specified

FOR PUMP TAPPED OPENINGS REFER TO DWG.:
TRWTPS / 2-10 MGD Pump-Alternate

DRAWING IS FOR REFERENCE ONLY.
NOT CERTIFIED FOR CONSTRUCTION UNLESS SIGNED.

Customer: Jordan, Jones & Goulding, Inc.
Serial No:
Customer P.O. No:
Item No: 2-10 MGD Pump-Alternate
Project No: Raw Water Transfer Pump Station
End User: Northern Kentucky Water District
Service:

All dimensions are in inches.
Drawing is not to scale
Weights (lbs) are approximate

DRAWING NO RWTPS/2-10 MGD Pump-Alternate

FORM # ED1200 | Program Version 1.12.0.0

Model: 3409	Size: 14x18-23	Group: L	60Hz	RPM Variable	Stages: 1

Job/Inq.No. :
Purchaser : Jordan, Jones & Goulding, Inc.
User : Northern Kentucky Water District Issued by : James Naus
Item/Equip.No. : 2-10 MGD Pump-Alternate Quotation No. : RWTPS Date : 09/14/2005
Service :
Order No. : Certified By :

Operating Conditions

Liquid: Water
Temp.: 70.0 deg F
S.G./Visc.: 1.000/1.000 cp
NPSHa:
Solid size:
% Solids:

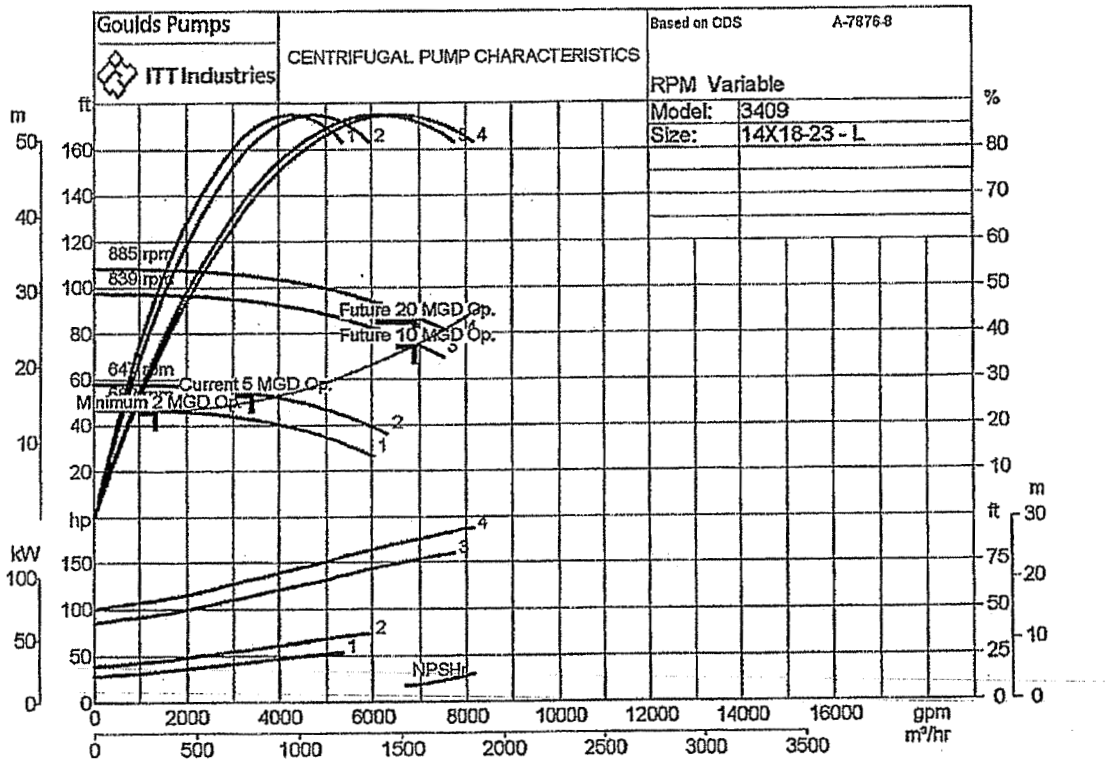
Total Power Loss:
Imp. Dia. First 1 Stg(s): 20.0000 in
Imp. Dia. Addt'l Stg(s):
Vapor Press:
Max. Solids Size: 2.1000 in

Pump Performance @ 885 RPM

Suction Specific Speed: 9,207.0 gpm(US) ft
Non-Overloading Power: 186.2 hp

Min. Thermal Flow: N/A

Notes: 1 . Elevated temperature effects on performance are.not included.



Name	Speed	Flow	Head	NPSH r	Eff %	Power	Shut off head	Min. Hydraulic Flow
Rated Point	885	6,944.0 gpm	86.9 ft	9.5 ft	86.5	175.1 hp	108.4 ft	2,588.7 gpm
Future 10 MGD Op.	839	6,944.0 gpm	74.9 ft	9.5 ft	85.5	152.9 hp	97.4 ft	2,454.8 gpm
Current 5 MGD Op.	648	3,472.0 gpm	53.8 ft		81.5	57.8 hp	57.9 ft	1,894.8 gpm
Minimum 2 MGD Op.	583	1,389.0 gpm	46.4 ft		48.5	33.1 hp	46.9 ft	1,704.0 gpm

10 MGD Pump

Goulds Pumps
ITT Industries

GPM ENVIRONMENTAL INC

GPM Environmental, Inc.
1000 Holcomb Woods Parkway
Building 400, Suite 418
Roswell, GA 30076

Telephone: 770-643-4859
Facsimile: 770-552-0319
Cell: 404-218-4675
E-mail: jimn@gpmind.com

Jordan, Jones & Goulding, Inc.
Proposal No: RWTPS
Item No: 2-10 MGD Pump

Attn: Tom Wynn

MODEL:3409 M SIZE: 14x16-17 QTY: 1

14 September 2005

Operating conditions

SERVICE	Raw Water Pump
LIQUID	Water Temp. 70.0 deg F, SP.GR 1.000, Viscosity 1.000 cp
CAPACITY	6,944.0 gpm
HEAD	86.0 (ft)

PRICE in USD	
Pump Unit	Incl
Driver	Incl
Boxing	
Testing	Incl
Freight	
Accessories	
Total 1 Unit	**47,135**

Performance at 1185 RPM

PUBLISHED EFFY	85.5% (CDS)
RATED EFFY	85.5%
RATED POWER	176.4 hp (Run out 176.4 hp NOL 179.6 hp)
NPSHR	16.6 (ft)
DISCH PRESSURE(R)	38.0 (56.0 @ Shut off) (psi g)
PERF. CURVE	A-7870-8 (Rotation CW viewed from coupling end)
SHUT OFF HEAD	129.3 ft
MIN. FLOW	Continuous Stable: 2,614.4 gpm Hydraulic: 2,614.4 gpm Thermal: N/A

Materials

CONSTRUCTION	Cast Iron-bronze fitted
CASING	Cast iron max.casing.pres. @ rated temp. 175.0 psi g
CASING WEAR RING	Bronze
IMPELLER	Silicon Brass - Enclosed (16.6000 rated (in) max=17.5000 min=12.5000)
CASING GASKETS	Vellumoid 505
SHAFT MATERIAL	Steel-AISI 4140
SHAFT SLEEVE	Bronze
LUBRICATION	Grease
GLAND	By Seal Vendor Plain
COUPLING	Falk - T10 1090T
COUPLING GUARD	Steel
BASEPLATE	Channel steel Base # 9

Sealing Method

MECHANICAL SEAL — John Crane - 5610Q - XF(55)-1O(58)H - (Cartridge - Single)

Flanges

125# flat face

Liquid end features

Impeller two-plane balanced to ISO G6.3

Frame features

Inpro VBX Labyrinth Seal

Piping

Copper bypass tubing

Testing

Non witnessed running performance test
Non witnessed casing hydrostatic-test
Performance Curve Approval Required Before Shipment

Baseplate Features

Drip Pan with NPT drain connection

Painting

Goulds Blue Epoxy primer (4.0 mils) - pump and baseplate

Sandblast

Pump and base (top of bedplate) SSPC-SP6

Driver : Electric motor Manufacturer : Pump mfg`s Choice

FURNISHED BY	Pump mfg	MOUNTED BY	Pump mfg
RATING	200.0 hp (149.1 KW)	ENCLOSURE	ODP - Inverter Duty
PHASE/FREQ/VOLTS	3/60 Hz/460	SPEED	1200 RPM
INSULATION/SF	F/1.15	FRAME	449T

Weights and Measurements

TOTAL NET UNIT WEIGHT / VOLUME	6,328.0 lb / 139.4 ft³
TOTAL GROSS UNIT WEIGHT / GROSS VOLUME	7,371.0 lb / 208.6 ft³

Program Version 1.12.0.0

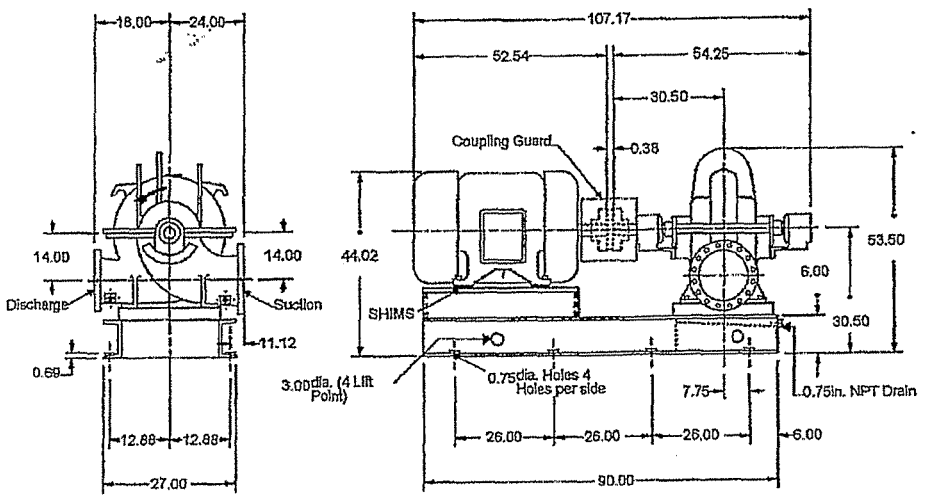
Our offer does not include specific review and incorporation of any Statutory or Regulatory Requirements and the offer is limited to the requirements of the design specifications. Should any Statutory or Regulatory requirements need to be reviewed and incorporated then the Customer is responsible to identify those and provide copies for review and revision of our offer.

Our quotation is offered in accordance with our comments and exceptions identified in our proposal.

Goulds Pumps
ITT Industries

OUTLINE DRAWING

Model 3409 M
14x16-17



Pump specification

SUCT.FLANGE SIZE	*16"*	DRILLING	*ANSI 125#*	FACING *FF*	FINISH *SMOOTH*
DISCH.FLANGE SIZE	*14"*	DRILLING	*ANSI 125#*	FACING *FF*	FINISH *SMOOTH*
PUMP ROTATION (LOOKING AT PUMP FROM MOTOR)				*CW*	
TYPE OF LUBRICATION	*GREASE*				COOLED *NO*
TYPE OF STUFFING BOX	*N/A*				COOLED *NO*
TYPE OF SEALING	*MECHANICAL SEAL*				

Weights and Measurements

PUMP	2,860.0 lb
MOTOR/CPLG	2,550.0/57.0 lb
BASEPLATE	861.0 lb
TOTAL	6,328.0 lb
GR.VOLUME w/BOX	208.6 ft³
GR.WEIGHT w/BOX	7,371.0 lb

Motor specification

MOTOR BY	*PUMP MFG*	MOUNT BY	*PUMP MFG*	MFG.	*PUMP MFG'S CHOICE*
FRAME	*449T*	POWER	*200.0 hp*	RPM	*1200*
PHASE	*3*	FREQUENCY	*60 HZ*	VOLTS	*460*
INSULATION	*F*	S.F.	*1.15*		
ENCLOSURE	*ODP - INVERTER DUTY*				

Notes and References

- MTR DIMENSIONS ARE APPROXIMATE
*Tolerance is +/-0.25 in.
For the rest of the dimensions tolerance is +/-0.13 in. unless otherwise specified

FOR PUMP TAPPED OPENINGS REFER TO DWG.:
TRWTPS / 2-10 MGD Pump

Auxiliary specification

COUPLING BY	*PUMP MFG*	CPLG TYPE	*FALK T10 1090T*
CPL GUARD BY	*PUMP MFG.*	CPLG GUARD MATL	*STEEL*
BASEPLATE	*CHANNEL STEEL Base # 9*		
MECH.SEAL	*JOHN CRANE 5610Q XF(55)-1O(58)H*		

DRAWING IS FOR REFERENCE ONLY.
NOT CERTIFIED FOR CONSTRUCTION UNLESS SIGNED.

Customer: Jordan, Jones & Goulding, Inc.
Serial No:
Customer P.O. No:
Item No: 2-10 MGD Pump
Project No: Raw Water Transfer Pump Station
End User: Northern Kentucky Water District
Service: Raw Water Pump

All dimensions are in Inches.
Drawing is not to scale
Weights (lbs) are approximate

DRAWING NO RWTPS/2-10 MGD Pump

FORM # ED1200 | Program Version 1.12.0.0

Model: 3409	Size: 14x16-17	Group: M	60Hz	RPM Variable	Stages: 1

Job/Inq.No. :
Purchaser : Jordan, Jones & Goulding, Inc.
User : Northern Kentucky Water District Issued by : James Naus
Item/Equip.No. : 2-10 MGD Pump Quotation No. : RWTPS Date : 09/14/2005
Service : Raw Water Pump
Order No. : Certified By :

Operating Conditions

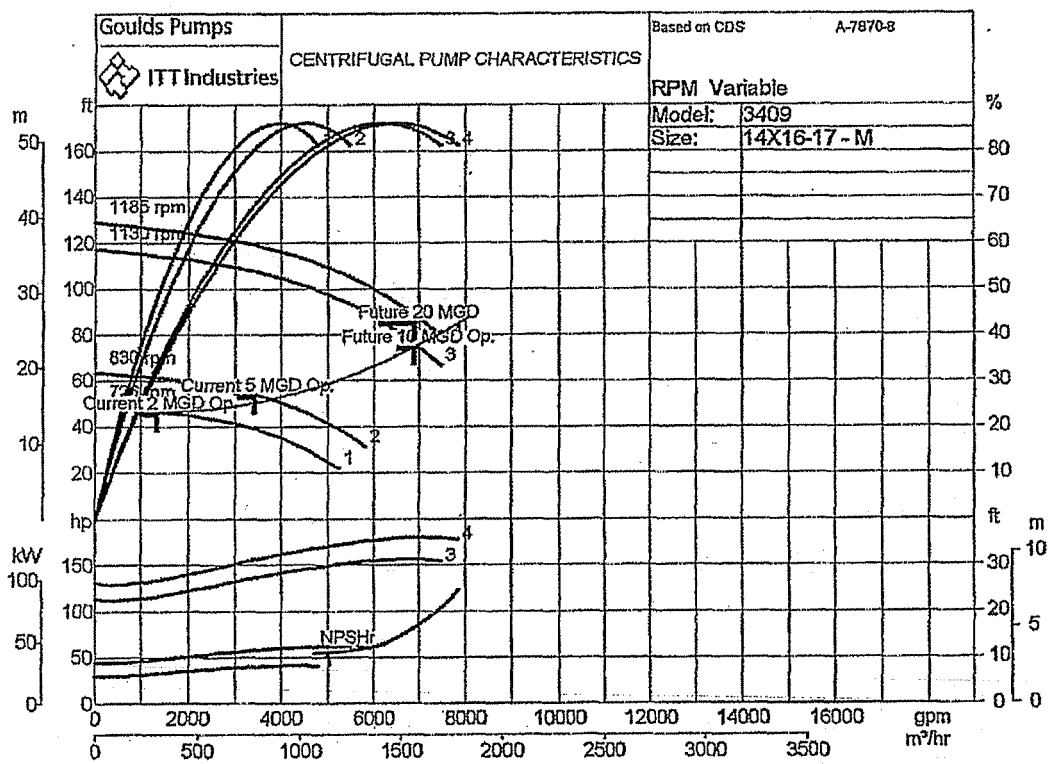
Liquid: Water
Temp.: 70.0 deg F
S.G./Visc.: 1.000/1.000 cp
NPSHa:
Solid size:
% Solids:

Total Power Loss:
Imp. Dia. First 1 Stg(s): 16.6000 in
Imp. Dia. Addt'l Stg(s):
Vapor Press:
Max. Solids Size: 1.2000 in

Pump Performance @ 1185 RPM

Suction Specific Speed: 8,370.0 gpm(US) ft
Non-Overloading Power: 179.6 hp
Min. Thermal Flow: N/A

Notes: 1. Elevated temperature effects on performance are not included.



Name	Speed	Flow	Head	NPSH r	Eff %	Power	Shut off head	Min. Hydraulic Flow
Rated Point	1,185	6,944.0 gpm	87.8 ft	16.6 ft	85.5	180.1 hp	129.2 ft	2,614.4 gpm
Future 10 MGD Op.	1,130	6,944.0 gpm	75.1 ft	16.6 ft	84.0	156.1 hp	117.5 ft	2,493.1 gpm
Current 5 MGD Op.	831	3,472.0 gpm	53.9 ft		80.5	58.4 hp	63.4 ft	1,832.9 gpm
Current 2 MGD Op.	727	1,389.0 gpm	46.4 ft		49.0	32.9 hp	48.5 ft	1,603.5 gpm

5 MGD Pump

Goulds Pumps
ITT Industries

GPM ENVIRONMENTAL INC

GPM Environmental, Inc.
1000 Holcomb Woods Parkway
Building 400, Suite 418
Roswell, GA 30076

Telephone: 770-643-4859
Facsimile: 770-552-0319
Cell: 404-218-4675
E-mail: jimn@gpmind.com

Jordan, Jones & Goulding, Inc.

Proposal No: RWTPS

Item No: 2-5 MGD Pump

Attn: Tom Wynn

MODEL:3410 XL SIZE: 10x12-15 QTY: 1

14 September 2005

Operating conditions

SERVICE	Raw Water Pump
LIQUID	Water Temp. 70.0 deg F, SP.GR 1.000, Viscosity 1.000 cp
CAPACITY	3,472.0 gpm
HEAD	54.0 (ft)

PRICE in USD	
Pump Unit	Incl
Driver	Incl
Boxing	
Testing	Incl
Freight	
Accessories	
Total 1 Unit	**26,805**

Performance at 1185 RPM

PUBLISHED EFFY	85.5% (CDS)
RATED EFFY	84.5% with contract seal
RATED POWER	56.0 hp (incl. Mech. seal drag 0.51). (Run out 56.8 hp)
NPSHR	15.6 (ft)
DISCH PRESSURE(R)	23.5 (36.2 @ Shut off) (psi g)
PERF. CURVE	3924-1 (Rotation CW viewed from coupling end)
SHUT OFF HEAD	83.6 ft
MIN. FLOW	Continuous Stable: 1,277.3 gpm Hydraulic: 1,277.3 gpm Thermal: N/A

Materials

CONSTRUCTION	Bronze fitted
CASING	Cast iron max.casing.pres. @ rated temp. 175.0 psi g
CASING WEAR RING	Bronze
IMPELLER	Bronze - Enclosed (13.2500 rated (in) max=15.0000 min=11.0000)
CASING GASKETS	Non asbestos
SHAFT MATERIAL	SAE 4140
SHAFT SLEEVE	Bronze
LUBRICATION	Regreasable bearings
SEAL CHAMBER	Enlarged bore
GLAND	Bronze Flush
GLAND GASKET	Viton
BEARINGS	SKF 6211 (Inboard Bearing) SKF 5309 A/C3 (Outboard Bearing)
COUPLING	Falk - T10 1080T
COUPLING GUARD	Steel
BASEPLATE	Cast iron D03190A

Sealing Method

MECHANICAL SEAL — John Crane - 8-1T - XF511XO101 (Carbon vs Ceramic with Viton) - (Conventional - Single)

Flanges

125# flat face

Frame features

Labyrinth oil seals - Inpro VBX

Single extended shaft

Piping

Copper bypass tubing

Testing

Non witnessed running performance test
Non witnessed casing hydrostatic-test
Performance Curve Approval Required Before Shipment

Painting

Goulds Blue Epoxy primer (4.0 mils) - pump and baseplate

Sandblast

Pump and base (top of bedplate) SSPC-SP6

Driver : Electric motor Manufacturer : Pump mfg's Choice

FURNISHED BY	Pump mfg	MOUNTED BY	Pump mfg
RATING	60.0 hp (44.7 KW)	ENCLOSURE	ODP - Inverter Duty
PHASE/FREQ/VOLTS	3/60 Hz/230/460	SPEED	1200 RPM
INSULATION/SF	F/1.15	FRAME	404T

Weights and Measurements

TOTAL NET UNIT WEIGHT / VOLUME	3,910.0 lb / 73.3 ft³
TOTAL GROSS UNIT WEIGHT / GROSS VOLUME	4,432.0 lb / 104.3 ft³

Program Version 1.12.0.0

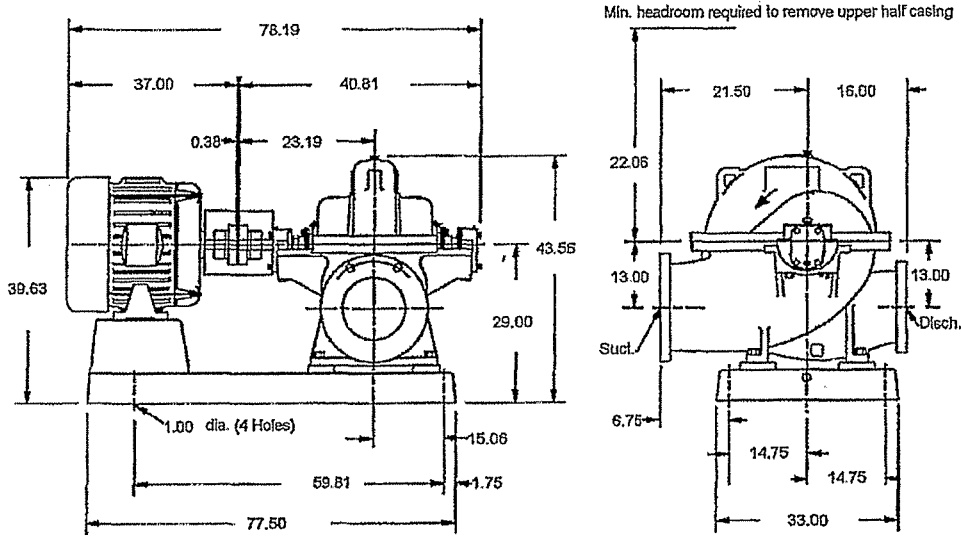
Our offer does not include specific review and incorporation of any Statutory or Regulatory Requirements and the offer is limited to the requirements of the design specifications. Should any Statutory or Regulatory requirements need to be reviewed and incorporated then the Customer is responsible to identify those and provide copies for review and revision of our offer.

Our quotation is offered in accordance with our comments and exceptions identified in our proposal.

Goulds Pumps
ITT Industries

OUTLINE DRAWING

Model 3410 XL
10x12-15



Pump specification

SUCT.FLANGE SIZE *12"*	DRILLING *ANSI 125 #*	FACING *FF*	FINISH *SMOOTH*		
DISCH.FLANGE SIZE *10"*	DRILLING *ANSI 125 #*	FACING *FF*	FINISH *SMOOTH*		
PUMP ROTATION (LOOKING AT PUMP FROM MOTOR)	*CW*				
TYPE OF LUBRICATION	*REGREASABLE BEARINGS*			COOLED *NO*	
TYPE OF STUFFING BOX	*ENLARGED BORE*			COOLED *NO*	
TYPE OF SEALING	*MECHANICAL SEAL*				

Weights and Measurements

PUMP	1,770.0 lb
MOTOR/CPLG	1,050.0/40.0 lb
BASEPLATE	1,050.0 lb
TOTAL	3,910.0 lb
GR.VOLUME w/BOX	104.3 ft³
GR.WEIGHT w/BOX	4,432.0 lb

Motor specification

MOTOR BY *PUMP MFG*	MOUNT BY *PUMP MFG*	MFG. *PUMP MFG'S CHOICE*			
FRAME *404T*	POWER *60.0 hp*	RPM *1200*			
PHASE *3*	FREQUENCY *60 HZ*	VOLTS *230/460*			
INSULATION *F*	S.F. *1.15*				
ENCLOSURE *ODP - INVERTER DUTY*					

Auxiliary specification

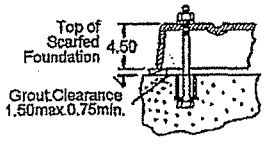
COUPLING BY *PUMP MFG*	CPLG TYPE *FALK T10 1080T*		
CPL GUARD BY *PUMP MFG.*	CPLG GUARD MATL *STEEL*		
BASEPLATE *CAST IRON D03190A*			
MECH.SEAL *JOHN CRANE 8-1T XP511XO101 (CARBON VS CERAMIC WITH VITON)*			

Notes and References

- MTR DIMENSIONS ARE APPROXIMATE
- INSTALL FOUNDATION BOLTS IN PIPE SLEEVES
- ALLOW FROM 0.75 to 1.50in. FOR GROUTING. SEE INSTRUCTION BOOK FOR DETAILS.

FOR PUMP TAPPED OPENINGS REFER TO DWG.: RWTPS / 2-5 MGD Pump

Typical Anchor Bolt Installation



DRAWING IS FOR REFERENCE ONLY.
NOT CERTIFIED FOR CONSTRUCTION UNLESS SIGNED.

Customer: Jordan, Jones & Goulding, Inc.
Serial No:
Customer P.O. No:
Item No: 2-5 MGD Pump
Project No: Raw Water Transfer Pump Station
End User: Northern Kentucky Water District
Service: Raw Water Pump

All dimensions are in inches.
Drawing is not to scale
Weights (lbs) are approximate

DRAWING NO *RWTPS/2-5 MGD Pump*

FORM # ED0188 N/A

Program Version 1.12.0.0

Model: 3410	Size: 10x12-15	Group: XL	60Hz	RPM Variable	Stages: 1

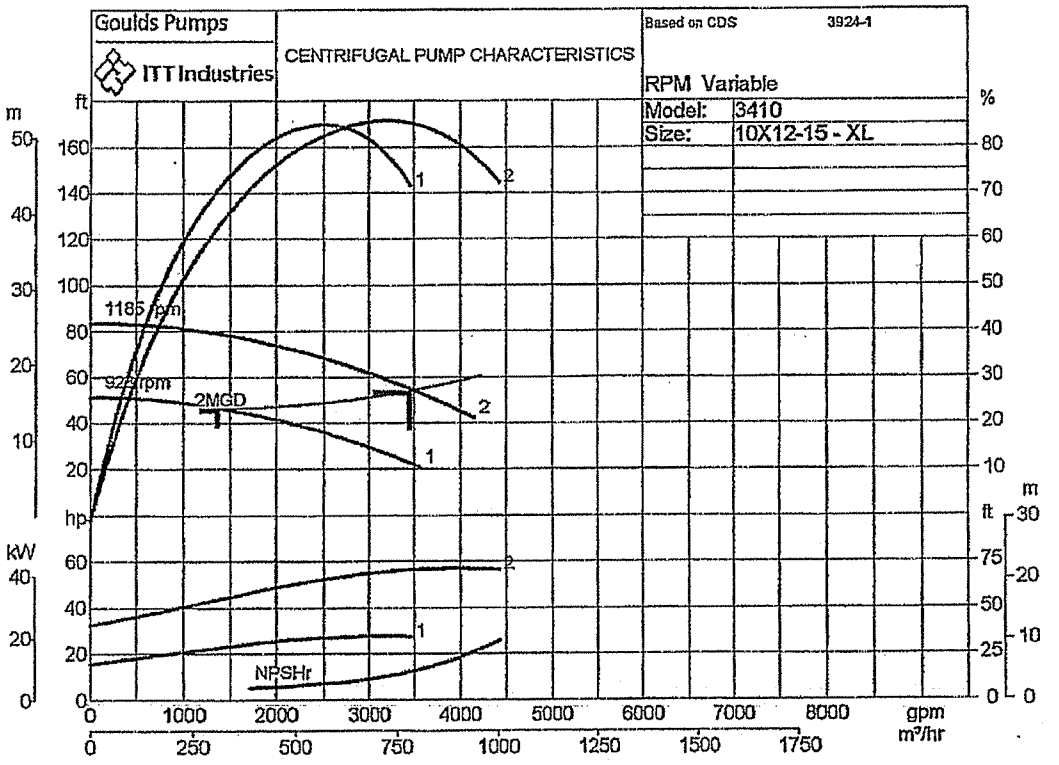
Job/Inq.No. :
Purchaser : Jordan, Jones & Goulding, Inc.
User : Northern Kentucky Water District Issued by : James Naus
Item/Equip.No. : 2-5 MGD Pump Quotation No. : RWTPS Date : 09/14/2005
Service : Raw Water Pump
Order No. : Certified By :

Operating Conditions

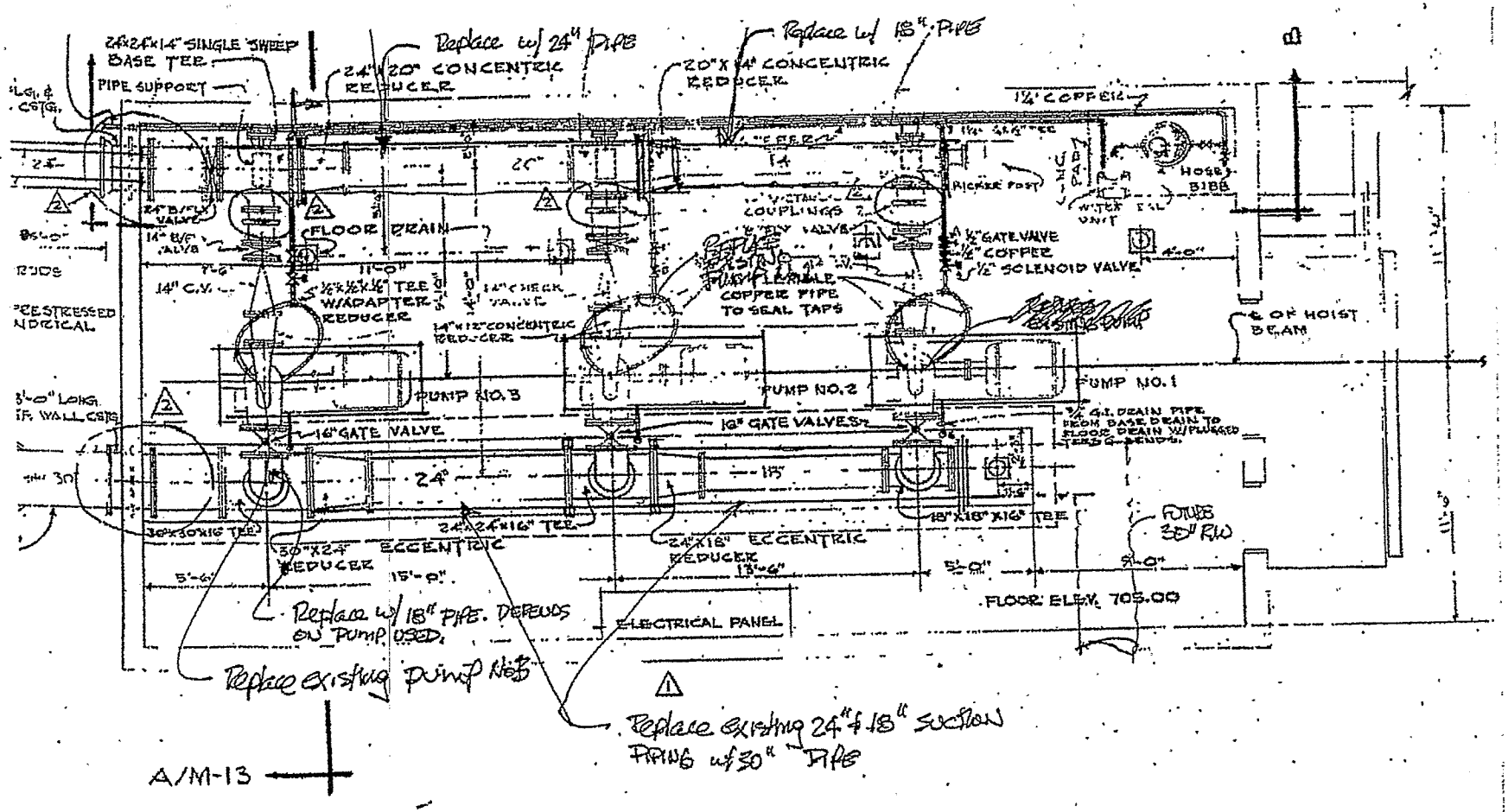
Liquid:	Water	Mech. Seal Loss:	0.51 hp	Suction Specific Speed:	7,276.0 gpm(US) ft
Temp.:	70.0 deg F	Imp. Dia. First 1 Stg(s):	13.2500 in	Non-Overloading Power:	56.7 hp
S.G./Visc.:	1.000/1.000 cp	Imp. Dia. Addt'l Stg(s):			
NPSHa:		Vapor Press:		Min. Thermal Flow:	N/A
Solid size:		Max. Solids Size:	1.3800 in		
% Solids:					

Pump Performance @ 1185 RPM

Notes: 1 . Elevated temperature effects on performance are not included.



Name	Speed	Flow	Head	NPSH r	Eff %	Power	Shut off head	Min. Hydraulic Flow
Rated Point	1,185	3,472.0 gpm	54.5 ft	15.6 ft	85.0	56.3 hp	83.4 ft	1,277.3 gpm
2MGD	928	1,389.0 gpm	46.5 ft		71.0	22.8 hp	51.1 ft	1,000.4 gpm



PLAN VIEW OF PUMP SUCTION PIPING

SCALE ½" = 1'-0"

APPENDIX G

On-Site Generation of Sodium Hypochlorite Evaluation

TECHNICAL MEMORANDUM

DATE: October 10, 2005

PREPARED FOR: Northern Kentucky Water District

PREPARED BY: David Haas, P.E.

REVIEWED BY: Lee Powell, Brent Tippey, P.E.

SUBJECT: On-Site Generation of Sodium Hypochlorite

PROJECT: Northern Kentucky Water District
Memorial Parkway Treatment Plant
Chemical Feed Storage and Feed System Improvements

Purpose and Background

Currently, NKWD utilizes bulk sodium hypochlorite (15% solution strength) for disinfection at all three of its treatment plants. This project included an evaluation of alternatives to generate sodium hypochlorite on-site to replace the bulk hypochlorite systems. The alternatives included:

Alternative 1 - Bulk Delivery of 12% Sodium Hypochlorite (existing method)

Alternative 2 - On-Site Generation of 12% Sodium Hypochlorite

Alternative 3 - On-Site Generation of 0.8% Sodium Hypochlorite

Overview of Chlorination Alternatives

The existing treatment plants currently utilize bulk storage and feed of sodium hypochlorite that is delivered by truck. Three chlorination alternatives for expansion were examined and are described in this document. The first option involves continued use of the current bulk hypochlorite systems. The second option is based on utilizing an on-site chlorine gas generation system, which also produces 15% sodium hydroxide (caustic soda) as a byproduct of the gas generation. With this option, 12% sodium hypochlorite can be produced by combining the chlorine gas and the sodium hydroxide. The third option is based on an on-site generation system that generates 0.8% sodium hypochlorite.

Historical data for the amount of flow treated and total chlorine used at the three treatment plants was summarized from monthly operating reports (MORs) over the past two to three years provided by NKWD. These ranges of flows and dosages were then reviewed with NKWD to determine the values that were used as the basis for the evaluation. The dosage requirements are presented in Tables 1, 2, and 3 for the Memorial Parkway Treatment Plant (MPTP), Fort Thomas Treatment Plant (FTTP), and Taylor Mill Treatment Plant (TMTP), respectively.

Table 1
Summary of Chlorine Dosage Requirements - MPTP

Item	Flow Rate (MGD)	Dosage (mg/L)	Chlorine Used (lbs/day)	0.8 % NaOCl (gal/day)	12% NaOCl (gal/day)
Average Annual Daily Flow (AADF) & Average Dosage	3.5	4.6	134	2,010	134
AADF & Maximum Dosage	3.5	11.0	321	4,815	321
Permitted Maximum Daily Flow (PMDF) & Average Dosage	10	4.6	384	5,760	384
PMDF & Maximum Dosage	10	11.0	917	13,755	917

Table 2
Summary of Chlorine Dosage Requirements - FTTP

Item	Flow Rate (MGD)	Dosage (mg/L)	Chlorine Used (lbs/day)	0.8 % NaOCl (gal/day)	12% NaOCl (gal/day)
AADF & Average Dosage	22	4.6	840	12,600	840
AADF & Maximum Dosage	22	8.0	1,468	22,020	1,468
PMDF & Average Dosage	44	4.6	1,688	25,320	1,688
PMDF & Maximum Dosage	44	8.0	2,936	44,040	2,936

Table 3
Summary of Chlorine Dosage Requirements - TMTP

Item	Flow Rate (MGD)	Dosage (mg/L)	Chlorine Used (lbs/day)	0.8 % NaOCl (gal/day)	12% NaOCl (gal/day)
AADF & Average Dosage	5	5.5	230	3,450	230
AADF & Maximum Dosage	5	9.0	375	5,625	375
PMDF & Average Dosage	12	5.5	550	8,250	550
PMDF & Maximum Dosage	12	9.0	897	13,455	897

Alternative 1 – Bulk Delivery of 12% Sodium Hypochlorite

Alternative 1 involves the delivery and bulk storage of commercially produced sodium hypochlorite solution. Since this is the existing system utilized at all three plants, there would be no additional capital improvements required. The current purchase price for this chemical is $0.698 per pound for comparison to the other alternatives.

Alternative 2 – On-Site Generation of 12% Sodium Hypochlorite

One of the emerging technologies in the chlorine market involves the on-site generation of chlorine gas. One such manufacturer of this technology is Electrolytic Technologies Corporation. They manufacture the Klorigen™ generator that produces chlorine gas on-site. This system requires a total of 1.65 pounds of salt and 1.75 kilowatt-hours for every pound of chlorine produced. With this type of system, the gas is produced and supplied under low-pressure. This is advantageous when compared to the one-ton gas cylinder's potential for leakage because the system will shut down should a breach in the low-pressure feed occur. Additionally, the gas is generated on an as needed basis, replacing the need to store large quantities of chlorine gas at the WTP. For NKWD, it was assumed that the generation unit would be equipped with a conversion skid that will produce 12% sodium hypochlorite by combining the chlorine gas and sodium hydroxide.

For the MPTP and TMTP, a 1,000-lb/day generation system is recommended (based on available sizes from the manufacturer). For the FTTP a 3,000-lb/day generation system would be required. Capital costs for the equipment, as provided by Electrolytic Technologies Corporation, are estimated to be $687,000 and $1,405,000 for the 1,000-lb/day and 3,000-lb/day generators, respectively. These costs include the brine storage tank, chlorine generation equipment, and hypochlorite conversion skid. These costs assume that existing hypochlorite solution tanks and metering pumps will be reused. The cost for installation was assumed to be 25% of the equipment cost.

Alternative 3 – On-Site Generation of 0.8% Sodium Hypochlorite

Alternative 3 involves the on-site production of 0.8% sodium hypochlorite with a 900-lb/day generation system for MPTP and TMTP and a 3,000-lb/day generation system for FTTP. Several manufacturers are available; ClorTec® provided budgetary pricing for this alternatives comparison. The process involves supplying an electrical potential to a concentrated brine solution to produce sodium hypochlorite. ClorTec's system requires a total of 3.0 pounds of salt and 2.0 kilowatt-hours for every pound of chlorine produced (power and salt requirements vary slightly by manufacturer). A byproduct of the sodium hypochlorite generation is the production of hydrogen, which is simply vented to the atmosphere.

Capital costs for the equipment, as provided by ClorTec, are estimated to be $500,000 and $1,000,000 for the 900-lb/day and 3,000-lb/day generators, respectively. These costs include the brine storage tank, chlorine generation equipment, hypochlorite solution tanks, and metering pumps. The cost for installation was assumed to be 25% of the equipment cost.

Economic Comparison of Alternatives

To perform the economic analysis, future flows were considered for the 20-year planning period. The amount of chlorine used was based on the annual average flow during the planning period. NKWD indicated that the treatment plants were anticipated to reach their capacity in year 2018. Annual average day demands were then calculated based on a peak day to average day ratio of 1.65. Straight line flow projections were used between year 2005 and 2018, at which time the flow rates were held constant for this analysis. Future plant expansions would be required in year 2018 at which time the chlorine system also would need to be expanded; these expanded flow rates were not included in the comparison. The average of the annual average flows for the 20-year planning period was used as the basis for the economic comparison of alternatives.

The economic comparison was based on the following general assumptions:

Planning Period – 20 years
Interest Rate – 5%
Cost of Electricity – $0.049 per kWh
Cost of Salt – 110 per ton
Cost of Bulk Hypochlorite – $0.698 per gallon (1 gallon = 1 pound of chlorine)

Inflation was not factored into this analysis. However, in general, it believed that the cost of bulk hypochlorite will be subject to greater fluctuations in price than the cost of salt or power, which would favor the OSG alternatives.

The estimated capital costs of OSG equipment was provided by the manufacturers as noted above. It was assumed equipment would be housed in existing buildings and that no additional capital improvements would be required. Further enhancements to the electrical systems at the treatment plants may be required; however, for this initial analysis, these costs were not factored into the economic comparison.

A cost comparison of the three alternatives is presented in Table 2 for each of the treatment plants. As shown in Table 2, Alternative 3, the existing bulk hypochlorite system, has the lowest present worth cost for the MPTP and TMTP, because there would be no new capital improvements required and these plants have relatively low average chlorine dosages (i.e., the payback in operational costs will take time). On the other hand, the present worth comparison for FTTP shows that either of the OSG alternatives (Nos. 1 and 2) are more economical than the existing bulk hypochlorite system. This results because of the higher chlorine dosages used at this plant.

The payback period for the two smaller systems (MPTP and TMTP) ranges from 15 to 20 years based on the assumptions made in this analysis. For the FTTP system, however, the payback period is estimated to be 8 years. As the price of bulk hypochlorite goes up or if chlorine usage increases, this payback period would be reduced.

Some of the manufacturers offer a lease/puchase program that may be of interest to NKWD. ClorTec provided preliminary cost information for this type of procurement method that would

Table 2
Economic Comparison of Chlorine Alternatives

A. Plant Information	**FTTP**	**TMTP**	**MPTP**
Average Flow Rate for 20-yr plan period (MG	25.1	5.7	5.2
Average Chlorine Dose (mg/L)	4.6	5.5	4.6
Total Daily Chlorine Usage (lbs/day)	963	262	200
Total Annual Chlorine Usage (lbs/yr)	351,627	95,551	72,914
Peak Flow Rate (MGD)	44.0	11.95	10.0
Peak Chlorine Dose (mg/L)	8.0	9.0	11.0
Peak Chlorine Use (lbs/day)	2,936	897	917

B. Economic Analysis Information	
Interest Rate	5.0%
Analysis Period (years)	20
Present Worth Factor (P/A)	12.46221034

C. Capital Costs (for generation eqmt only; includes 25% added cost for installation)

	FTTP	**TMTP**	**MPTP**
12% Hypo OSG (1 gal = 1 lb)	$1,756,250	$858,750	$858,750
0.8% Hypo OSG (15 gal = 1 lb)	$1,250,000	$625,000	$625,000
12% Bulk Hypo (1 gal = 1 lb)	$0	$0	$0

D. Operational Unit Costs		
Power	$ 0.049	per kWh
Salt (Purex food grade)	$ 110	per ton
Bulk Hypo (12%)	$ 0.698	per gal

E. OSG System Efficiency Information		
Klorigen (12% hypo)		
Power	1.75	kWh/lb
Salt	1.65	lbs/lb
Water	0.95	gal/lb
ClorTec (0.8% hypo)		
Power	2.0	kWh/lb
Salt	3.0	lbs/lb
Water	15.0	gal/lb

F. Maintenance Costs

For this evaluation, maintenance costs have been assumed to be approximately equal for the three alternatives and have not been included in this economic analysis.

Table 2 (cont.)
Economic Comparison of Chlorine Alternatives

FTTP	12% Hypo OSG	0.8% Hypo OSG	Bulk Hypo (12%)
G. Annualized Costs Analysis			
Average Annual Operational Cost	$ 62,062	$ 92,478	$ 245,436
Amortized Capital Cost	$ 140,900	$ 100,300	$ -
Total Annual Cost ($)	$ 202,962	$ 192,778	$ 245,436
Total Annual Cost ($/lb)	$ 0.58	$ 0.55	$ 0.70
Annual Operating Cost ($/lb)	$ 0.18	$ 0.26	$ 0.70
H. Present Worth Analysis			
Present Worth of Operating Costs	$ 773,500	$ 1,152,500	$ 3,058,700
Capital Costs	$ 1,756,250	$ 1,250,000	$ -
Total Present Worth	$ 2,529,750	$ 2,402,500	$ 3,058,700

TMTP	12% Hypo OSG	0.8% Hypo OSG	Bulk Hypo (12%)
G. Annualized Costs Analysis			
Average Annual Operational Cost	$ 16,865	$ 25,130	$ 66,695
Amortized Capital Cost	$ 68,900	$ 50,200	$ -
Total Annual Cost ($)	$ 85,765	$ 75,330	$ 66,695
Total Annual Cost ($/lb)	$ 0.90	$ 0.79	$ 0.70
Annual Operating Cost ($/lb)	$ 0.18	$ 0.26	$ 0.70
H. Present Worth Analysis			
Present Worth of Operating Costs	$ 210,200	$ 313,200	$ 831,200
Capital Costs	$ 858,750	$ 625,000	$ -
Total Present Worth	$ 1,068,950	$ 938,200	$ 831,200

MPTP	12% Hypo OSG	0.8% Hypo OSG	Bulk Hypo (12%)
G. Annualized Costs Analysis			
Average Annual Operational Cost	$ 12,869	$ 19,176	$ 50,894
Amortized Capital Cost	$ 68,900	$ 50,200	$ -
Total Annual Cost ($)	$ 81,769	$ 69,376	$ 50,894
Total Annual Cost ($/lb)	$ 1.12	$ 0.95	$ 0.70
Annual Operating Cost ($/lb)	$ 0.18	$ 0.26	$ 0.70
H. Present Worth Analysis			
Present Worth of Operating Costs	$ 160,400	$ 239,000	$ 634,300
Capital Costs	$ 858,750	$ 625,000	$ -
Total Present Worth	$ 1,019,150	$ 864,000	$ 634,300

allow NKWD to lease the equipment for a 5-year period; after 5 years, NKWD would own the equipment. ClorTec estimated the lease payments would be approximately $30,000 per month.

Non-Cost Comparison of Chlorination Alternatives

There are many additional considerations when choosing the preferred chlorination option for a WTP. These advantages/disadvantages should be weighed accordingly with the cost estimates for each option to facilitate the selection of an option. Table 3 presents the "Non-Cost Comparison of Chlorination Alternatives" to compliment the aforementioned cost comparisons between the three alternatives.

Conclusions

Based on the economic comparison presented in this TM, in terms of life-cycle cost, Alternative 3, the existing bulk hypochlorite system, is the more favorable alternative for MPTP and TMTP. For the FTTP, either of the two OSG alternatives have a lower present worth value than Alternative 3; the payback period for switching to an OSG system at this plant is estimated to be 8 years. With Alternatives 1 and 2, NKWD would realize substantially lower annual operating costs and avoid potential significant future increases in the cost of bulk hypochlorite.

At this time, it is recommended that NKWD remain with the bulk hypochlorite chemical feed system at the MTTP. Should the price of bulk hypochlorite continue to rise or if NKWD desires to eliminate the risk of handling high-strength hypochlorite, a 0.8% sodium hypochlorite on-site generation system has the next lowest present worth and should be considered.

For the TMTP, the same conclusion was reached, because the bulk hypochlorite has the lowest 20-year present worth value. For the FTTP, either OSG system has a lower 20-year present worth value than the existing bulk hypochlorite system. This result is driven by the fact that FTTP uses substantially more chlorine than the other two plants. If an OSG system is selected, it is recommended for NKWD staff to visit sites of existing installations as part of the manufacturer selection process.

Table 3

Non-Cost Comparison of Chlorination Options

Chlorine Alternative	Pressurized Chlorine Gas	On-site Generation of Chlorine Gas	On-site Generation of 12% Hypo	On-site Generation of 0.8% Hypo	Bulk Delivery of 12% Hypo
Advantages	• Typically existing system/ equipment • Operator familiarity	• Chlor-Alkali process has 25 years of experience in industry • Process yields 15% NaOH • Gas fed under vacuum • No off-site risks • Operator familiarity with gaseous Cl_2 • Production rate variable with demand	• High-quality hypo produced • No additional sodium/ impurities from salt into water supply • No off-site risks • Requires less storage and metering pump capacity than 0.8% hypo • Production rate variable with demand	• Low strength eliminates chemical handling issues • No off-site risks • 0.8% hypo has little degradation with time and temperature • Batch operation • Can oversize generator to produce hypo only during off-peak electrical power rates*	• No generation system to maintain • No off-site risks
Disadvantages	• Off-site risks (RMP) • Operator safety (PSM) • Emergency scrubber or containment required	• New application/ market for process • Few existing installations at water/ wastewater facilities • Maintenance of generator (replacement of membrane cells) • Continuous operation of generator recommended • Other chemical systems required within generation skid	• Handling of 12% hypo can be an operator safety concern • Maintenance of generator (replacement of membrane cells) • Continuous operation of generator recommended • Other chemical systems required within generation skid	• Routine maintenance required to clean electrolytic cell • Requires more storage and metering pump capacity than 12% hypo • Sodium from salt enters the water supply	• Handling of 12% hypo can be an operator safety concern • Dependence upon chemical suppliers (routine deliveries) • Quality of product delivered can be an issue • Price fluctuations in raw material more variable than other options • 12% hypo degrades with time and temperature

* 12% sodium hypo generation system can do this too to a lesser degree since it should remain operational continuously, but can be turned down.

APPENDIX H
Architectural Design Memo

MEMO

Date: September 23, 2005
To: JJG and Quest Eng.
cc:
Re: **ARCHITECTURAL DESIGN CRITERIA**
From: Rick Wolnitzek, HW Architects

DIVISION	CRITERIA
1	Submittals.
2	NA
3	Galvanized dovetail anchor slots for brick veneer.
4	Severe weather rated brick matching existing brick in appearance. Lightweight concrete block. #5 reinf. at 8" on center, full height. Proprietary Type S color mortar. Hot dip galvanized 9 ga. horizontal joint reinforcing, anchors and fasteners. Structural grout all cells. 2" T&G closed cell polystyrene insulation with joints taped.
5	20 GA galvanized wide rib roof deck with self-tapping fasteners. High performance shop preparation and shop painting. (Avoid bar joists.)
6	Kiln dried southern yellow pine #2.
7	EPDM, 60 mil, fastened. 3" polyisocyanurate. Kynar finished formed aluminum coping system with welded corner pieces. 24 GA Kynar finished aluminum downspouts, scuppers, conductor heads and trim.
8	1/8" color anodized aluminum storefront sash with thermal break. 1" insulating glass with low-e exterior light. 14 GA galvanized hollow metal frames – interior and exterior. 16 GA galvanized hollow metal insulated doors – interior and exterior. Heavy duty commercial stainless steel hardware.
9	3 coat enamel paint on all hollow metal and exposed structural steel. 3 coat polyurethane finish on interior concrete block 1/8" VCT and vinyl base in all occupied spaces Heavy duty acoustical ceilings in all occupied spaces (exposed structure elsewhere)

HW
Architects

MEMO

Date: September 23, 2005
To: JJG and Quest Eng.
cc:
Re: **Building Materials Evaluation – ROOF SYSTEMS**
From: Rick Wolnitzek, HW Architects

Roofing systems were evaluated for suitability and cost effectiveness. I evaluated three structural systems and three roofing types. The structural systems are steel frame, pre-engineered metal building and pre-cast concrete. The roofing types are single-ply (EPDM), industrial metal roofing, and commercial metal roofing. Table No. 1 is a matrix of the roof structures options and the roofing type options showing how each combination would rank for cost effectiveness.

Table No. 1

STRUCTURAL SYSTEM	ROOFING TYPES		
	EPDM	INDUSTRIAL METAL	COMMERCIAL METAL
Steel Frame	23	21	24
PEMB	21	20	22
Pre-cast Conc.	30	28	31

STRUCTURAL SYSTEMS:

- STEEL FRAME – This consists of traditional columns and beams. Special shop painting of the steel may be desirable due to moisture and/or corrosion considerations. Steel may not approach historic pricing levels again; but it is still the system of choice for most non-residential construction.
- PEMB – Pre-Engineered Metal Building is a system similar to the Acti-Flo building. It is a steel system customized for specific loads and spans. It is normally less expensive than Steel Frame. Clear spans are easy to achieve; but the foundation system must resist outward thrust through under floor tie-rods which may be hard to achieve because of the containment areas.
- PRE-CAST CONCRETE – This is a system of planks supported by columns and beams of either concrete or steel. The weight of the concrete is usually an issue for foundations and crane equipment. Economy comes from using just one or two size planks.

ROOFING TYPES:

- EPDM – This is a single ply roofing system, which is used in the majority of non-residential construction. Warranties of over 20 years are available from the major manufacturers. A major advantage is that very large sheet sizes can be used, which minimizes the number of joints in the roofing system.
- METAL – Industrial and commercial metal roofing are very similar. Industrial metal roofs are usually the roof deck, also. Commercial metal roofs are not usually the roof deck and have more aesthetic options.

RECOMMENDATION

I recommend a steel structure of columns and beams with a high performance paint finish, galvanized steel roof deck and an EPDM roof membrane. The PEMB systems will not offer any future flexibility, and the Industrial Metal Roofs use exposed batt insulation which is not durable or require alternatives that are more expensive.

HW
Architects

MEMO

Date: September 23, 2005
To: JJG and Quest Eng.
cc:
Re: **Building Materials Evaluation – WALL SYSTEMS**
From: Rick Wolnitzek, HW Architects

Wall systems were evaluated for suitability and cost effectiveness. I evaluated four wall systems and five exterior finishes. The wall systems are industrial metal girt system, metal stud system, concrete block, pre-cast concrete panels. The five finish systems are metal panels, synthetic plaster (EIFS), integral color and texture concrete, applied 'Z' brick and brick veneer. Table No. 2 is a matrix of the wall systems and finish system showing how each combination would rank for cost effectiveness.

Table No. 2

FINISH SYSTEMS	WALL SYSTEMS			
	INDUSTRIAL METAL GIRT	METAL STUDS	CONCRETE BLOCK	PRE-CAST CONCRETE
Metal Panels	16	18	26	NA
EIFS	NA	20	25	NA
Integral Concrete	NA	NA	NA	50
'Z' Brick	NA	25	30	60
Brick Veneer	NA	28	28	65

WALL SYSTEMS:

- INDUSTRIAL METAL GIRT– This consists of horizontal 'beams' supported from the structural frame to which metal siding is attached.
- METAL STUDS – Structural metal studs braced to the building structural frame support the interior and exterior finishes. Abuse-resistant dry wall could be used for the interior.
- CONCRETE BLOCK – The traditional system to which a finish is attached.
- PRE-CAST CONCRETE – This is a system of panels manufactured off-site. They are supported by the structural frame. We will not have the quantity or the large flat floor for tilt-up panels.

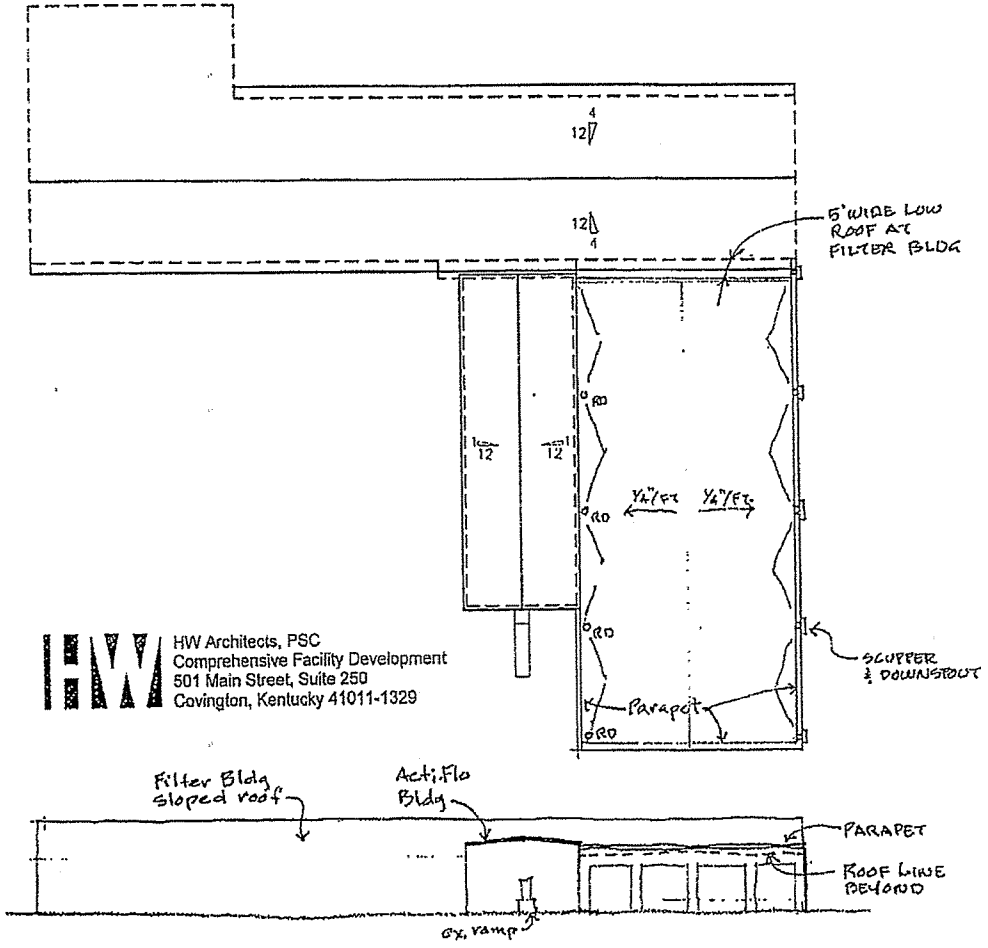
FINISH SYSTEMS:

- METAL PANELS – This is metal siding or metal sandwich panels.
- EIFS – Exterior Insulating Finish System is a synthetic plaster over Styrofoam and sheathing.
- INTEGRAL CONCRETE FINISH – Color and texture cast into the surface of a concrete panel.
- 'Z' BRICK – A tile-like brick that is adhered to the surface of a wall system.
- BRICK VENEER – The traditional brick anchored to a supporting wall system of block or studs.

RECOMMENDATION

I recommend a concrete block wall system with brick veneer finish and possibly some limited EIFS for aesthetic interest. Metal panels seem undesirable in a residential neighborhood. Metal stud systems are very susceptible to moisture and will require periodic maintenance beyond painting. Precast wall systems are too expensive for the small quantity of wall. 'Z' brick is a retail product that has poor durability.

HW
Architects



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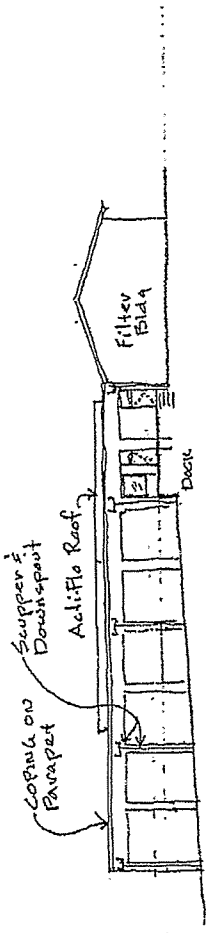
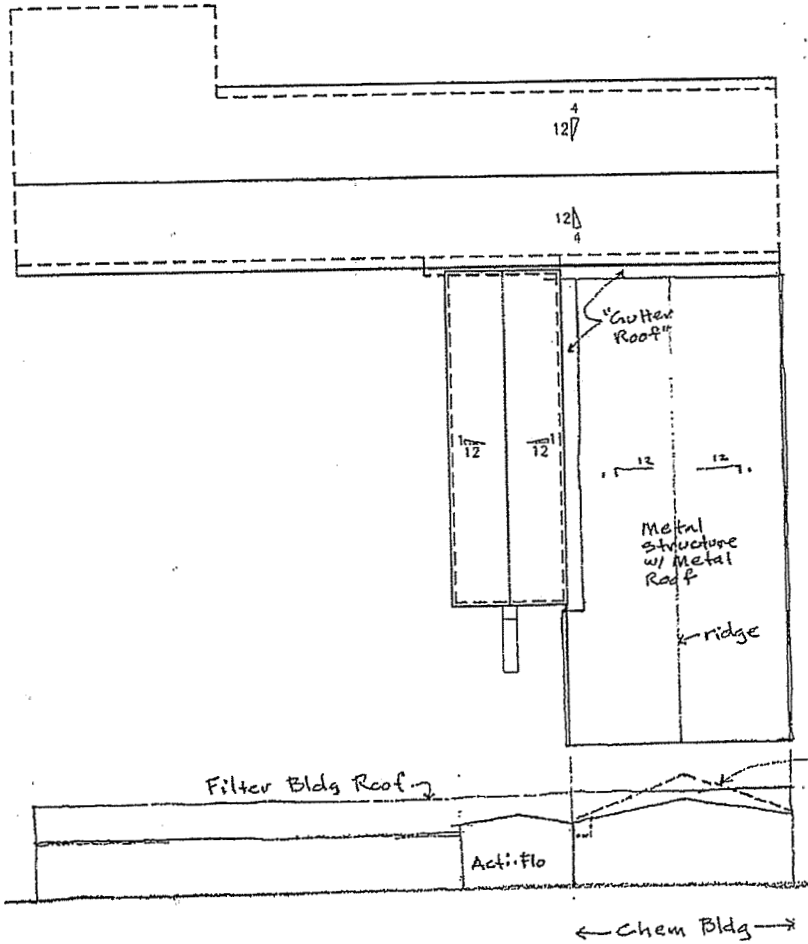


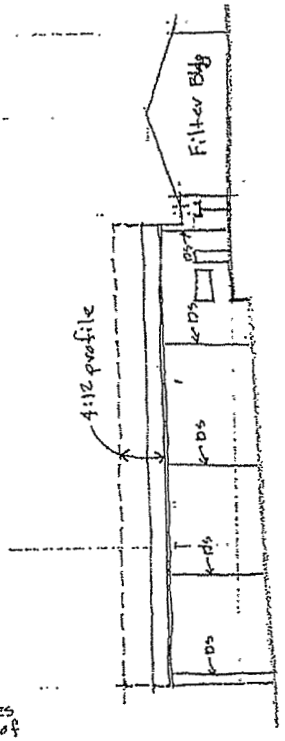
"FLAT ROOF"

- Roof structure can be conc or steel.
- Parapet hides awkward connections.
- EIFS proposed to create look of columns.
- Panels are brick.

SCHEME A-1

1" = 30' 13 SEP'05





"TWO ROOFS"

- Requires a "gutter roof" (flat) to catch runoff from existing buildings – complicates structure

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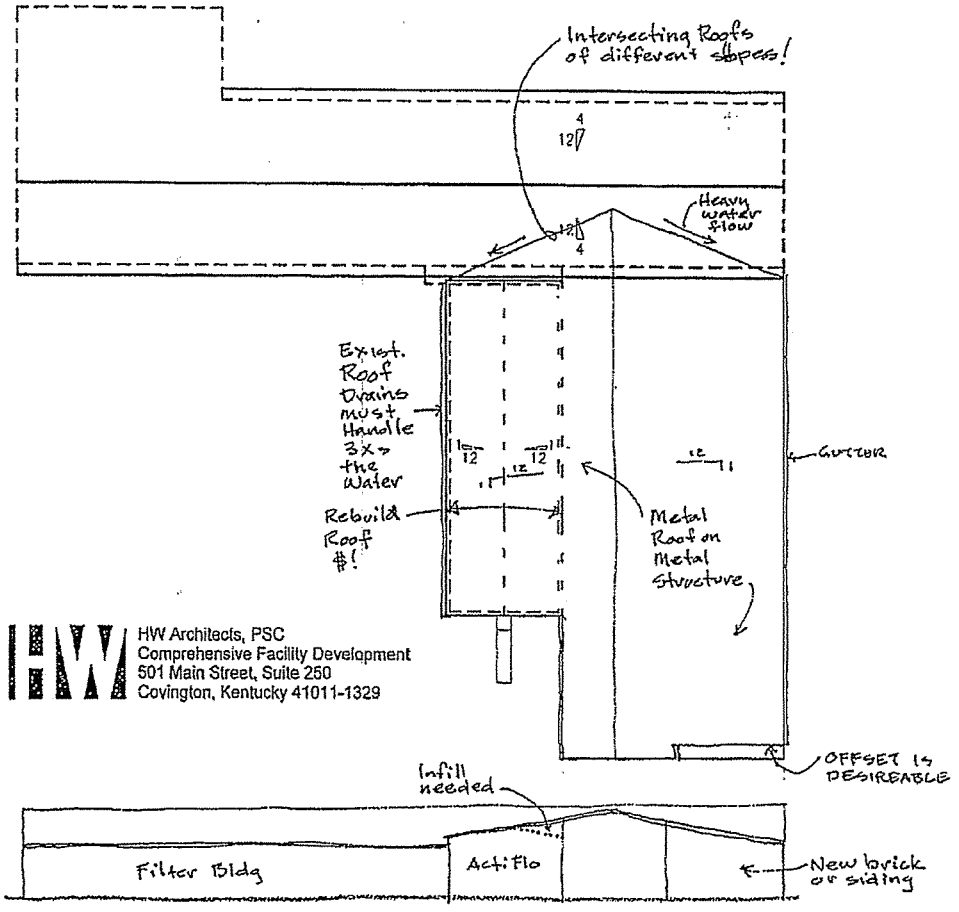
SCHEME A-2

1" = 30' 13 SEP 05



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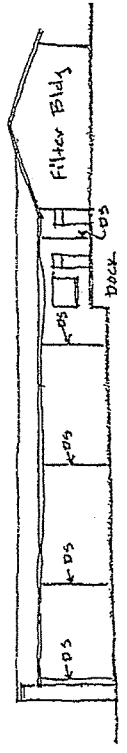
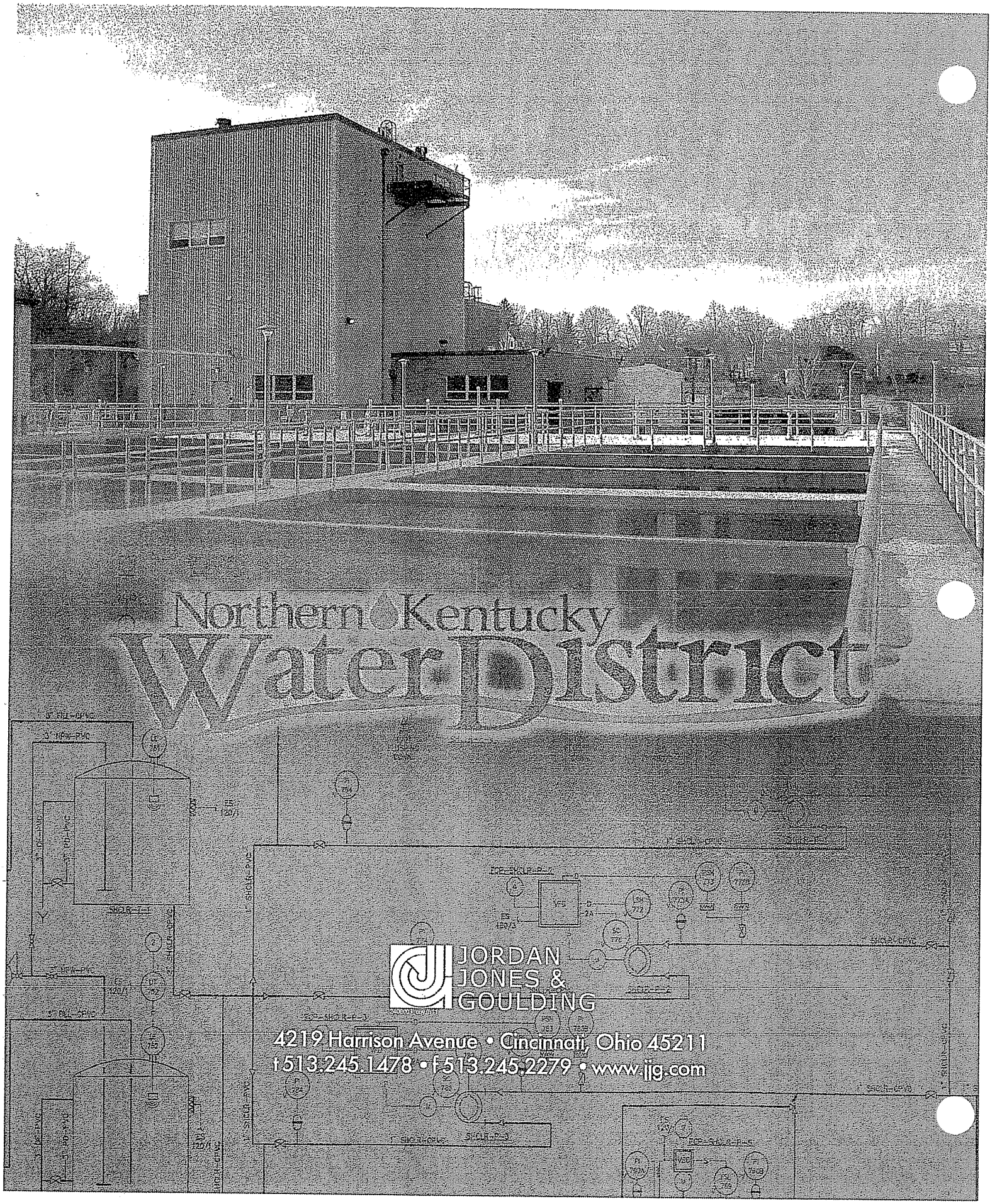


"ONE ROOF"

- Many extra costs.
- No aesthetic improvement.
- Must be 1:12 slope to match Actiflo structure and to remain lower at the ridge than the Filter Bldg

SCHEME A-3

1" = 30' 13 SEP '05



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Case No. 2006-____
Exhibit ____A____

NORTHERN KENTUCKY WATER DISTRICT

Project
Memorial Parkway Treatment Plant Improvements

Campbell County
184-435

Engineer's Opinion of Probable Total Construction Cost

Northern Kentucky Water District

JORDAN JONES & GOULDING

Quest

Final Estimate of Probable Construction Costs
Memorial Parkway WTP Improvements
Northern Kentucky Water District
May 22, 2006 , Integrated w/ Filter Project August 4, 2006

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost			Unit Price	Total Price
						Manhours	$/MH	Est Cost		
	CHEMICAL FEED FACILITIES									
1.	**Site Work**									
	- Excavation & Regrade	2,500	CY						$ 20	$ 50,000
	- Concrete (4,500 psi)	10	CY						$ 475	$ 4,750
	- Driveway DGA	771	Tons						$ 18	$ 13,878
	- Bituminous Pavement	430	Tons						$ 40	$ 17,200
	- Concrete Driveway	220	CY						$ 200	$ 44,000
	- 4' Sanitary Sewer Manholes	3	EA						$ 2,000	$ 6,000
	- 4" PVC Sanitary Sewer	210	LF						$ 12	$ 2,520
	- 8" PVC Sanitary Sewer	210	LF						$ 25	$ 5,250
	- 4' Storm Manhole	1	EA						$ 2,000	$ 2,000
	- 18" RCP Storm Pipe	20	LF						$ 50	$ 1,000
	- 24" RCP Storm Pipe	100	LF						$ 75	$ 7,500
	- Exterior Grating	1	LS						$ 6,000	$ 6,000
	- Chemical Injection Vault	1	LS						$ 14,000	$ 14,000
	- Fire Protection Vault	1	LS						$ 22,000	$ 22,000
	- 6" DI Pipe	300	LF						$ 25	$ 7,500
	- 6" Gate Valve	1	EA						$ 1,000	$ 1,000
	- 1" PVC Copper Sulfate Line	340	LF						$ 5	$ 1,700
	- 3/4" PVC Plant Service Line	175	LF						$ 4	$ 700
	- 2" PVC Plant Water Service	115	LF						$ 8	$ 920
	- 1" Gas Line	220	LF						$ 10	$ 2,200
	- Valve Stem Extension	3	EA						$ 750	$ 2,250
	- Fire Hydrant	1	LS						$ 2,000	$ 2,000
	- Security Gate	1	LS		$ 3,000			$ 500	$ 3,500	$ 3,500
	- Site Restoration/Seeding	7,500	SY						$ 1.00	$ 7,500
	- Silt Fence	600	LF						$ 4	$ 2,400
	- Erosion Control Rock Check	1	LS						$ 1,000	$ 1,000
	- Fencing	100	LF						$ 30	$ 3,000
	- Site Electrical	1	LS		$ 71,000	320	$ 55	$ 17,600	$ 88,600	$ 88,600
									Sitework Sub total	**$ 320,368**

2.	Chemical Feed Building									
	- Demolition of Sedimentation Basin Equipment	1	LS	$ 5,400		120	$ 40	$ 4,800	$ 10,200.00	$ 10,200
	- Demolition of Concrete in Ex. Sed Basin	1	LS					$ -	$ 24,000.00	$ 24,000
	- Demolition of Effluent Trough	1	LS						$ 12,000.00	$ 12,000
	- Demolition of Electrical Components	1	LS			80	$ 40	$ 3,200	$ 3,200.00	$ 3,200
	- Miscellaneous Demolition	1	LS						$ 6,000.00	$ 6,000
	- Core Drill Holes in Floor	24	EA						$ 200.00	$ 4,800
	- Structural Fill of Existing Sedimentation Basin	4,000	CY	$ 9,900	$ 80,000	290	$ 40	$ 11,600	$ 25.38	$ 101,500
	- Reinforced Concrete Floor	350	CY					$ -	$ 475.00	$ 166,250
	- Reinforced Concrete Walls	105	CY					$ -	$ 525.00	$ 55,125
	- 8" CMU Interior Walls	5,406	SF					$ -	$ 8.00	$ 43,248
	- 8" CMU / Masonry Exterior Walls	2,074	SF					$ -	$ 18.00	$ 37,332
	- 12" CMU Walls	1,360	SF						$ 12.00	$ 16,320
	- 12" CMU/Masonry Exterior Walls	4,580	SF						$ 22.00	$ 100,760
	- Modified Bitumin Roof System	7,800	SF					$ -	$ 10.00	$ 78,000
	- 12" Precast Concrete Roof Deck	7,800	SF						$ 12.00	$ 93,600
	- Roof and Building Insulation	1	LS						$ 20,000.00	$ 20,000
	- Firestops	1	LS						$ 10,000.00	$ 10,000
	- Steel Doors and Frames	6	EA					$ -	$ 1,000.00	$ 6,000
	- FRP Doors	9	EA						$ 1,200.00	$ 10,800
	- Translucent Panels	1	LS					$ -	$ 7,500.00	$ 7,500
	- Building Hardware	1	LS						$ 10,000.00	$ 10,000
	- Suspended Ceiling	200	SF						$ 5.00	$ 1,000
	- Handrails	200	LF					$ -	$ 55.00	$ 11,000
	- Grating	550	SF					$ -	$ 35.00	$ 19,250
	- Stairwell	350	SF					$ -	$ 75.00	$ 26,250
	- Special Containment Coatings	1	LS						$ 50,000.00	$ 50,000
	- Other Coatings	1	LS						$ 95,000.00	$ 95,000
	- Fire Suppression System	1	LS		$ 44,000	70	$ 55	$ 3,850	$ 47,850.00	$ 47,850
	- Lighting	1	LS		$ 20,000	200	$ 55	$ 11,000	$ 31,000.00	$ 31,000
	- Electrical Components	1	LS		$ 65,000	1200	$ 55	$ 66,000	$ 131,000.00	$ 131,000
	- HVAC System	1	LS		$ 175,000	200	$ 55	$ 11,000	$ 186,000.00	$ 186,000
	- Instrumentation & Control	1	LS		$ 186,000	520	$ 55	$ 28,600	$ 214,600.00	$ 214,600
	- Mechanical/Feed Water Piping	1	LS		$ 35,000	200	$ 40	$ 8,000	$ 43,000.00	$ 43,000
	- Hot Water Heater/System	1	LS		$ 15,000	80	$ 40	$ 3,200	$ 18,200.00	$ 18,200
	- Eyewash Asssemblies	11	EA		$ 5,500	16	$ 40	$ 640	$ 6,140.00	$ 67,540
	- Vent Piping (Mech & Chemical)	1	LS		$ 15,000	120	$ 40	$ 4,800	$ 19,800.00	$ 19,800
	- Floor Drains/Piping	1	LS		$ 2,000	60	$ 40	$ 2,400	$ 4,400.00	$ 4,400
	- Washroom/Janitorial Facilities	1	LS		$ 12,000	80	$ 40	$ 3,200	$ 15,200.00	$ 15,200
	- Chemical Spill Containment Channels	1	LS						$ 10,000	$ 10,000
	- Concrete Retaining Wall/Load ing Dock & Leveller	1	LS						$ 55,000	$ 55,000

	Ferric Sulfate Chemical Feed Equipment									
	- Fill Connection Assembly	4	EA						$ 2,500.00	$ 10,000
	- Bulk Tanks	4	EA	$ 400	$ 10,000	66	$ 40	$ 2,640	$ 13,040.00	$ 52,160
	- Day Tank	1	EA		$ 5,500	8	$ 40	$ 320	$ 5,820.00	$ 5,820
	- Tank Access Ladder/Handrail	4	EA		$ 2,500	16	$ 40	$ 640	$ 3,140.00	$ 12,560
	- Transfer Pumps	2	EA	$ 9,000		12	$ 40	$ 480	$ 9,480.00	$ 18,960
	- Chemical Metering Pumps/ Equipment	2	EA	$ 14,000		8	$ 40	$ 320	$ 14,320.00	$ 28,640
	- Electrically Actuated Ball Valves	5	EA						$ 2,000.00	$ 10,000
	- Level Indicators	3	EA	$ 2,000		8	$ 40	$ 320	$ 2,320.00	$ 6,960
	- Pressure Sensors	2	EA	$ 1,500		4	$ 55	$ 220	$ 1,720.00	$ 3,440
	- Piping, Valves, Fittings , Hangers and Equipment	1	LS					$ -	$ 12,000.00	$ 12,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 1,000		12	$ 40	$ 480	$ 1,480.00	$ 1,480
	- Sump Discharge Assembly and Piping	1	LS		$ 4,000	12	$ 40	$ 480	$ 4,480.00	$ 4,480
	Polyaluminum Chloride Chemical Feed Equipment									
	- Fill Connection Assembly	2	EA						$ 2,500.00	$ 5,000
	- Bulk Tanks	2	EA	$ 400	$ 10,000	66	$ 40	$ 2,640	$ 13,040.00	$ 26,080
	- Day Tank	1	EA	$ -	$ 5,500	8	$ 40	$ 320	$ 5,820.00	$ 5,820
	- Tank Access Ladder/Handrail	2	EA		$ 2,500	16	$ 40	$ 640	$ 3,140.00	$ 6,280
	- Transfer Pumps	2	EA	$ 9,000		12	$ 40	$ 480	$ 9,480.00	$ 18,960
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 40	$ 320	$ 14,320.00	$ 42,960
	- Electrically Actuated Ball Valves	5	EA						$ 2,000.00	$ 10,000
	- Level Indicators	3	EA	$ 2,000		8	$ 40	$ 320	$ 2,320.00	$ 6,960
	- Pressure Sensors	2	EA	$ 1,500		4	$ 55	$ 220	$ 1,720.00	$ 3,440
	- Piping, Valves, Fittings, Hangers and Equipment	1	LS					$ -	$ 12,000.00	$ 12,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 3,160
	- Sump Pump	1	LS	$ 1,000		12	$ 40	$ 480	$ 1,480.00	$ 1,480
	- Sump Discharge Assembly and Piping	1	LS		$ 4,000	12	$ 40	$ 480	$ 4,480.00	$ 4,480
	Caustic Feed Chemical Feed Equipment									
	- Fill Connection Assembly	2	EA						$ 2,500.00	$ 5,000
	- Bulk Tanks (w/ Heat Blanket)	2	EA	$ 500	$ 17,000	66	$ 40	$ 2,640	$ 20,140.00	$ 40,280
	- Day Tank	1	EA	$ -	$ 5,500	8	$ 40	$ 320	$ 5,820.00	$ 5,820
	- Tank Access Ladder/Handrail	2	EA		$ 2,500	16	$ 40	$ 640	$ 3,140.00	$ 6,280
	- Transfer Pumps	2	EA	$ 9,000		12	$ 40	$ 480	$ 9,480.00	$ 18,960
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 40	$ 320	$ 14,320.00	$ 42,960
	- Electrically Actuated Ball Valves	5	EA						$ 2,000.00	$ 10,000
	- Level Indicators	3	EA	$ 2,000		8	$ 40	$ 320	$ 2,320.00	$ 6,960
	- Pressure Sensors	2	EA	$ 1,500		4	$ 55	$ 220	$ 1,720.00	$ 3,440
	- Piping, Valves, Fittings, Hangers and Equipment	1	LS					$ -	$ 12,000.00	$ 12,000
	- Flow Meter	2	EA		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 6,320
	- Sump Pump	1	LS	$ 1,000		12	$ 40	$ 480	$ 1,480.00	$ 1,480
	- Sump Discharge Assembly and Piping	1	LS		$ 4,000	12	$ 40	$ 480	$ 4,480.00	$ 4,480

	Fluoride Feed Chemical Feed Equipment										
	- Fill Connection Assembly	2	EA						$ 2,500.00	$	5,000
	- Bulk Tanks	1	EA	$ 500	$ 10,000	66	$ 40	$ 2,640	$ 13,140.00	$	13,140
	- Day Tank	1	EA		$ 3,000	8	$ 40	$ 320	$ 3,320.00	$	3,320
	- Tank Access Ladder/Handrail	2	EA		$ 2,500	16	$ 40	$ 640	$ 3,140.00	$	6,280
	- Transfer Pumps	2	EA	$ 9,000		12	$ 40	$ 480	$ 9,480.00	$	18,960
	- Chemical Metering Pumps/ Equipment	2	EA	$ 12,000		8	$ 40	$ 320	$ 12,320.00	$	24,640
	- Electrically Actuated Ball Valves	5	EA						$ 2,000.00	$	10,000
	- Level Indicators	2	EA	$ 2,000		8	$ 40	$ 320	$ 2,320.00	$	4,640
	- Pressure Sensors	2	EA	$ 1,500		4	$ 55	$ 220	$ 1,720.00	$	3,440
	- Piping, Valves, Fittings, Hangers and Equipment	1	LS					$ -	$ 12,000.00	$	12,000
	- Flow Meter	1	LS		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	3,160
	- Sump Pump	1	LS	$ 1,000		12	$ 40	$ 480	$ 1,480.00	$	1,480
	- Sump Discharge Assembly and Piping	1	LS		$ 4,000	12	$ 40	$ 480	$ 4,480.00	$	4,480
	Sodium Hypochlorite Chemical Feed Equipment										
	- Fill Connection Assembly	2	EA						$ 2,500.00	$	5,000
	- Bulk Tanks	2	EA	$ 500	$ 13,000	66	$ 40	$ 2,640	$ 16,140.00	$	32,280
	- Day Tank	1	EA		$ 6,500	8	$ 35	$ 280	$ 6,780.00	$	6,780
	- Tank Access Ladder/ Handrail	2	EA		$ 2,500	16	$ 40	$ 640	$ 3,140.00	$	6,280
	- Transfer Pumps	2	EA	$ 12,000		20	$ 40	$ 800	$ 12,800.00	$	25,600
	- Chemical Metering Pumps/Equipment	4	EA	$ 12,000		8	$ 40	$ 320	$ 12,320.00	$	49,280
	- Electrically Actuated Ball Valves	5	EA						$ 2,000.00	$	10,000
	- Level Indicators	3	EA	$ 2,000		8	$ 40	$ 320	$ 2,320.00	$	6,960
	- Pressure Sensors	2	EA	$ 1,500		4	$ 55	$ 220	$ 1,720.00	$	3,440
	- Piping, Valves, Fittings, Hangers and Equipment	1	LS					$ -	$ 12,000.00	$	12,000
	- Flow Meter	3	EA		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$	9,480
	- Sump Pump	1	LS	$ 1,000		12	$ 40	$ 480	$ 1,480.00	$	1,480
	- Sump Discharge Assembly and Piping	1	LS		$ 4,000	12	$ 40	$ 480	$ 4,480.00	$	4,480
	Future Chemical Feed Area										
	- Fill Connection Assembly	2	EA						$ 2,500.00	$	5,000
	- Bulk Tanks	1	EA	$ 500	$ 10,000	66	$ 40	$ 2,640	$ 13,140.00	$	13,140
	- Tank Access Ladder/Handrail	1	EA		$ 2,500	16	$ 40	$ 640	$ 3,140.00	$	3,140
	- Piping, Valves, Fittings, Hangers and Equipment	1	EA						$ 5,000.00	$	5,000
	- Sump Pump	1	LS	$ 1,000		12	$ 55	$ 660	$ 1,660.00	$	1,660
	- Sump Discharge Assembly and Piping	1	LS		$ 4,000	12	$ 40	$ 480	$ 4,480.00	$	4,480

	Copper Sulfate Feed Chemical Feed Equipment									
	- Volumetric Feeder & Wetting System	1	LS	$ 45,000		48	$ 40	$ 1,920	$ 46,920.00	$ 46,920
	- Chemical Metering Pumps/Equipment	3	EA	$ 14,000		8	$ 40	$ 320	$ 14,320.00	$ 42,960
	- Piping, Valves, Fittings, Hangers and Equipment	1	LS					$ -	$ 12,000.00	$ 12,000
	Filter Aid Polymer Chemical System									
	- Make-Up Tank	1	LS		$ 1,500	8	$ 40	$ 320	$ 1,820.00	$ 1,820
	- Chemical Metering Pumps/Equipment	2	EA	$ 12,000		48	$ 40	$ 1,920	$ 13,920.00	$ 27,840
	- Piping, Valves, Fittings, Hangers and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Level Indicators	1	LS	$ 2,000		8	$ 40	$ 320	$ 2,320.00	$ 2,320
	Corrosion Control Chemical System									
	- Make-Up Tank	1	LS		$ 1,500	8	$ 40	$ 320	$ 1,820.00	$ 1,820
	- Chemical Metering Pumps/Equipment	2	EA	$ 14,000		8	$ 40	$ 320	$ 14,320.00	$ 28,640
	- Piping, Valves, Fittings, Hangers and Equipment	1	LS					$ -	$ 7,500.00	$ 7,500
	- Flow Meter	1	LS		$ 2,500	12	$ 40	$ 480	$ 2,980.00	$ 2,980
	Actiflo Polymer Chemical System									
	- Volumetric Feeder & Wetting System	2	EA	$ 42,500		48	$ 40	$ 1,920	$ 44,420.00	$ 88,840
	- Chemical Metering Pumps/Equipment	3	EA	$ 12,000		8	$ 40	$ 320	$ 12,320.00	$ 36,960
	- Level Indicators	2	EA	$ 2,000		8	$ 40	$ 320	$ 2,320.00	$ 4,640
	- Piping, Valves, Fittings, Hangers and Equipment	1	LS					$ -	$ 5,000.00	$ 5,000
	- Flow Meter	2	EA		$ 2,500	12	$ 55	$ 660	$ 3,160.00	$ 6,320
	- Heat Tracing of Effluent Lines	2	EA		$ 1,500	16	$ 55	$ 880	$ 2,380.00	$ 4,760
	Chemical Feed Building Sub total									**$ 2,985,325**
3.	**Miscellaneous**									
	- Miscellaneous Construction									$ 330,569
	- Mobilization/Demobilization (3%)									$ 99,171
	- Contractor Overhead & Profit (@18%)									$ 595,025
	Miscellaneous Sub total									**$ 1,024,765**
	Total Opinion of Construction Costs - Chemical Feed Building and Facilities									**$ 4,330,458**

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost			Unit Price	Total Price
						Manhours	$/MH	Est Cost		
	RAW WATER TRANSFER STATION									
1.	**Raw Water Transfer Station**									
	- Demolition	1	LS						$ 12,500.00	$ 12,500
	- 12" DI Suction Piping & Fittings	1	LS		$ 100	30	$ 40	$ 1,200	$ 1,300.00	$ 1,300
	- 18" DI Suction Discharge Piping	1	LS		$ 200	45	$ 40	$ 1,800	$ 2,000.00	$ 2,000
	- 30" DI Suction Piping	24	LF		$ 750	45	$ 40	$ 1,800	$ 2,550.00	$ 2,550
	- 30" Butterfly Valve	1	LS		$ 5,200	24	$ 40	$ 960	$ 6,160.00	$ 6,160
	- 12" Suction Isolation Valves	1	EA		$ 1,500	24	$ 40	$ 960	$ 2,460.00	$ 2,460
	- 18" Suction Isolation Valves	2	EA		$ 3,000	24	$ 40	$ 960	$ 3,960.00	$ 7,920
	- 3,500 GPM Split Case Pump (incl VFD's)	1	EA	$ 55,000	$ 1,000	48	$ 40	$ 1,920	$ 57,920.00	$ 57,920
	- 7,000 GPM Split Case Pumps (incl VFDs)	2	EA	$ 72,000	$ 1,000	48	$ 40	$ 1,920	$ 74,920.00	$ 149,840
	- 10" Swing Check Valve	1	EA		$ 2,500	30	$ 40	$ 1,200	$ 3,700.00	$ 3,700
	- 16" Swing Check Valves	2	EA		$ 3,500	30	$ 40	$ 1,200	$ 4,700.00	$ 9,400
	- 10" Discharge Isolation Valve	1	EA		$ 1,250	24	$ 40	$ 960	$ 2,210.00	$ 2,210
	- 16" Discharge Isolation Valves	2	EA		$ 2,000	24	$ 40	$ 960	$ 2,960.00	$ 5,920
	- 24" Discharge Valve	1	EA		$ 4,500	30	$ 40	$ 1,200	$ 5,700.00	$ 5,700
	- 18" DI Discharge Piping	12	LF		$ 200	45	$ 40	$ 1,800	$ 2,000.00	$ 2,000
	- 24" DI Discharge Piping	12	LF		$ 500	45	$ 40	$ 1,800	$ 2,300.00	$ 2,300
	- Miscellaneous Fittings	1	LS		$ 15,000	120	$ 40	$ 4,800	$ 19,800.00	$ 19,800
	- Rework Grating	1	LS		$ 500	32	$ 40	$ 1,280	$ 1,780.00	$ 1,780
	- Variable Frequency Drives - 200 HP	2	EA	$ 45,000		100	$ 55	$ 5,500	$ 50,500.00	$ 101,000
	- Variable Frequency Drives - 100 HP	1	EA	$ 35,000		100	$ 55	$ 5,500	$ 40,500.00	$ 40,500
	- Electrical	1	LS		$ 158,000	525	$ 55	$ 28,875	$ 186,875.00	$ 186,875
	- Instrumentation & Control	1	LS		$ 18,800	71	$ 55	$ 3,905	$ 22,705.00	$ 22,705
	- HVAC/Mechanical	1	LS	$ 28,000		40	$ 55	$ 2,200	$ 30,200.00	$ 30,200
	RWTS Subtotal									**$ 676,740**
2.	**Miscellaneous**									
	- Miscellaneous Construction									$ 67,674
	- Mobilization/Demobilization (3%)									$ 20,302
	- Contractor Overhead & Profit (@18%)									$ 121,813
	Miscellaneous Sub total									**$ 209,789**
	Total Opinion of Construction Costs - Raw Water Transfer Station									**$ 886,529**

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost			Unit Price	Total Price
						Manhours	$/MH	Est Cost		
	FILTER/CLEARWELL MODIFICATIONS									
1	**Filter Modifications**									
	- Demolition of Existing Piping/Valves	1	LS			80	$ 40	$ 3,200	$ 3,200.00	$ 3,200
	- Demolition of Existing Surface Wash Equipment	3	EA			40	$ 40	$ 1,600	$ 1,600.00	$ 4,800
	- Demolition of Existing Filter Wheeler Bottoms	3	EA	$ 3,000		100	$ 40	$ 4,000	$ 7,000.00	$ 21,000
	- Demolition of Filter Influent Valves/Actuators	3	EA			48	$ 40	$ 1,920	$ 1,920.00	$ 5,760
	- 8-inch DI Air Piping	35	LF		$ 50	2	$ 40	$ 80	$ 130.00	$ 4,550
	- 8-inch Butterfly Air Valve w/Actuator	3	EA		$ 4,000	32	$ 40	$ 1,280	$ 5,280.00	$ 15,840
	- Miscellaneous Air Piping Fittings	1	LS		$ 1,000	32	$ 40	$ 1,280	$ 2,280.00	$ 2,280
	- 8-inch DI Air Relief Piping	15	LF		$ 15	2	$ 40	$ 80	$ 95.00	$ 1,425
	- 8-inch Air Relief Valve (O/C)	1	LS		$ 4,000	60	$ 40	$ 2,400	$ 6,400.00	$ 6,400
	- 24" Filter Influent Valves w/ Actuators	3	EA		$ 9,000	40	$ 40	$ 1,600	$ 10,600.00	$ 31,800
	- 24" Backwash Effluent Valves w/ Actuators	3	EA		$ 9,000	40	$ 40	$ 1,600	$ 10,600.00	$ 31,800
	- 20" Backwash Influent Valves w/ Actuators	3	EA		$ 8,000	40	$ 40	$ 1,600	$ 9,600.00	$ 28,800
	- 12" Filter Effluent Valve w/ Actuator & Venturi	3	EA		$ 5,500	24	$ 55	$ 1,320	$ 6,820.00	$ 20,460
	- 6" Filter-to-Waste Valve w/ Actuators	3	EA		$ 3,500	16	$ 40	$ 640	$ 4,140.00	$ 12,420
	- Filter Underdrain Systems (w/ Media Cap)	3	EA	$ 55,000	$ 7,500	200	$ 40	$ 8,000	$ 70,500.00	$ 211,500
	- Mixed Media	3	EA		$ 13,000	64	$ 40	$ 2,560	$ 15,560.00	$ 46,680
	- New Gooseneck /Floor Cut	1	LS	$ 2,500	$ 4,500	48	$ 40	$ 1,920	$ 8,920.00	$ 8,920
	- 1 1/2" Fiberglass Handrail (w/ Kickplate)	230	LF		$ 35	0.5	$ 40	$ 20	$ 55.00	$ 12,650
	- Miscellaneous Instruments	24	Ea	$ 1,500		8	$ 55	$ 440	$ 1,940.00	$ 46,560
	- Control Panels	3	EA	$ 6,500		24	$ 55	$ 1,320	$ 7,820.00	$ 23,460
	- LCP - Filters	1	LS	$ 30,000		40	$ 55	$ 2,200	$ 32,200.00	$ 32,200
	- Electrical Modifications	1	LS	$ 55,000		300	$ 55	$ 16,500	$ 71,500.00	$ 71,500
	Subtotal									**$ 644,005**
2	**Clearwell Improvements**									
	- Baffling (w/ Supports)	1	LS	$ 2,500	$ 18,500	80	$ 40	$ 3,200	$ 24,200.00	$ 24,200
	- Replacement of 24" Bfly Valves & Stands	2	EA		$ 9,000	40	$ 40	$ 1,600	$ 10,600.00	$ 21,200
	- 1 1/2" Fiberglass Handrail (w/ Kickplate)	520	LF		$ 35	0.5	$ 40	$ 20	$ 55.00	$ 28,600
	- Concrete Restoration - Surface Spall	225	SF						$ 45.00	$ 10,125
	- Concrete Restoration - Under Beam & Slab Spall	265	SF					$ -	$ 65.00	$ 17,225
	- 1" Clearwell Sample Line	25	LF						$ 50.00	$ 1,250
	Subtotal									**$ 102,600**
3.	**Miscellaneous**									
	- Miscellaneous Construction									$ 74,661
	- Mobilization/Demobilization (3%)									$ 22,398
	- Contractor Overhead & Profit (@18%)									$ 134,389
	Miscellaneous Sub total									**$ 231,448**
	Total Opinion of Construction Costs - Filter Modofications and Clearwell Improvements									**$ 978,053**
	Total Opinion of Construction Costs - Chemical Building, RWTS and Filter/Clearwell Improvements									**$ 6,195,040**

ADDITIONAL COSTS

New PAC Building

Item No.	Item	Qty.	Unit	Equipment Price	Material Cost	Labor Cost			Unit Price	Total Price
						Manhours	$/MH	Est Cost		
1.	**Powder Activated Carbon (PAC) Facility**									
	- Excavation & Regrade	75	CY						$ 40.00	$ 3,000
	- Bituminous Pavement	60	tons						$ 40.00	$ 2,400
	- Foundation	12	CY						$ 450.00	$ 5,400
	- Pre-Engineered Metal Building/Block Foundation	300	SF						$ 135.00	$ 40,500
	- Interior CMU Wall	125	SF						$ 12.00	$ 1,500
	- Doors & Windows	2	EA						$ 3,000.00	$ 6,000
	- Roll-Up Doors	2	EA						$ 5,000.00	$ 10,000
	- Roof	225	SF						$ 30.00	$ 6,750
	- Supersac Equipment	1	LS	$ 68,000		32	$ 35	$ 1,120	$ 69,120.00	$ 69,120
	- Mechanical	1	LS	$ 1,500	$ 2,500	100	$ 35	$ 3,500	$ 7,500.00	$ 7,500
	- HVAC	1	LS	$ 15,000		24	$ 35	$ 840	$ 15,840.00	$ 15,840
	- Instumentation & Control	1	LS		$ 2,500	40	$ 55	$ 2,200	$ 4,700.00	$ 4,700
	- Electrical	1	LS		$ 9,500	100	$ 55	$ 5,500	$ 15,000.00	$ 15,000
	PAC Sub total									**$ 187,710**
2.	**Miscellaneous**									
	- Miscellaneous Construction									$ 18,771
	- Mobilization/Demobilization (3%)									$ 5,631
	- Contractor Overhead & Profit (@18%)									$ 33,788
	Miscellaneous Sub total									**$ 58,190**
	Total Opinion of Construction Costs - PAC Building									**$ 245,900**

Case No. 2006-____
Exhibit ____A____

NORTHERN KENTUCKY WATER DISTRICT

Project
Memorial Parkway Treatment Plant Improvements

Campbell County
184-435

Plans and specifications prepared by Quest titled "Memorial Parkway Treatment Plant Improvements"

Submitted as separate attachments

Northern Kentucky
Water District

The following items are enclosed separately from this volume.

- Plans prepared by Quest titled "Memorial Parkway Treatment Plant Improvements" dated July, 2006. (5 sets)

- Specifications prepared by Quest titled "Memorial Parkway Treatment Plant Improvements" dated July, 2006. (5 sets)

2835 Crescent Springs Rd Erlanger, KY 41018 (859) 578-9898 Fax (859) 578-5456

80000 SERIES
30% P.C.W.

Case No. 2006-____
Exhibit ____B____

NORTHERN KENTUCKY WATER DISTRICT

Project
Memorial Parkway Treatment Plant Improvements

Campbell County
184-435

CERTIFIED STATEMENTS

Affidavit

Franchises

Plan Review and Permit Status

Easements and Right-of-Way Status

Construction Dates and Proposed Date In Service

Plant Retirements

AFFIDAVIT
Memorial Parkway Treatment Plant Improvements

Affiant, Jack Bragg, Jr., being the first duly sworn, deposes and says that he is the Vice President of Finance of the Northern Kentucky Water District, which he is the Applicant in the proceeding styled above; that he has read the foregoing "Memorial Parkway Treatment Plant Improvements" Application and knows the contents thereof, and that the same is true of his own knowledge, except as to matters which are therein stated on information or belief, and that is to those matters he believes them to be true.

Jack Bragg, Jr.
Vice President - Finance
Northern Ky. Water District

Subscribed and sworn to before me in said County to be his act and deed by Jack Bragg, Jr., Vice President of Finance of the Northern Kentucky Water District, this 31 day of August 2006.

NOTARY PUBLIC
Campbell County, Kentucky
My commission expires 1-17-07

Northern Kentucky
Water District

Franchises required – None

Plan Review and Permit Status - The District has reviewed and approved the plans and specifications prepared by Quest titled "Memorial Parkway Treatment Plant Improvements" dated July, 2006.

The District received approval from the Division of Water on July 7, 2006. See attached letter.

Easements and Right-of-Way Status - Easement and Right-of-Way statements are not required.

Start date of construction – assumed November, 2006

Proposed date in service – assumed November, 2007

Plant retirements – Existing chemical storage and feed equipment to be removed; building to remain.

2835 Crescent Springs Rd Erlanger, KY 41018 (859) 578-9898 Fax (859) 578-5456

Case No. 2006-____
Exhibit ____B____

NORTHERN KENTUCKY WATER DISTRICT

Project
Memorial Parkway Treatment Plant Improvements

Campbell County
184-435

PLAN REVIEW AND PERMIT STATUS

Approval Letter from Kentucky Division of Water

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

Ernie Fletcher
Governor

Frankfort Office Park
14 Reilly Road
Frankfort, Kentucky 40601
www.kentucky.gov

LaJuana S. Wilcher
Secretary

July 7, 2006

RECEIVED
JUL 14 2006
ENGINEERING DEPT.

Amy Kramer, P.E., Design Engineering Manager
Northern Kentucky Water District
2835 Crescent Springs Road
P. O. Box 18640
Erlanger, Kentucky 41018

RE: Campbell County
AI #: 2485
DW # 0590220-06-023, SRF 77940
Memorial Parkway Treatment Plant Improvements
Activity ID: APE 20060023

Dear Ms. Kramer:

We have received the Plans and Specifications for the above referenced project. The project consists of the following:

1. Replacement of pumps and appurtenance at the raw water transfer station (two 7,000 gpm and one 3,500 gpm).

2. Construction of a new chemical feed/storage building for the following chemicals: Poly Aluminum Chloride, Ferric Sulphate, Copper Sulphate, Caustic Soda, Sodium Hypochlorite, Corrosion Inhibitor, Actiflo Polymer, Filter Aid Polymer and Fluoride.

3. Construction of a pre-engineered Activated Carbon System (Alternate Bid).

4. Renovation of three existing filters (12-inch sand and 18-inch Anthracite).

5. Installation of baffles in the existing clearwell.

This is to advise that plans and specifications covering the above referenced subject are APPROVED with respect to sanitary features of design as of this date with the following stipulations:

a) The capacity of the treatment plant shall remain at 10.0 MGD (6,944 gpm).

b) Water pipe materials and adhesives used in the construction shall be NSF approved and compatible with various pH ranges and chemicals to be used.

c) Per phone conversation with Mr. Brent Tippey, project engineer for Quest Engineers, Inc., on June 30, 2006, it was agreed to make some

changes in the clearwell piping arrangement accordance with the diagram submitted as "option #2- extended overflow pipe". Also, it was agreed to install vacuum breaker device on each chemical transfer line that feeds chemicals from the bulk storage tank to the day tank in order to prevent back-siphon and a positive ventilation system (explosion proof) in the activated carbon feeder room in the Alternate Bid. Revised pages of the engineering plans to reflect the above changes shall be submitted to the Drinking Water Branch prior to beginning construction.

d) The recommendations and/or comments made by the Kentucky Oral Health Program review shall be addressed (see the memo from the Oral Health Program).

The following information and requirements relate to the Drinking Water State Revolving Fund.

1. You are required to keep one set of approved plans and specifications at the project site at all times. If modifications are made to these plans and specifications prior to bidding, then four (4) complete sets of revised plans and specifications shall be submitted to the Division of Water for approval. Our notice of construction approval will be issued at a later date by separate correspondence.

2. You are hereby approved to advertise for bids on the construction for this project. In addition to other notices, you shall advertise the bid between seven (7) and twenty-one (21) days prior to the Bid Opening date in the Kentucky Post. Please provide the bid opening date to Cathy Arnett, Project Administration Section, at (502) 564-2225, extension 420.

3. A set of AS-BID plans and specifications (with the APPROVAL conditions addressed) and a copy of the Advertisement shall be submitted to the Division of Water when the project is advertised. These items will be reviewed as part of the Authority to Award process. A checklist is attached for your use.

4. Please be advised that the construction contract is subject to the Equal Employment opportunity requirements contained in Executive Order 11246. Equal Employment opportunity affirmative action by the prime contractor and all subcontractors is mandated throughout the duration of the contract. Documentation of efforts to comply with Executive Order 11246, Equal Employment Opportunity in accordance with the Kentucky State Drinking Water Revolving Fund to Bidders is required. Compliance with the MBE/WBE Fair Share Policy in accordance with 40 CFR 31.36(e) is required.

5. Review the attached Project Review and Cost Summary Form for details of the information to either be collected and submitted to the Division for review and approval or to be retained by the grantee in their records. This project Review and Cost Summary is to be completed, signed, and with the necessary information be then forwarded to the Division by the recipient. This signature will certify that all the information to be retained by the recipient has been secured

and is available for review by the Division at the pre-construction conference. The required information must be forwarded to the Division for review within fourteen (14) days of bid opening.

6. All modifications to the original approval shall be approved by Northern Kentucky Water District and Drinking Water Branch prior to any construction.

7. Upon approval of the documents, the Division of Water will authorize you to award the construction contract, and arrange for a pre-construction conference. Division of Water staff needs to be notified about the above dates.

You are cautioned that the advertisement and award of this contract will be subject to the laws and regulations that govern the Drinking Water Revolving Fund process.

When this project is completed, the owner shall submit a written certification to the Division of Water that the above referenced water supply facilities have been constructed and tested in accordance with the approved plans and specifications and the above stipulations. Such a certification shall be signed by a licensed professional engineer.

This approval has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this approval does not relieve the applicant from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal and local agencies.

Unless construction on this project commences within one year from the date of this approval letter, Northern Kentucky Water District shall request an official extension from the Division of Water prior to the first anniversary of this approval letter, or re-submit the original plans and specifications for a new comprehensive review.

If you have any questions concerning this project, please contact Solitha W. Dharman, P.E. at (502) 564-2225, extension 572.

Sincerely,

Donna S. Marlin

Donna S. Marlin, Manager
Drinking Water Branch
Division of Water

DSM: SWD
Enclosures

C: Brent Tippey, PE., Quest Engineers
Kenton County Health Department
Campbell County Health Department
Robert Murphy, Oral Health Program
Kentucky Infrastructure Authority
Cathy Arnett, RPPS Branch
Florence Regional Office

ERNIE FLETCHER
GOVERNOR

CABINET FOR HEALTH AND FAMILY SERVICES
DEPARTMENT FOR PUBLIC HEALTH
HEALTH CARE ACCESS BRANCH
ORAL HEALTH PROGRAM
275 EAST MAIN STREET, HS2WB
FRANKFORT, KENTUCKY 40621-0001
(502) 564-3246 (502) 564-8389 FAX
ROBERT.MURPHY@KY.GOV

JAMES W. HOLSINGER, JR., M.D.
SECRETARY

MEMORANDUM

TO: Solitha Dharman, P. E.,
Permits & Plans Review Section
Drinking Water Branch
Division of Water

FROM: Robert Murphy, Health Program Administrator RM
Oral Health Program
Department for Public Health

DATE: June 29, 2006

SUBJECT: DW # 0590220-06-023
Memorial Parkway Treatment Plant Improvements
Northern Kentucky Water District
Kenton/Campbell County

In accordance with the operating protocols between the Environmental & Public Protection Cabinet and the Cabinet for Health & Family Services, I have reviewed the above plans and make the following recommendations and/or comments.

1. The fluoride feed room should be a separate enclosed room and have a power fan vented to the outside atmosphere. This vent fan should be located close to the ceiling.

2. Metering pumps shall be sized to operate in the mid-range of their capacity and mounted not more than 4 feet above the solution tank.

3. A day tank is required with a bulk system and should be sized to hold about a two day supply of hydrofluosilicic acid. **The day tank should be mounted on scales to record the daily weight loss of hydrofluosilicic acid.** The day tank should be vented to the bulk tank (which must be vented to the outside atmosphere) or vented directly to the outside atmosphere. The lines from the bulk tank to the day tank should be flexible enough to allow the scales to work properly.

4. The bulk tank should have a berm or a floor drain run to a holding area that would hold 80 % of the bulk tanks capacity.

5. All fittings should be compatible with hydrofluosilicic acid.

6. When this project is completed, the Oral Health Program should be notified for start-up approval. (Bob Murphy, (502) 564-3246 ext 3778

CLEAN WATER SRF ☐ DRINKING WATER SRF ☐
EPA GRANT ☐
PROJECT REVIEW AND COST SUMMARY

THIS QUESTIONNAIRE/CHECK SHEET IS FURNISHED AS AN ADMINISTRATIVE AID AND IS REQUIRED FOR USE IN SUPPLYING INFORMATION AND DOCUMENTS, REPORTING MINOR CHANGES AND PROJECT STATUS. THE INFORMATION AND DOCUMENTS MUST BE SUBMITTED TO DOW WITHIN 7 to 14 DAYS AFTER BID OPENING.

SECTION 1.

1. **Project Name** **Project Number**

_____ _____

2. **Changes: Have there been any changes in the project since DOW's plan and specification approval of the plans and specifications?**

☐ Yes ☐ No Construction Drawings. If yes, submit revised drawings and addenda. **See Note***

☐ Yes ☐ No Specifications. If yes, submit addenda. – **See Note***

***Note:** **Prior approval is required for changes in design, scope, type of treatment, size, capacity, time to complete the project, etc. Changes, which result in increase in the amount of a contract, must be procured in accordance with state and federal requirements, as applicable.**

☐ Yes ☐ No Site Changes. Clear Site Certificates are required prior to start of construction.

SECTION 2.

Date Bids Opened: _____ **Date Bids Expire:** _____

1. **The following items must be submitted to DOW:**

A. Executed Project Review & Cost Summary Form
B. Copy of advertisement with affidavit of publication
C. Revised Budget (copies attached)
D. Certified Bid Tabulations
E. Executed Contract Documents (once contracts are signed)
F. Notice To Proceed (generally included in executed contracts are signed)
G. MBE/WBE Documentation (See Attachment No. 12 of the Supplemental General Conditions (SGC)):

Data Sheet I from all bidders.
From the successful bidder, Data Sheet II with MBE/WBE certifications, subcontracts with MBE/WBE, and a letter from the MBE/WBE accepting the subcontract; or Data Sheet III with documentation on the level of effort including copies of correspondence with MBE/WBE contractors, requesting quotes and copies of any advertisements soliciting MBE/WBE contractors, copies of returned envelopes and certified mail receipts, telephone log, etc.

2. A copy of the items identified in Section 2.1, above, and the following must be retained by the owner. This documentation is subject for review, by DOW, at the time of the pre-construction conference.

A. Name and qualifications of the proposed resident inspector(s).
B. Proposal of the successful bidder(s).
C. Bid Bond.
D. EEO documentation required by Executive Order 11246 as amended. Items 1 through 11 (See Attachment No. 7 in the SGC), is required for all contracts over $10,000 except supplier contracts. Supplier contracts require:

1. Name, address, and telephone number.
2. Materials to be supplied and dollar value.

For contracts below $10,000, the same information required for supplier contracts must be submitted.

E. Engineer's letter to the loan recipient recommending award of the contract. Letter must include a description of work, dollar amount, and name of the low bidder. If award is recommended to be made to other than the low bidder, a justification indicating why the low bidder is not responsive or responsible.
F. Contractor's Debarred Firm Certification (See Attachment No. 10 in the SGC).
G. Contractor's Certification Regarding Lobbying (See Attachment No. 11 in the SGC).
H. Contractor project construction schedule and payment schedule.
I. Applicable wage rate determination letter.
J. Tentative Award Resolution

3. Comments:

_____

_____

I hereby certify that all documentation outlined in Section 2.1 and 2.2 will be retained in our project files and all documentation outlined in Section 2.1 has been submitted to DOW.

_____ **Date:** _____
Signature of Authorized Representative

_____
Name and Title

Attachment

CLEAN WATER STATE REVOLVING FUND

Part III - Budget Information
Detailed Project Cost Estimate

If other funding sources will be used with Fund A, please identify the funding source and the amount for each line item.

1. ADMINISTRATIVE AND LEGAL EXPENSES

Allowable administrative expenses **do not include** costs that are related to the normal functions of government. Allowable legal fees are generally those associated with the purchase of eligible land or easements and certain services in support of the project (e.g., review of contracts compliance with the Real Property Acquisition Act).

Cost Category	Cost	Funding Source(s)	Total Cost
Advertisements	$_____	_____	
Legal Fees	$_____	_____	
Other _____	$_____	_____	
_____	$_____	_____	
_____	$_____	_____	
			$_____

2. LAND ACQUISITION

This category includes purchases, lease, and/or easements for the site and/ or rights-of-way.
NOTE: Land acquisition is ineligible for FAWRF participation.

Cost Category	Cost	Funding Source(s)	Total Cost
Wastewater Treatment Plant	$_____	_____	
Sludge Handling Facilities	$_____	_____	
Pump Stations	$_____	_____	
Interceptor Sewers	$_____	_____	
Collection Sewers	$_____	_____	
On-site and Other Innovative/ Alternative Systems	$_____	_____	
			$_____

3. RELOCATION EXPENSES

Enter estimated costs related to relocation advisory assistance, replacement housing, relocation payments to displaced persons and businesses, etc.

Cost Category	Cost	Funding Source(s)	Total Cost
_____	$_____	_____	
_____	$_____	_____	
_____	$_____	_____	

$_____

4. ENGINEERING

Planning	Cost	Funding Source(s)	Total Cost
Preliminary Planning	$_____	_____	
Facility Plan	$_____	_____	
Loan Application	$_____	_____	
Sewer Use Ordinance	$_____	_____	
User Charge System	$_____	_____	
Archaeological/Vegetative Surveys	$_____	_____	
Sewer System Evaluation Survey	$_____	_____	
Other _____	$_____	_____	$_____
Design			
Plans/Specifications	$_____	_____	
Preliminary Plan of Operation	$_____	_____	
Value Engineering (if applicable)	$_____	_____	$_____
Construction Services			
Securing/Evaluating Bids	$_____	_____	
Change Orders	$_____	_____	
General Engineering Reviews	$_____	_____	
On-site Inspections	$_____	_____	
Provide As-Built Drawings	$_____	_____	$_____
Resident Inspection	$_____	_____	$_____
Other Engineering Services			
Final Plan of Operation	$_____	_____	
O & M Manual	$_____	_____	
Start-up Services	$_____	_____	
Other _____	$_____	_____	$_____
Additional Engineering Services			
Negotiation of Service due to change in Scope	$_____	_____	
Service as expert witness	$_____	_____	
Other _____	$_____	_____	$_____
TOTAL ENGINEERING COSTS			$_____

5. CONSTRUCTION COSTS ESTIMATE

Enter the estimated cost of construction contracts only. (Space is provided for additional information such as location, contracts, etc.).

_____ Pre-Bid Engineer's Estimate _____ Actual Bid Prices

Cost Category	Cost	Funding Source(s)	Total Cost
Wastewater Treatment Plant			
(I) Secondary Portion	$_____	_____	$_____
(II) Advanced Portion	$_____	_____	$_____
(IIIA) I/I Correction	$_____	_____	$_____
(IIIB) Major Sewer Rehabilitation	$_____	_____	$_____
(IVA) Collector Sewers	$_____	_____	$_____
(IVB) Interceptor Sewers including Pump Stations	$_____	_____	$_____
(V) Combined Sewer Overflow Correction	$_____	_____	$_____
TOTAL CONSTRUCTION COSTS			$_____

6. EQUIPMENT

Enter the estimated cost of shop, laboratory, and safety equipment, etc. to be used at the facility if such costs are not included in any construction contract.

Cost Category	Cost	Funding Source(s)	Total Cost
_____	$_____	_____	
_____	$_____	_____	
_____	$_____	_____	
_____	$_____	_____	
_____	$_____	_____	
			$_____

7. MISCELLANEOUS

Enter the estimated costs for items such as but not limited to value engineering, interim financing, and capitalized interest.

Cost Category	Cost	Funding Source(s)	Total Cost
_____	$_____	_____	
_____	$_____	_____	
_____	$_____	_____	
_____	$_____	_____	
_____	$_____	_____	
			$_____

8. CONTINGENCIES

Enter estimated contingency costs. This amount should be calculated at 5% based on construction contracts only).

	Funding Source(s)	Total Cost
	_____	$_____

9. TOTAL PROJECT COSTS _____ $_____

Project Title _____ **Date Prepared** _____

Part III - Budget Information
Project Cost Summary

COST CLASSIFICATION	LOCAL FUNDS	GRANT	GRANT	LOAN	FUND A	TOTAL PROJECT COSTS
1. Administrative and Legal Expense	$	$	$	$	$	$
2. Land Acquisition						
3. Relocation Expenses						
4. Engineering						
5. Construction						
6. Equipment						
7. Miscellaneous						
8. Contingencies						
9. Total Project Costs Each Funding Source	$	$	$	$	$	$

For funding sources other than FUND A, please identify the grant/loan and indicate the award, or application date of such:

_____

_____

Identify Source of Local Funds:

_____ Revised _____

_____ Revised _____

_____ Revised _____

EPA SPECIAL APPROPRIATION GRANTS

ATTACHMENT TO SECTION B - BUDGET CATEGORIES - PER FUNDING SOURCES

OBJECT CLASS CATEGORIES	EPA GRANT	LOCAL	OTHER	OTHER	TOTAL
a. Administrative and legal expenses					
b. Land structures, right-of-way, appraisals					
c. Relocation expenses & payments					
d. Equipment					
e. Engineering fees (Planning)					
f. Engineering fees (Design)					
g. Engineering fees (Construction Administration)					
h. Engineering fees (Resident Inspection)					
i. Other engineering fees					
j. Construction					
k. Miscellaneous					
l. Contigencies (10% of lines d & j)					
TOTAL PROJECT COSTS					

DOW-RPPS-PAS Revised 11/18/03

80000 SERIES
30% P.C.W.