BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

RECEIVED
JAN - 2 2004
STATE OF ILLINOIS
POLLUTION CONTROL BOARD

CITY OF CHARLESTON, ILLINOIS,	)	
Petitioner,	)	
v.	)	PCB 04-111
	)	Variance – IESWTR
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent,	)	

NOTICE OF FILING

To: Illinois Pollution Control Board
100 West Randolph Street
James R. Thompson Center
Suite 11-500
Chicago, Illinois 60601-3218

Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control the SECOND VARIANCE PETITION of THE CITY OF CHARLESTON, ILLINOIS, a copy of which is herewith served upon you.

Brian L. Bower, City Attorney

12/30/03
Date

Brian L. Bower
Brainard, Bower and Kramer Law Offices
600 Jackson Avenue
Charleston, Illinois 61920
(217) 345-2484

Certificate of Service

I, the undersigned, certify that I have served the attached VARIANCE PETITION, of THE CITY OF CHARLESTON, ILLINOIS, via the United States Post Office at Charleston, Illinois, in an envelope with sufficient postage affixed, upon the following persons with ten (10) copies going to the Illinois Pollution Control Board and one (1) copy going to the Illinois Environmental Protection Agency.

To:

Illinois Pollution Control Board
100 West Randolph Street
James R. Thompson Center
Suite 11-500
Chicago, Illinois 60601-3218

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1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

DATED this 31 **day of** December **2004.**

Brian L. Bower, City Attorney

Brian L. Bower
City Attorney
600 Jackson Avenue
Charleston, Illinois 61920
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VARIANCE

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	)	**Variance – IESWTR**
ILLINOIS ENVIRONMENTAL	)	
PROTECTION AGENCY,	)	
Respondent.	)	

SECOND VARIANCE PETITION

TIME EXTENSION – INTERIM ENHANCED SURFACE WATER TREATMENT RULE

CITY OF CHARLESTON

a) STATEMENT DESCRIBING THE REGULATION, REQUIREMENT, OR ORDER OF THE BOARD FROM WHICH A VARIANCE IS SOUGHT: The City of Charleston is seeking a time extension variance in order to comply with the provision of the Interim Enhanced Surface Water Treatment Rule (IESWTR) which requires that 95% of all monthly combined filtered water turbidity measurements (taken every four hours) be less than or equal to 0.3 nephelometric turbidity units (NTU). The IESWTR was promulgated in the Federal Register, 63 FR 69478, on December 16, 1998. The IESWTR requirements are applicable to public water systems serving 10,000 or more persons. Section 611.743, Part 611: Primary Drinking Water Standards of Subtitle F: Public Water Supplies regulations, 35 Illinois Administrative Code, has incorporated specific filtration requirements and reads as follows: "A PWS subject to the requirements of this Subpart that does not meet all of the standards in this Subpart and Subpart B of this Part for avoiding filtration shall provide treatment consisting of both disinfection, as specified in Section 611.242, and filtration treatment which complies with the requirements of subsection (a) or (b) of this Section or Section 611.250 (b) or (c) by December 31, 2001. a) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month, measured as specified in Sections 611.531 and 611.533."

b)

1. LOCATION OF, AND AREA AFFECTED BY, THE PETITIONER'S ACTIVITY: The City of Charleston owns and operates a water treatment plant (IEPA Facility #0290100) located at 2600 McKinley Avenue, Charleston, Illinois, 61920. The City provides potable water service to 21,039 residents within the City limits including Eastern Illinois University.

2. LOCATION OF POINTS OF DISCHARGE & NEAREST AIR MONITORING STATION: Discharge and air quality information are not applicable to this variance.

3. IDENTIFICATION OF PRIOR VARIANCE ISSUED TO PETITIONER: The City of Charleston was granted a variance to 35 IL Admin Code 611.743(a)(1) by the Illinois Pollution Control Board on December 06, 2001. That variance expires on December 30, 2003 and is attached as Exhibit 'A'.

4. IDENTIFICATION, INCLUDING NUMBER, OF ENVIRONMENTAL PERMITS AFFECTED BY VARIANCE: IEPA issued a facility number to the City of Charleston for the Water Treatment Plant. The Facility Number is 00290100. To the best of the City's knowledge, the issuance of a variance for the water treatment plant would not impact the permits issued to the City.

5. NUMBER OF PERSONS EMPLOYED AT FACILITY AND AGE OF FACILITY: Seven fulltime, certified operators are employed at the water treatment plant, which was constructed in 1964 and now is over 29 years old.

6. NATURE AND AMOUNT OF MATERIALS USED IN THE PROCESS AND A DESCRIPTION OF THE PROCESS: The existing water treatment plant is a 4.0

MGD conventional lime softening plant. The source water for the plant is a 1-billion gallon reservoir known as the Charleston Side Channel Reservoir. Source water is pumped to the plant from a raw water pump station located at the reservoir. Lime (158 mg/l avg. dose), alum (27 mg/l avg. dose), chorine (1.46 mg/l avg. dose), chlorine dioxide (0.78 mg/l avg. dose) and a coagulant aid are added to the water in the rapid mix chamber before entering the lime softening contact basins. Settled water from the basins then flows through a recarbonation chamber where carbon dioxide (38 mg/l avg. dose) and polyphosphate (0.9 mg/l avg. dose) are added for pH adjustment and corrosion control. The water then is filtered through multi-media GAC filter beds before entering the clearwell where chlorine (3.36 mg/l avg. dose), ammonia (0.8 mg/l avg. dose), fluoride (0.93 mg/l avg. dose) are added. The filtered water is then pumped from the clearwell into the distribution system.

7. DESCRIPTION OF RELEVANT POLLUTION CONTROL EQUIPMENT IN USE: The City monitors water quality as per the requirements of the Safe Drinking Water Act, as amended. Process residuals are monitored either by probe or by manual sampling. IEPA approved laboratory protocols are used for analysis. Turbidity automatically is monitored using "Hach turbidimeters" and is of particular importance in this instance since this is the particular new parameter limit (0.3 NTU) that the City's existing plant will not be able to meet beginning on January 1, 2002.

8. NATURE AND AMOUNT OF DISCHARGES OF THE CONSTITUENT IN QUESTION CURRENTLY GENERATED BY PETITIONER: Currently, the City is able to meet the current finished water turbidity requirement of 0.5 NTU 95% of the time as required by the present regulations. However, based upon historical finished

water quality data, the plant only can produce finished water meeting the new 0.3 NTU requirement 70% of the time, on the average, with a minimum monthly turbidity compliance rate of only 33%. This is somewhat less than the 95% compliance rate required by the IESWTR.

c) DATA DESCRIBING THE NATURE AND EXTENT OF THE PRESENT OR ANTICIPATED FAILURE TO MEET THE REGULATION, REQUIREMENT, OR ORDER OF THE BOARD FROM WHICH VARIANCE IS SOUGHT AND FACTS THAT SUPPORT PETITIONER'S ARGUMENT THAT COMPLIANCE CAN NOT BE ACHIEVED BY THE COMPLIANCE DATE: Attached as Exhibit 'B' are the finished water turbidity records from January 2002 to October 2003. The records show the plant achieved the 0.3 NTU requirement in 13 of the past 22 months and for 10 of the past 12 months. The City has continued to increase our ability to meet the 0.3 NTU requirement. However, we are not yet capable of meeting the rule every month.

d) DESCRIPTION OF EFFORTS THAT WOULD BE NECESSARY FOR THE PETITIONER TO ACHIEVE IMMEDIATE COMPLIANCE WITH THE REGULATION: The immediate effort being taken to comply with the IESWTR is the construction of a new 4.5mgd Water Treatment Plant. The project includes larger contact basins, improved recarbonation contact, and deeper filters. The cost of the project is $9,071,000.00. The Engineer's Design Summary for the project, prepared by Crawford, Murphy, & Tilly Engineering Consultants, is attached as Exhibit 'C'.

e) FACTS THAT SETS FORTH THE REASONS THE PETITIONER BELIEVES THAT IMMEDIATE COMPLIANCE WOULD IMPOSE AN ARBITRARY OR UNREASONABLE HARDSHIP: The previous variance dated December 06, 2001 allowed

2 years for the City of Charleston to complete the design and construction of a new Water Treatment Plant. Design work was completed and construction bids were accepted on May 22, 2002. This work was completed on an appropriate time schedule to meet the conditions of the variance. The lowest bid was $11,202,800.00. The City elected to redesign the project in an effort to reduce the construction cost closer to the City's budget of $8,500,000.00. The second design was completed and construction bids were accepted on August 21, 2003. The lowest bid was $9,071,000.00. The City awarded that bid to River City Construction on September 30, 2003. The City of Charleston contends that accepting the initial $11,202,800 bid to meet the time lines of the December 06, 2001 variance would have resulted in an undue hardship of $2,131,800.

f)

1. DISCUSSION OF PROPOSED EQUIPMENT OR METHOD OF CONTROL TO BE UNDERTAKEN TO ACHIEVE FULL COMPLIANCE WITH THE REGULATION: The City of Charleston will construct a new water treatment plant including new solids contact basins for hardness and particulate (turbidity) removal, new recarbonation basins for pH adjustment, a new ozone contact basin for taste and odor control and new biologically active filters with granular activated carbon filters for particulate (turbidity) removal and taste and odor control. The finished water turbidity produced by the new plant is expected to be 0.1, or less, NTU 95% of the time - far exceeding the 0.3 NTU / 95% requirement of the IESWTR.

2. TIME SCHEDULE FOR THE IMPLEMENTATION OF ALL PHASES OF THE CONTROL PROGRAM FROM INITIATION OF DESIGN TO PROGRAM COMPLETION: The "Notice to Proceed" for the construction contract was

issued to River City Construction on October 24, 2003. The contract requires that construction be completed by April 27, 2005. The City of Charleston has also been required to complete a pilot study on the ozone and biologically active filter process for the new plant prior to permit approval for the ozone equipment. The April 27, 2005 completion date is expected to be delayed to June 30, 2005 for full completion including the ozone and biologically active filter processes.

3. ESTIMATED COSTS TO ACHIEVE COMPLIANCE: An itemized list of costs for the project includes:

Phase 1 Design, Black & Veatch	$96,384
Phase 2 Design, Black & Veatch	$775,000
Phase 1 Design, Crawford Murphy & Tilly	$40,000
Phase 2 Design, Crawford Murphy & Tilly	$699,300
Construction, River City Construction	$9,071,000
Construction Engineering, Crawford Murphy & Tilly	$260,000
Construction Engineering, Resident Engineer	$142,000
Pilot Study	$60,000
Bond Issuing Fees	$93,000
TOTAL COST	$11,236,684

g)

1. NATURE AND AMOUNT OF DISCHARGES OF THE CONSTITUENT IN QUESTION IF VARIANCE IS GRANTED, COMPARED TO THAT WHICH WOULD RESULT IF IMMEDIATE COMPLIANCE IS REQUIRED: The existing water treatment plant is capable of meeting a turbidity standard of 0.5 NTU's every

month. Continuing declines in water usage and continuing efforts to improve treatment process control has allowed the existing plant to meet the 0.3 NTU turbidity standard in 70%, or more, of the readings collected in 21 of the past 22 months.

2. QUALITATIVE AND QUANTITATIVE DESCRIPTION OF THE IMPACT OF PETITIONER'S ACTIVITY ON HUMAN HEALTH AND THE ENVIRONMENT: The City of Charleston will continue its efforts to achieve improved performance on the 0.3 NTU Turbidity Standard while awaiting construction of the new water treatment plant. There are no anticipated impacts on human health or the environment in the interim.

3. A STATEMENT OF MEASURES TO BE TAKEN DURING PERIOD OF THE VARIANCE TO MINIMIZE THE IMPACT OF THE DISCHARGE OF CONTAMINANTS ON HUMAN, PLANT, AND ANIMAL LIFE IN AFFECTED AREA, INCLUDING NUMERICAL INTERIM DISCHARGE LIMITATIONS THAT CAN BE ACHIEVED DURING THE PERIOD OF THE VARIANCE: The City will continue to comply with the 0.5 NTU Turbidity Standard. Specifically the City of Charleston will achieve turbidity readings of 0.544 NTU's or less, on 95%, or more, of the readings required to be taken in each calendar month. Furthermore, the City of Charleston will endeavor to achieve turbidity readings of 0.344 NTU's, or less, on 70%, or more, of the readings required to be taken in each calendar month for the duration of the variance.

h) CITATION TO SUPPORTING DOCUMENTS OR LEGAL AUTHORITIES WHENEVER THEY ARE USED AS A BASIS FOR THE PETITION: Not applicable.

i) PERMITS: The existing permits are included herein as Exhibit D.

4. ANY CONDITIONS PETITIONER SUGGESTS FOR THE REQUESTED VARIANCE: If the City fully complies with the measures outlined in (g) (3), it shall not be cited for violations pertaining to 0.3 NTU/95% turbidity requirement contained in Section 611.743, Part 611: Primary Drinking Water Standards of Subtitle F: Public Water Supplies regulations, 35 Illinois Administrative Code.

j) PROPOSED BEGINNING AND ENDING DATE FOR THE VARIANCE: The City of Charleston would like the variance to extend from January 1, 2004 until June 30, 2005.

k) DISCUSSION OF CONSISTENCY WITH FEDERAL LAW: A two (2) year time extension was provided for in Section 1412 (b) (10) of the 1996 Safe Drinking Water Act where major capital improvements are needed to comply with new regulations. The City must construct a new water treatment plant in order to comply with the new IESWTR, which is a major capital improvement. Section 1412 (b) (10) reads as follows: " A national primary drinking water regulation promulgated under this section (and any amendment thereto) shall take effect on the date that is three years after the date on which the regulation is promulgated unless the Administrator determines that an earlier date is practicable, except that the Administrator or a State (in the case of an individual system) may allow up to 2 additional years to comply with a maximum contaminant level or treatment technique if the Administrator or State (in the case of an individual system) determines that additional time is necessary for capital improvements." The City's second variance request is consistent with this federal provision since the City must construct a new treatment facility in order to comply with the regulations and the second variance is needed for the reasons stated herein.

l) AFFIDAVIT: The affidavit is enclosed.

m) STATEMENT REQUESTING OR DENYING HEARING: Petitioner requests hearing in this cause.

Wherefore, the City of Charleston, Illinois prays that this honorable Board grant the variance as requested herein and for such other and different relief the Board finds as appropriate.

DATED THIS 30 DAY OF December, 2004.

CITY OF CHARLESTON, ILLINOIS

By: ____________________

Its Attorney

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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	)	
Petitioner,	)	
	)	
v.	)	PCB ___ - ___
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	)	Variance – IESWTR
ILLINOIS ENVIRONMENTAL	)	
PROTECTION AGENCY,	)	
	)	
Respondent,	)	

AFFIDAVIT

R. SCOTT SMITH, City Manager for the City of Charleston being first duly sworn under oath deposes and states as follows:

1. That this affiant, if called as a witness could competently testify to the contents of this affidavit.
2. That this affiant, is the City Manager for the City of Charleston, Coles County, Illinois.
3. That this affiant, has read the contents of the Petition for Variance for which this affidavit is filed in support, is familiar with the factual assertions contained therein and the same are true and correct.
4. Further this affiant saith not.

DATED this 30 day of December 2003.

R. Scott Smith, City Manager

Subscribed and Sworn to before
me this 30th day of December 2003.

Jeanette L. Combs
Notary Public

OFFICIAL SEAL
JEANETTE L COMBS
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES:08/09/06

EXHIBIT A

CITY OF CHARLESTON WATER TREATMENT PLANT
TURBIDITY DATA SUMMARY
JANUARY, 1998 TO MAY, 2001

MONTH		1998			1999	
	Total Measurements	Total Measurements below 0.3 NTU	Percent of Measurements below 0.3 NTU	Total Measurements	Total Measurements below 0.3 NTU	Percent of Measurements below 0.3 NTU
January	286	250	87.41%	241	173	71.78%
February	266	228	85.71%	231	148	64.07%
March	280	186	66.43%	242	141	58.26%
April	293	121	41.30%	273	126	46.15%
May	283	96	33.92%	282	183	64.89%
June	283	242	85.51%	278	261	93.88%
July	310	297	95.81%	283	256	90.46%
August	312	262	83.97%	281	280	99.64%
September	287	117	40.77%	287	283	98.61%
October	280	197	70.36%	289	288	99.65%
November	243	163	67.08%	253	250	98.81%
December	244	209	85.66%	223	174	78.03%
AVERAGE			**70.33%**			**80.35%**
MINIMUM			**33.92%**			**46.15%**

MONTH		2000			2001	
	Total Measurements	Total Measurements below 0.3 NTU	Percent of Measurements below 0.3 NTU	Total Measurements	Total Measurements below 0.3 NTU	Percent of Measurements below 0.3 NTU
January	247	95	38.46%	251	205	81.67%
February	241	154	63.90%	330	223	67.58%
March	246	234	95.12%	336	313	93.15%
April	262	230	87.79%	340	265	77.94%
May	251	231	92.03%	340	250	73.53%
June	252	248	98.41%			
July	255	233	91.37%			
August	281	278	98.93%			
September	260	243	93.46%			
October	282	278	98.58%			
November	232	218	93.97%			
December	238	217	91.18%			
AVERAGE			**86.93%**			**78.77%**
MINIMUM			**38.46%**			**67.58%**

EXHIBIT B
DESIGN MEMORANDUM

The mezzanine level of the conditioned area will consist of the lime feed room, administrative areas, including the plant superintendent's office, a control station, an operators laboratory restroom/locker facilities, a small multipurpose meeting room/lunchroom, and a gallery overlooking the filters and unconditioned area. A wall consisting of glass panels will separate the mezzanine level from the unconditioned area. Two doors will provide access to catwalks located in the unconditioned area.

The lime silo will be located on the roof of the building above the lime feed room. Slaked lime will be delivered to the mixing zone of each softening basin by gravity through troughs attached to the catwalks in the unconditioned area. Chemical feed lines and electrical conduit will also be attached to the catwalks.

The unconditioned area will contain all of the basins, filters, and the large equipment. A traveling bridge crane will access all of the equipment located in this area. The clearwells, future UV modules, washwater pumps, and high service pumps will be located in the basement at elevation 678. Two sets of stairs will lead to this lower area. A sump containing a small sump pump and larger emergency sump pump will transfer spilled water from this elevation to drains located on the operating floor above. The area directly above the basement level will be kept open to allow the bridge crane to access all equipment.

The operating floor of the unconditioned area will be at elevation 691. A two-foot tall concrete containment wall surrounds the perimeter of the operating floor to contain a catastrophic leak from one of the softening basins. The pre-engineered metal building will be constructed atop this wall.. The containment curb will also encircle the opening to the basement level to prevent leaks from reaching the lower level. The conditioned area will be located two feet higher than the operating floor of the non-conditioned area to prevent leakage from entering the chemical feed area. The large area drains will be designed to convey the spillage away from the building to the storm sewer system. All equipment, located on the operating floor, will be installed on two feet tall equipment bases to prevent damage from basin leakage.

The operating floor will contain two painted steel softening basins, two painted steel recarbonation basin, four cast-in-place concrete or packaged steel filter boxes, a painted steel flow splitter, ozone generation and injection equipment, and air/water backwash equipment. Space has been left for a future recarbonation basin, a future softening basin, and two additional filters. The future filters may be constructed at this time, without piping or media, to avoid future installation problems.

A loading dock, with an overhead door, will be provided for unloading equipment picked up by the travelling bridge crane. A personnel door will be located at the dock to provide access to the exterior of the building. A manual operated overhead door will be provided near the future softening basin to provide access for the future construction. The air/water backwash blowers and equipment will be located in a small room, with removable roof panels, to reduce noise. The existing engine generator will be relocated from the existing chemical feed building to a concrete pad outside the new operations building. The generator will be housed in a weatherproof enclosure.

Steel catwalks will be located at elevation 705.5, in the operating room, to provide operator access to the basins, filters, and flow splitter. The catwalks will support the electrical conduit and chemical feed lines to each process unit. Stairs will provide access from the catwalks to the operating floor. Any portion of the catwalk located over piping will contain a removable floor to allow the bridge crane to access the piping.

The travelling bridge crane will be mounted on tracks as close as possible to the building eaves. The crane will access any equipment located on the operating floor. Equipment located in the conditioned area on the mezzanine floor must be moved to the elevator and removed from the building through the chemical area unloading dock.

VI. WATER TREATMENT PLANT PROCESS COMPONENTS

The following paragraphs provide brief descriptions of the treatment process components. Provisions will be included in the design of the new facilities to accommodate the addition of another treatment train in the future. Hydraulic and design criteria are detailed in the next section of this design memorandum.

A. RAW WATER SUPPLY

The existing intake structure will be maintained. A new raw water pumping station will be constructed adjacent to the existing raw water pump station. The existing pump station will be demolished once the new pump station is operational.

The new raw water pump station will include space for four vertical diffusion vane can-type pumps; if the plant is expanded in the future, one of the smaller pumps will be replaced with a larger capacity pump. The two smallest pumps will be equipped with adjustable frequency drive units. The pumps will be housed in an insulated metal superstructure on a concrete foundation. Roof hatches will be provided over each of the pumps to facilitate removal.

The new pump station will have a designated electrical room for location of the electrical distribution equipment and adjustable frequency drives. The room will be air conditioned to maximize the operational efficiency of the drives. A 480 V power distribution panel will be provided for the AFDs and all infrastructure loads.

A programmable logic controller (PLC) will be provided at the pump station for monitoring and control of the pumps. The most likely means of communication between the PLC and the plant control system (PCS) will be over radio. This will allow the operators to monitor flow rates and maintain the pumping rates remotely.

The two existing 12-inch mains from the pump station to the treatment plant will be maintained. A new raw water flow meter will be provided upstream of the new flow splitter.

B. PRESEDIMENTATION BASINS

The existing 48-foot diameter softening basin will be converted for use as a presedimentation basin. The two smaller existing softening basins will be abandoned or demolished. A rapid mix chamber equipped with a mechanical mixer will be provided upstream of the presedimentation basin for chemical addition (alum). Provisions for feeding sodium hypochlorite to the rapid mix (for odor control in the summer) will also be included. To accommodate modified plant hydraulics, the elevation of the top of the existing basin walls will need to be raised several feet. The basin will be modified to increase the bottom slope to improve sludge collection. Piping will include provisions to allow bypassing around the presedimentation basin. The existing 4-inch sludge discharge piping will be replaced with 6-inch diameter piping. Flushing connections will be provided on the sludge piping to facilitate cleaning. Residuals will be discharged by gravity (if possible) to the modified lagoons for dewatering.

The presedimentation basin will be enclosed with an aluminum dome for security reasons.

C. FLOW SPLITTER

A new flow splitter will be provided at the head of the treatment process to split the flow equally between the treatment trains by the use of broad crested concrete weirs. Provisions for feeding alum (or ferric) and sodium hypochlorite at the flow splitter will be included.

D. SOFTENING BASINS

Water from the presedimentation basins will flow to two softening basins equipped with circular solids contact units. The equipment will include variable speed mixers and circular sludge collection equipment. Radial effluent launders with v-notch weirs will be furnished as a part of the solids contact basin equipment. Piping will be configured to allow either of the basins to be bypassed. The sludge piping will be sized at 6-inch diameter minimum, and will be equipped with automatic flushing connections. Residuals will flow by gravity (if possible) to the modified lagoons for dewatering.

Lime and alum feed points will be provided at the mixing well of each basin.

Each basin will be provided with walkways for access to the basin drive equipment located at the center of each basin.

E. RECARBONATION BASINS

Water from the softening basins will flow to two recarbonation basins where carbon dioxide will be added to stabilize the water. The basins will be baffled internally to minimize short circuiting.

Piping will be configured to allow bypassing of either recarbonation basin for maintenance. Provisions for draining each recarbonation basin will be included. A pH meter will be provided on the effluent of each recarbonation basin to control carbon dioxide feed rate.

F. OZONE CONTACTORS

Water from the recarbonation basins will flow to two ozone contact chambers.

A sidestream from the main process flow will be injected with a high concentration of ozone gas using eductors. The gas/liquid mixture will then be injected back into the main process stream just prior to the water entering the contact chamber. Ozone contact will be accomplished in a pipeline rather than a concrete basin. Ozone will be generated on-site from vaporized liquid oxygen (LOX). A junction structure will be provided downstream of the injection point to strip some of the unreacted dissolved ozone. Off-gasses from each contact chamber will be collected in the junction structure and routed through a common thermal-catalytic ozone destruct system before being discharged to the atmosphere. The junction structure will be equipped with a foam suppressant system consisting of spray nozzles. Calcium thiosulfate will be fed at the contact chamber effluent to quench any remaining dissolved ozone residual. Piping will be configured to allow bypassing of either ozone train for maintenance.

Each contact chamber will be equipped to allow sampling of dissolved ozone levels in multiple locations along the length of the chamber.

Because ozone gas is a very strong oxidant, all metallic materials used in construction, with the exception of reinforcing steel embedded in concrete, will be ANSI Type 316 stainless steel. The contact chamber will consist of ductile iron pipe lined with a high silica cement mortar.

G. FILTERS

Four deep bed, dual media filters will be provided. Each filter box will be equipped with air-water backwash, fiberglass wash water troughs, dual media (with granular activated carbon caps), and Leopold "Universal" or Roberts "Infinity" underdrains. The filters will also be equipped for filter-to-waste.

Polyphosphate (sodium hexametaphosphate) will be fed at the filter influent to minimize scaling of the filter media.

1. Filter Controls and Instrumentation. To support manual control, each filter will be provided with a valve control station wall-mounted along the filter gallery. Filter valves can be independently controlled by selector switches and push buttons on the station. In addition to manual control, a network communications port will be provided at each filter for connection of a single, mobile computer workstation for automatic control and monitoring of the filter valves by the plant control system. Filter controls will be electric operated butterfly valves. The following instrumentation will be provided for filter controls:

a. Loss of Head. A loss-of-head gauge and recorder will be provided at each filter. The gauge will measure loss of head across the filter. The output will be sent to the plant control system and will be one factor in determining when a backwash should be initiated.

b. Local-Remote Selector Switch. Each filter will be provided with a "Local-Remote" selector switch on the valve control station. In the remote position, operation is from the filter workstation. In the local position, selector switches located on the valve control station will operate the valves for each filter.

c. Filter Influent, Washwater Drain, Wash Water, Filter-to-Waste and Air Wash Supply Valves. Each of the noted valves will be provided with an "Open-Stop-Close" selector switch and position indicator. The valve operation will be programmed in the PCS to support automatic backwash operation.

d. Filter Effluent Rate Control. Each filter will be provided with a filter effluent rate set, rate set indicator, flow indicator, and "Auto-Close-Manual" selector switch for the rate control valve in the filter effluent piping. Each filter effluent will be equipped with a full body type venturi flow meter. The rate control valve will operate so that in "Auto", the flow rate from all filters will be maintained at an equal, predetermined (operator adjustable) setpoint while maintaining a set level in the filter influent piping. In "Manual", the flow rate from the individual filter will be maintained at the setpoint entered at the filter workstation. The "Close" setting will close the corresponding filter effluent valve.

e. Wash Water Supply. The common wash water supply header will be furnished with a rate control butterfly valve and full body type venturi flow meter. The PCS will control wash water rate set, rate set indicator, flow indicator, and "Increase-Decrease" functions. In local control, pushbuttons on a single valve control station will jog the valve operator open or closed to manually adjust the flow rate. In remote, the control system will maintain a preset position when there is no flow. The valve operation will be programmed to support automatic backwash operation. "Start-Stop" controls for the wash water supply pump will also be provided at the PCS.

Automatic backwashing will allow for only one filter to be backwashed at a time. To manually wash a filter, the "Local-Remote" selector switch for all filters must be in the manual mode. Automatic backwash will be initiated manually by the operator, after which the control system will implement the backwash sequence. Automatic backwash will include air scour and filter-to-waste cycles. In Remote-Auto mode, the plant control system will automatically initiate a filter backwash based on either elapsed time, loss of head, or turbidity level.

f. Turbidimeters. Each filter will be provided with a turbidimeter to monitor effluent turbidity. This information will be indicated and recorded at the plant control system.

H. WASH WATER FACILITIES

Wash water will be provided by a constant speed centrifugal pump that draws suction from the filter clearwell effluent piping, prior to chlorine addition. An emergency interconnect will be provided between the wash water supply header and the high service pump discharge header to provide a measure of redundancy in the event that the wash water pump is out of service. The emergency interconnect will be equipped with throttling valves or an orifice plate to regulate the pressure and prevent disruption of the filter media. Waste wash water will be discharged by gravity to the modified lagoons.

WASHWATER RECOVERY

Waste filter wash water and filter-to-waste water will be collected in a buried cast-in-place concrete equalization basin (wash water recovery basin). Recovered water will be pumped by two (one standby) submersible pumps, equipped with adjustable frequency drives, from the recovery basin to the head of the presedimentation basin. A magnetic flow meter will be provided on the pump discharge header. Wash water return pump operation will be automatically controlled based on level in the wash water recovery basin and the plant influent flow rate; manual control from the plant control room will also be provided. The wash water recovery basin will overflow to the existing surge lagoon. This Washwater Recovery Basin will be bid as an alternative. If the alternative bid is not accepted, the existing wash water surge lagoon will continue to be used in it's current condition.

I. LAGOONS

The eastern most existing sludge lagoon will be modified and converted into six to seven new smaller lagoons will be constructed in place of one of the existing lagoons. The lagoons will be narrow enough to allow dredging equipment to remove dewatered solids without having to enter the lagoons. Decant from the lagoons will be discharged to Lake Charleston if IEPA grants an NPDES permit. The need for pumping and pH adjustment of the decant will be evaluated during detailed design. The lagoon modifications will be bid as an alternative.

J. CLEARWELLS

Filter effluent water will be collected in two clearwells. Provisions will be included to allow either of the clearwells to be removed from service during operation. Water will flow from the clearwells to the existing treated water reservoir. Fluoride will be fed at the clearwell effluent. Sodium hypochlorite and ammonia will be fed at the reservoir influent. Level indication for the clearwells will be provided at the plant control room.

K. ULTRAVIOLET DISINFECTION

Provisions will be included on the clearwell effluent piping to allow the addition of ultraviolet disinfection modules in the future.

L. HIGH SERVICE PUMPING

A new high service pumping station will be provided, equipped with four horizontal centrifugal pumps. ~~The two smaller pumps will be equipped~~ with adjustable ~~frequency drives, the larger~~ pumps will be constant speed. The pumps will draw suction from pipeline connection to the treated water reservoir. The pumps will be provided with "Local-Off-Remote" selector switches. In "Remote", the pump operation will be controlled based on the level in the West elevated tank in the distribution system or manually from the plant control system. In "Local", the pump operation will be controlled locally at the pump. A full body type venturi flow meter will be provided on the high service pump discharge. Each pump discharge will be provided with an automatic check valve and an isolation valve.

A chlorine residual analyzer and pH meter will be provided for the high service discharge header, and will be indicated and recorded at the plant control room. Sodium hydroxide will be fed at the high service discharge header for pH adjustment. The corrosion inhibitor (Aqua Mag) currently used by the City will continue to be fed to the plant effluent.

M. CHEMICAL FEED

A loading dock area will be provided to facilitate chemical delivery. For bulk liquids, a control panel will be provided at the loading dock to indicate liquid level in the corresponding storage tanks. The following chemical feed system will be provided:

1. Lime. Lime will be delivered as 90% pure calcium oxide (quicklime) and stored in a roof-mounted dual cone steel bin at the softening basins. The bin will be filled from trucks equipped for pneumatic unloading. High and low level bin indicators, bin vibrators, and a dust collector will be provided on the bin. Lime will be fed by gravity from the bin to two gravimetric belt type feeder-slaker units. Slaked lime will be fed by gravity to the mixing zone of each basin through troughs. The troughs will be configured to allow one feeder to feed both basins (at a lower dose) at the same time under emergency conditions. Space will be provided for the addition of another lime storage and feed system for the third basin train in the future.

2. Alum. Alum will be delivered as a bulk liquid and will be stored in one new fiberglass storage tank located in the new chemical building. A concrete containment curb will be provided around the bulk storage tank. Two transfer pumps (one standby) will transport chemical from the storage tank to two day tanks. Alum will be fed from the day tanks by four (one standby) metering pumps. Space will be provided for additional bulk storage and a fifth metering pump in the future. Flushing connections will be provided on the alum piping to facilitate maintenance.

3. Sodium Hypochlorite. Sodium hypochlorite will be delivered as a bulk liquid and will be stored in one new fiberglass storage tank located in the new chemical building. A concrete containment curb will be provided around the bulk storage tank. Two transfer pumps (one standby) will transport chemical from the storage tank to two day tanks. Sodium hypochlorite

will be fed from the day tanks by three (one standby) metering pumps. Space will be provided for additional bulk storage and metering pumps in the future.

4. Carbon Dioxide. The existing carbon dioxide storage tank will be maintained. New direct gas feeders will be provided, each consisting of an electric modulating valve and flow meter for automatic control and a rotameter for manual feed capability. The feed equipment will be located at the recarbonation basins. Carbon dioxide feed rate will be controlled based on maintaining a predetermined pH at the recarbonation basin effluent.

5. Calcium Thiosulfate. Calcium thiosulfate will be delivered in 55 gallon drums as a 24 percent solution. Three metering pumps (one standby) will feed chemical directly from the drum (mounted on a hydraulic load cell type scale, to the ozone contact chambers effluent.

6. Polyphosphate. Polyphosphate (sodium hexametaphosphate) will be delivered as a bulk liquid and will be stored in one new fiberglass storage tank located in the operations building. A concrete containment curb will be provided around the bulk storage tank. Two transfer pumps (one standby) will transport chemical from the storage tank to two day tanks. Polyphosphate will be fed from the day tanks by two (one standby) metering pumps.

7. Sodium Hydroxide. Liquid sodium hydroxide will be delivered in two 330 gallon totes as a 25 percent solution. Containment will be provided for the totes to protect against accidental spills. Two metering pumps (one standby) will feed the chemical from the totes to the high service pump discharge header. Flushing connections will be provided on the sodium hydroxide piping to facilitate maintenance.

8. Ammonia. Anhydrous ammonia will be delivered in 150-pound pressurized cylinders. Four cylinder-mounted feeders (one standby) will feed the chemical directly from the cylinders, mounted on a hydraulic load cell type scale, to the reservoir influent piping.

9. Fluoride. Fluoride (hydrofluosilicic acid) will be delivered in a 330 gallon tote as a 23 percent solution. Two peristaltic type metering pumps (one standby) will feed the chemical from the tote to the clearwell effluent. Containment curb will be provided around the tote to protect against accidental spills.

10. Corrosion Inhibitor. Aqua Mag will be delivered as a solution in 55 gallon drums. Two peristaltic type metering pumps (one standby) will feed the chemical directly from a drum, mounted on a hydraulic load cell type scale, to the high service discharge piping.

N. ELECTRICAL

The plant's power distribution system consists of an incoming utility feed and an engine-generator servicing a double-ended motor control center (MCC) located in the basement of the Operations Building. In turn, this MCC feeds an MCC in the existing basin building and provides power to the raw water pumping station. The existing MCC will remain in service to feed remaining existing loads at the Operations Building. The incoming utility line will be relocated from its existing location near the high service pumping station to avoid a conflict with the new chemical feed facilities.

The motor control center (MCC) inside the existing basin building will be replaced with a new unit centrally located to the equipment that will remain in service after the expansion. The lack of working space required by the NEC and the environmental hazards caused by the lime dust are the main factors in determining replacement. If an outdoor location is chosen, the unit will be provided with a NEMA 3R rated enclosure.

A new MCC will be provided in an electrical room located on the operating floor of the new building. All process and infrastructure equipment in the new building will be fed from this MCC. The new MCC will become the primary distribution unit and will feed the existing HSP MCC. The engine generator will be relocated and will tie-in to the new MCC with a mechanical interlocking scheme. Distribution power and lighting panels will be provided in centralized locations throughout the building to minimize conduit and cable runs. It is anticipated that the ozone generators and UV equipment will require isolation transformers to reduce harmonics introduced by the unbalanced loads on the power distribution system. The transformers will be located as near as possible to the equipment and will be rated for harmonics reduction. Pad-mounted transformers will be provided if located outdoors. The electrical room will be air conditioned for more efficient operation of the AFD's.

O. INSTRUMENTATION & CONTROLS (I&C)

The I&C system design will stress efficient monitoring and control of equipment and process conditions. The plant will be provided with two control system server/workstation computers located in the new control room. The servers will run commercially available MMI software, such as Intellution iFIX or Wonderware, and they will be set up in a dual-redundant arrangement to provide increased system reliability. In addition to the control room, it is anticipated that additional workstations will be provided in the new building office and the filter gallery. Network jacks will be placed in offices and other locations for future connections to the system. Communications between the servers and workstations will be on an Ethernet 10BaseT network.

The server/workstation computers will communicate with a network of PLCs distributed throughout the plant. PLC locations will be determined by process area and it is expected that they will be located at the raw water pumping station, chemical feed area, filter pipe gallery, and the control room. In addition, the ozone generation and future UV systems are generally provided with dedicated PLCs within manufacturer supplied control panels. All of the PLCs will be connected to the PCS over a data highway and will provide monitoring and limited control of the systems.

The City of Charleston or the contractor will be responsible for all PLC, MMI, and network software programming.

In general, all equipment will be operated in one or more of the following control modes:

Local Manual: The equipment is manually and locally controlled from the motor starter or a control station.

Remote Manual: The equipment is controlled manually through the PLC based on commands issued from a PCS workstation.

Remote Auto: The equipment is automatically controlled by the PLC based on process setpoints issued from the operator workstation. The PLC will automatically adjust process equipment to meet the setpoint.

An I&C workshop will be held at the beginning of the design phase. Different technologies and control level options will be introduced, and general control descriptions for each process will be completed.

VII. PROCESS AND HYDRAULIC DESIGN DATA

A. PUMPING EQUIPMENT

Raw Water (Reservoir) Pumps	
Number	4 (one standby)
Rated Capacity, each	2 @ 1.5 mgd, 1 @ 2 mgd, 1 @ 5 mgd (standby)
Rated Head, feet	135
Type	Vertical diffusion vane, can type
Power Supply	480V, 3 phase, 60 Hz
Motor	2 @ 50 hp, 1 @ 100 hp, 1 @ 200 hp
Control	Adjustable frequency drive on two smallest pumps; others will be constant speed.
Sludge Recirculation Pumps	
Number	2
Rated Capacity, each, gpm	100
Rated Head, feet	10
Type	Horizontal end suction centrifugal
Power Supply	480V, 3 phase, 60 Hz
Motor	½ hp
Control	Constant speed
Ozone Sidestream Injection Pumps	
Number	3 (one standby)
Rated Capacity, each, gpm	175
Rated Head, feet	25

Type	Horizontal centrifugal
Power Supply	480V, 3 phase, 60 Hz
Motor	2 hp
Control	Constant speed

Wash Water Supply Pump

Number	1
Rated Capacity, gpm	4060
Rated Head, feet	25
Type	Horizontal centrifugal
Power Supply	480V, 3 phase, 60 Hz
Motor	40
Control	Constant speed

High Service Pumps

Number	4 (one standby)
Rated Capacity, each	2 @ 1.5 mgd, 1 @ 2 mgd, 1 @ 5 mgd (standby)
Rated Head, feet	200*
Type	Horizontal centrifugal
Power Supply	480V, 3 phase, 60 Hz
Motor	2 @ 75 hp, 1 @ 100 hp, 1 @ 250 hp
Control	Adjustable frequency drive on two smallest pumps; others will be constant speed.

*Evaluation of system losses or existing pump discharge head is required to verify rated head of new pumps.

Wash Water Return Pumps (optional bid item)

Number	2
Rated Capacity, each, gpm	350
Rated Head, feet	35
Type	Submersible
Power Supply	480V, 3 phase, 60 Hz
Motor	5 hp
Control	Adjustable frequency drive

B. HYDRAULIC DESIGN DATA

Plant Capacity

Design, mgd	5
Minimum, mgd	0.5
Average, mgd	2.5
Ultimate, mgd	7.5

Plant Influent (existing)	
Number	2
Diameter, inch	12
Flow, each, mgd	
Design	2.5
Ultimate	3.5
Velocity, fps	
Design	4.9
Ultimate	7.4
Flow meter (new)	
Number	1
Size, in	16
Type	Magnetic

Presedimentation Rapid Mix	
Number	1
Design capacity, mgd	5
Width, ft	5.5
Length, ft	5.5
Side water depth, ft	8
Side wall depth, ft	9
Detention time, seconds	30
Mixer type	Vertical shaft, turbine or propeller
Minimum velocity gradient at 32 F, sec^{-1}	500
Power supply	480 V, 3 phase, 60 hz
Motor	50

Presedimentation Basin	
Number	1 (convert existing softening basin)
Design capacity, mgd	5
Diameter, ft	48
Straight side wall depth, ft	13.25 (raise sidewalls for new plant gradient)
Depth at center of basin, ft	23.75
Detention time, minutes	73 (49 minutes at 7.5 mgd)
Equipment type	Circular sludge collector
Power supply	480 V, 3 phase, 60 hz
Weir type	Peripheral

Softening Basins	
Number	2 initial, 1 future
Design capacity, mgd	2.5
Diameter, feet	41
Side water depth, ft	12.5

Side wall depth, ft	13
Water depth at center, ft	14.5
Detention time, minutes	60 (minimum)
Equipment type	Upflow solids contact
Flocculation zone detention time, min	30 (minimum)
Design surface loading rate @ 2 ft below water surface, gpm/sf	1.5
Weir type	Radial launders, v-notch
Design weir overflow rate, gpm/ft	20 (maximum)
Mixer	
Power supply	480 V, 3 phase, 60 hz
Motor	20 hp
Speed adjustment	Adjustable frequency drive
Sludge collection	
Power supply	480 V, 3 phase, 60 hz
Motor	1 hp
Recarbonation Basins	
Number	2 initial, 1 future
Design capacity, each, mgd	2.5
Diameter, ft	23.5
Side water depth, ft	11
Side wall depth, ft	12
Detention time, minutes	20
Ozone Generation System	
Type of generation	Liquid oxygen
Type of dissolution	Sidestream injection
Number of generators	2 (one standby) (3 total ultimate)
Design capacity, each, mgd	5
Design ozone production capacity, each, lb/d	150
Average ozone dose, mg/L	3.5
Design ozone concentration at design production capacity, percent	10
Design ozone transfer efficiency, percent	93
Cooling water system type	Open loop
Ozone Contact Chambers	
Number	2 initial, 1 future
Design capacity, each, mgd	2.5
Type	Pipeline reactor
Diameter, inches	54
Length, ft, each	150

Detention time, minutes	10
Liquid Oxygen Storage	
Number	1
Type	Pressurized, steel, vertical
Design capacity, gal	3,000
Days storage at avg dose, avg flow	68
Vaporizors	
Number	2
Type	Ambient, 12 hour duty
Filters	
Number	4 initial, 2 future
Size of filter bed, ft x ft	14'9" x 14'9"
Water depth above media, ft	5 ft minimum
Capacity, mgd, each	1.25
Design loading rate, gpm/sf	4.0
w/ 1 filter out of service	5.33
Filter underdrain, type	Leopold or Roberts, HPDE, dual lateral
Valve type	Butterfly, electric actuated
Effluent flow meter type	Full body venturi
Filter media, type & depth	
Granular activated carbon	48 inches
Sand	12 inches
Support gravel	12 inches
Filter to waste	
Design rate, each, mgd	1.25
Design duration, minutes	10
Volume per waste cycle, gal	8,680
Clearwell	
Number	2
Capacity, each, gallons	41,000 minimum
Sidewater depth, feet	10
Wash Water Supply	
Design water rise rate, in/min	30
Design bed expansion, percent	50
Design flow, mgd (gpm/sf)	6.3 (18.7)
Design wash duration, minutes	10
Volume per wash, gallons	40,600
Flow meter type	Full body venturi
Rate control valve type	Butterfly valve, electric actuated

Backwash Air	
Number of blowers	2
Design flow rate, each, scfm/sf	5
Air flow rate, scfm	1085
Wash Water Recovery Basin (optional bid item)	
Number	1
Capacity, gallons	100,000
Residuals Storage Lagoons	
Average solids production, dry lbs per mgd	3,400
Avg solids concentration, percent	
Lagoon influent	4
Dewatered in lagoon	18
Storage volume required, annual, cf	
at 2.5 mgd average flow	332,000
at 5 mgd design flow	664,000

C. CHEMICAL FEED

The average and maximum dosages are based on the current average and maximum dosages for those chemicals currently used at the plant. New chemical feed systems will be designed for the maximum expected dose at the design flow capacity of the facility. New chemical storage facilities will be designed to provide a minimum of 30 days storage at average dose and average flow capacity for all chemicals except lime. The storage volume for lime and carbon dioxide is based on providing approximately 14 days of storage.

1. Lime

Form	Quicklime, 90% pure
Density, lb/cf	60
Application points	Softening basins
Avg dose, mg/l	
as 90% CaO	165
as $CaCO_3$	266
Average feed rate, lb/d as 90% CaO at avg flow, avg dose	3,440
Max dose, mg/l as 90% CaO	212
Max feed rate, lb/d as 90% CaO at max flow, max dose	8,840
Storage	
Number of silos	1
Capacity, tons	24
Days storage at avg flow, avg dose	14

Feeder/slakers	
Number	2 (one existing)
Type	Gravimetric feeder, paste type slaker
Capacity, each, lb/hr	200

2. Aluminum Sulfate (Alum)

Form	8 percent Al_2SO_4
Density, lb/gal	11.1 (5.34 lb alum/gal soln)
Application points	Presedimentation basin (alternative – flow splitter), and softening basins
Avg total dose, mg/l as Al_2SO_4	33
Avg total feed rate, gal/hr solution at avg flow, avg dose	5.4
Max total dose, mg/l as Al_2SO_4	55
Max total feed rate, gal/hr solution at max flow, max dose	17.9
Storage	
Number	1
Type	Fiberglass, bulk tank
Capacity, each, gallons	4,400
Days storage at avg dose, avg flow	34
Transfer pumps	
Number	2
Type	Magnetic drive centrifugal
Capacity, ea, gpm	10
Motor	Constant speed, 1/4 hp
Time to fill day tank, minutes	10
Day tank	
Number	2
Type	Fiberglass
Capacity, ea, gallons	100
Metering pumps	
Number	4 (one standby)
Type	Peristaltic
Capacity, ea, gpd	129 (presedimentation basin) 150 (each softening basin)

3. Sodium Hypochlorite

Form	Liquid, 12.5%
Density, lb/gal	10 (1.04 lb Cl_2 per gallon solution)
Application points	Flow splitter (optional) and reservoir influent

Avg dose, mg/l as Cl_2	3
Average feed rate, gal/hr of solution at avg dose, avg flow	2.5
Max dose, mg/L as Cl_2	10
Maximum feed rate, gal/hr of solution at max dose, max flow	16.7
Storage	
Number	1
Type	Fiberglass, bulk (full truck load)
Capacity, each, gal	4,400
Days storage at avg dose, avg flow	73
Transfer pumps	
Number	2
Type	Magnetic drive centrifugal
Capacity, ea, gpm	10
Motor	Constant speed
Time to fill day tank, minutes	10
Day tank	
Number	2
Type	Fiberglass
Capacity, ea, gallons	100
Metering pumps	
Number	2
Type	Peristaltic
Capacity, ea, gph	17

4. Carbon Dioxide

Type	100%, compressed gas
Application point	Recarbonation basins
Avg dose, mg/l as CO_2	37
Average feed rate, lb/d at avg dose, avg flow	771
Max dose, mg/L as CO_2	157
Maximum feed rate, lb/d at max dose, max flow	6,547
Storage	
Number	1 (existing)
Type	Insulated, refrigerated, steel, bulk
Capacity, lb	12,000
Days storage at avg dose, avg flow	15

Feeders	
Number	3 (one standby)
Type	Manual rotameter; electric throttling valve w/ mass flowmeter
Capacity, ea, lb/d	3,500

5. Calcium Thiosulfate

Type	Liquid, 24 percent solution
Density, lb/gal	10.38 (2.5 lb CaS_2O_3 per gallon solution)
Application points	Ozone contact chamber effluent
Avg dose, mg/l as CaS_2O_3	0.16
Average feed rate, gph at avg dose, avg flow	0.05
Max dose, mg/L as CaS_2O_3	0.48
Max feed rate, gph at max dose, max flow	0.33
Storage	
Number	1
Type	Drum
Capacity, each, gallons	55
Days storage at avg dose, avg flow	42
Metering Pumps	
Number	3 (one standby)
Type	Peristaltic
Capacity, ea, gph	0.17

6. Polyphosphate

Type	Liquid, hexametaphosphate, 10.7%
Application point	Filter influent header
Avg dose, mg/l as 100% hexametaph.	1.5
Average feed rate, gal/hr as solution at avg dose, avg flow	1.3
Max dose, mg/L as 100% hexametaph.	5
Maximum feed rate, gal/hr as solution at max dose, max flow	8.7
Storage	
Number	1
Type	Fiberglass, bulk
Capacity, each, gallons	4,800 (full truck delivery)
Days storage at avg dose, avg flow	154

Transfer pumps	
Number	2
Type	Magnetic drive centrifugal
Capacity, ea, gpm	10
~~Motor~~	Constant speed, 1/4 hp
Time to fill day tank, minutes	7
Day tank	
Number	2
Type	Fiberglass
Capacity, ea, gallons	70
Metering pumps	
Number	2 (one standby)
Type	Peristaltic
Capacity, ea, gph	8.7

7. Sodium Hydroxide

Type	Liquid, 25% solution
Density, lb/gallon	10.62 (2.66 lb NaOH/gal solution)
Application point	High service pump discharge
Avg dose, mg/l as 100% NaOH	2
Average feed rate, gph at avg dose, avg flow	0.65
Max dose, mg/L as 100% NaOH	5
Maximum feed rate, gph at max dose, max flow	3.3
Storage	
Number	2
Type	Lined steel, totes
Capacity, each, gallons	330
Days storage at avg dose, avg flow	42
Metering pumps	
Number	2 (one standby)
Type	Peristaltic
Capacity, ea, gph	4

8. Ammonia

Form	Anhydrous, 100%
Application point	Reservoir influent
Avg dose, mg/l as 100% NH3	0.8
Average feed rate, lb/d at avg dose, avg flow	17
Max dose, mg/L as 100% NH3	1.1
Maximum feed rate, lb/d at max dose, max flow	46

Storage	
Number	4
Type	Pressurized cylinders
Capacity, each, lbs	150
Days storage at avg dose, avg flow	35
Feeders	
Number	2
Type	Direct gas, cylinder mounted
Capacity, ea, lb/d	50

9. Fluoride

Form	23% H_2SiF_6 (17.4% F)
Density, lb/gallon	10.0 (1.83 lb F/gallon solution)
Application point	Clearwell effluent
Avg dose, mg/l as F	0.9
Average feed rate, gph at avg dose, avg flow	0.4
Max dose, mg/L as F	1.1
Maximum feed rate, gph at max dose, max flow	1.0
Storage	
Number	1
Type	Tote
Capacity, gallons	330
Days storage at avg dose, avg flow	32
Metering pumps	
Number	2 (one standby)
Type	Peristaltic
Capacity, ea, gph	1.0

10. Corrosion Inhibitor

Form	Solution; Aqua Mag
Density, lb/gallon	3.9 lb chemical per gallon of solution
Application point	High service pump discharge
Avg dose, mg/l as 100% chemical	0.9
Average feed rate, gph at avg dose, avg flow	0.2
Max dose, mg/L	1.1
Maximum feed rate, gph at max dose, max flow	0.49

Storage	
Number	3
Type	Drum
Capacity, each, gallons	55
Days storage at avg dose, avg flow	34
Metering pumps	
Number	2 (one standby)
Type	Peristaltic
Capacity, ea, gph	0.5

City of Charleston, IL
WTP Upgrade/Replacement Project
Facilities Inspection

B&V Project 49807.100
B&V File E-1
February 22, 2001
Revised February 23, 2001
Revised February 27, 2001

Purpose
Black & Veatch engineers Judy Winger and Stephanie Kelemetc inspected the existing water treatment plant and raw water intake pumping station on February 6, 2001. The inspection was conducted to assess the current conditions of the facility and evaluate the feasibility of incorporating them into the improvements proposed for the plant. The findings and recommendations from this inspection are presented below.

Electrical Distribution
The water treatment plant (WTP) power distribution system consists of a single incoming overhead line from AmerenCIPS. Three single phase pole-mounted transformers step-down the delivery voltage to 480 V. The pole is located in the access drive area for the Chemical Feed Building making it difficult for delivery trucks to maneuver. A service disconnect switch and meter enclosure are panel mounted adjacent to the transformers. The disconnect and meter appear to have been in use for some time. The enclosures show signs of rust but are in fair condition. The transformers appear fairly new and well maintained. The WTP staff indicate that persistently high voltage is the only power quality problem that they have experienced on the line side. The WTP is at the end of the AmerenCIPS distribution system, and the electric utility has had to boost the delivery voltage to maintain their system. Voltage measurements at individual motors are consistently 504-510 V. Continuously high voltage can reduce the overall efficiency of the motors and shorten their service life. AmerenCIPS also provides a second electric service feed to the Aeration Building near the raw water intake.

The WTP has an on site engine-generator that provides emergency backup power. The generator is rated at 480 V, 600 kW. The generator is cycled once each month and loaded approximately twice each year. A lack of substantial recent power outages has precluded the need to operate the generator as a backup. WTP personnel have observed during regular maintenance service that the engine-generator appears to be oversized for the present distribution system. The generator is not fully loaded when exercised.

The main power distribution panel is a motor control center (MCC) located in the Electrical Room in the basement of the Filter Building. The engine-generator and several control panels are also located in the room. The MCC is vintage mid-1980's and is in good condition. The MCC has a main-main configuration with kirk-key interlocks. The engine-generator is not equipped with an automatic transfer switch and, thus, power must be manually transferred in the event of an outage. Engine-generator controls, lighting panelboards, and various motor starters are part of the MCC lineup. Mechanical metering is available on the engine-generator line. However, there are no mechanical or solid-state metering options on the incoming utility main. The Electrical Room is equipped with a monorail and hoist for equipment handling.

The Filter Building MCC provides power to a second MCC located in the Rapid Mix/Lime Building. This MCC is in poor condition due to its age and proximity to nearby lime feed equipment. The MCC is located on the south interior wall of the building with approximately 3 feet of working space between the MCC and the lime feed equipment. Lime dust and equipment wash-down have attributed to cabinet and component corrosion. The lack of adequate working space around the MCC represents a potentially hazardous situation.

Panelboards and dry-type transformers are located in each MCC for various 120 V loads, including lighting and instrumentation. WTP personnel indicated that the existing circuit schedules need re-evaluation and updating. It is difficult to isolate circuits for equipment maintenance due to panel schedule misinformation.

Raw Water Pumping Station
The Raw Water Pumping Station is located near the Lake Charleston raw water intake. The building is in fair to poor condition. The building's plywood ceiling is rotting and delaminating, and floor drainage and ventilation are very poor. The two raw water pumps appear to be at least 30 years old. The largest raw water pump has been totally overhauled within the past 10 years. Only the motor for the smaller pump has been overhauled within this time period. Both pumps are constant speed units. The WTP must typically be shut down several times each day, whenever the treated water demands are less than the capacity of the smallest raw water pump, to prevent overflowing of the treated water reservoir. This practice of intermittent WTP operation results in poor filter performance.

The raw water pumps are powered from the Filter Building MCC. The electrical equipment in the pumping station is in extremely poor condition. There is standing water in the building as a result of leaking/spraying pumps. The motor starters are inaccessible from a safety aspect. If maintenance is required, personnel must stand between the pumps and in the water. The pump motors overheat and cut-out in the summer due to poor ventilation.

The raw water intake structure is located in a corner of the lake that has caused deep deposits of silt to form around the structure. Consequently, only the highest of the intake screens are usable. The ability to deliver high quality raw water to the WTP is diminished by the location of the intake, the shallow depth of water around the intake, and the inability to draw water from the lower intake screens.

Considering the age and the lack of variable speed capability for the existing raw water pumps, the condition of the building, and the location and limitations of the existing intake, the existing intake facilities should be abandoned and a new intake and raw water pumping station should be constructed or the City should dredge around the existing intake and construct a new raw water pump station.

Rapid Mix/Lime Building
The plant's influent piping enters the rapid mix chamber in the lower level of this building. Insufficient space for straight pipe runs on either side of the existing raw water flow meter probably results in inaccurate flow measurements. The distribution of flow from the rapid mix chamber to the softening basins is determined by hydraulic friction and fitting losses in the piping. There is no positive means for measuring the flow to each basin, or for producing a uniform distribution of the flow to the three basins. The situation results in non-uniform hydraulic loading of the softening basins and diminished overall basin performance.

The WTP has a single lime feed system with no spare or redundant automatic feed equipment on line. When equipment problems inevitably occur, the plant staff must feed lime manually from bags. The existing lime feed equipment appears to be in generally good condition.

The poor and potentially hazardous condition of the MCC located in the Rapid Mix/Lime Building was previously described. Several control panels and drives associated with the lime equipment are located along the interior south wall. These panels are in better condition than the MCC. The alum feed pump and booster pump and piping located in the basement of the Rapid Mix/Lime Building are in poor condition and corroded. The alum feed system has no standby pump. The basement area is very damp and poorly ventilated.

The superstructure of the Rapid Mix/Lime Building has significant cracking in the masonry walls and large cracks in the concrete operating level floor slab.

Softening Basins

The plant has three IDI Accelator type basins for lime softening. The two original basins are approximately 28 feet in diameter; the third basin, added under a subsequent plant expansion, is 48 feet in diameter. The basins are not covered and, consequently, collect fallen leaves and other windblown debris that tends to plug the sludge piping. The concrete basins are in generally good condition, with some cracking and spalling around the top perimeter. The southern-most basin is partially exposed above grade and exhibits cracking and calcification in the exposed wall, indicating potential leakage. Some cracking and leakage are also apparent in the basin walls exposed in the gallery below the lime building. The basin equipment itself appears to be in good condition with minor corrosion in isolated locations. Plant staff indicate that the gearboxes have had to be replaced several times. Each basin drive unit has a motor and motor starter located on the basin walkway. The motors and starters appear to be in good condition. Conduit to the equipment is painted galvanized steel. *Each basin has a temporary submersible de-icing system.* Electrical cords to the probes are strung along the basin walkways. The basins are lit by a roadway light and a single basin mounted pole light.

The basin residual piping and valving is located in the basement of the lime building. The valves are equipped with timers set to blow down residuals approximately 10 minutes per hour per basin.

Recarbonation Basin

The existing recarbonation basin is located west of the softening basins, below the loading dock area. Due to the piping configuration leading into and out of the recarbonation basin, it appears that some short-circuiting may be occurring. In addition, the basin is too small to provide adequate reaction time. It is likely that calcium carbonate from the softening process is entering the filters and appearing as turbidity in the effluent samples. The water surface elevation of this basin is roughly 4 inches below the overflow elevation.

Filter Building

The Laboratory (Lab) is located in the west end of the Filter Building, on the main level. The east wall of the Lab has windows looking out onto the filters. Along this wall is also a row of chart recorders for the clearwell level and filter turbidities, selector switch control for the high service pumps and the chlorine feeders. The Lab has a desk with two computer workstations for data entry. Limited open counter space and work space is available for the lab staff to perform their duties.

There are two BIF Filter Consoles located in the Filter Gallery. Each console provides manual and timed control for two filters. The consoles have selector switches and indicating lights. Plant staff indicate that replacement parts for the filter controls are difficult to obtain, due to the age of the equipment. There is an analyzer transmitter at each console to provide local indication of filter turbidity. Due to the configuration of the parallel filter influent piping, the two western filters tend to get water directly from the large clarifier, and the two eastern filters tend to get water directly from the two smaller clarifiers. The turbidities for the two western filters tend to be higher than for the two eastern filters, indicating uneven loading of the clarifiers.

The four filters are equipped with approximately 18 inches of granular activated carbon (GAC) over approximately 12 inches of sand. The filter media is supported over the underdrain collection system by gravel support media. Backwash water is supplied by a pump located in the Pipe Gallery, which draws suction from the treated water storage reservoir. The filters are also equipped for surface wash. The surface wash pump takes suction from the high service pump discharge. The filter boxes are relatively shallow, making it difficult to adequately expand the media during backwash to provide effective cleaning without washing media out into the wash water troughs. The filters are generally backwashed at a rate of 2100 gpm (approximately 11 gpm/sf) for 15 to 20 minutes. Increasing the depth of the filter beds to improve performance would require raising the elevation of the filters and all treatment processes upstream.

The ammonia feed room is located east of the Filter Gallery, on the upper level. There is a gas detector outside of the room: however, it is located above eye level. The weight scale for the ammonia tanks has a mechanical readout only. Motor starters and other electrical equipment in the room are rusted and in poor condition. There are not any HVAC alarms associated with the gas detector.

Across the hall from the Ammonia Feed Room is a sample closet. There are several analyzers in this room, including Finished Water Chlorine and Finished Water Turbidity. They provide local indication and most of the units are in fair condition.

The High Service Pumps (HSP) are located between the Filter Building Electrical Room and the Pipe Gallery on the lower level. Two of the three pumps are constant speed. The third, and largest pump at 250 hp, has an adjustable frequency drive. The drive is located on the east wall of the pump room. The drive and motor are in good condition although there is little working room around the drive and it is not in an easily accessible area. The wash water pump, also constant speed, is located adjacent to the high service pumps. The filter surface wash pump is situated directly on the floor, adjacent to the south wall of the high service pump area. The plant staff has indicated that the small high service pump is too small to meet system demands and keep the elevated tank full and, so, is rarely used. The suction inlets for all of these pumps are located several feet above the bottom of the treated water reservoir, causing priming problems if the pumps are stopped and the reservoir level is low. Plant staff indicate that the pumps require a high level of maintenance.

The plant compressed air system is located in the Pipe Gallery near the high service pumps. No sound attenuation material or acoustic enclosures have been provided; consequently, noise levels in the Pipe Gallery are very high.

The filter valves have pneumatic actuators, and are a mix of butterfly and gate valves. Plant staff have experienced problems with plugging of the air supply lines to the valve actuators. Each filter has a pressure analyzer and turbidimeter with transmitters mounted on the filter walls. The filter piping is in generally good condition and exhibits little corrosion, with the exception of several valves and some of the filter-to-waste piping. The filter effluent valve actuators on several filters appeared to be leaking. Adequate straight pipe length is not available on either side of the filter effluent flow meter, likely resulting in inaccurate readings.

Hydrofluosilic Acid and Phosphate feed pumps and drums are located on the north wall of the Pipe Gallery within a few feet of the filter piping. No containment curbs are available for either system, and emergency showers and eyewash stations are not readily accessible from the feed equipment. Both systems have electric weight scales and digital readouts.

A boiler is located in an open area in the basement to the west of the Pipe Gallery. The boiler electrical components appear in good condition. However, to meet current building code requirements, the boiler should be located in a separate room with adequate combustion air.

City of Charleston, IL
WTP Upgrade/Replacement Project
Facilities Inspection

B&V Project 49807.100
B&V File E-1
February 22, 2001
Revised February 23, 2001
Revised February 27, 2001

Chemical Feed Building
The Chemical Feed Building is located south of the Filter Building and Softening Basins, and houses the sodium chlorite storage and feed room, the chlorine dioxide feed room, and chlorine feed and storage room. The superstructure is in generally good shape with some minor cracking apparent in the masonry. Ventilation in this building will not meet current building code requirements. Emergency shower and eyewash stations are not readily accessible from the chemical areas.

The Sodium Chlorite Room is self-contained. The drum scale has dial indication and is not automated. The Chlorine Room is located at the west end of the building. There is a gas detector located at the exterior door but there are no alarm lights and horns. The chlorine tank weight scales have local indication only. HVAC in the room is minimal and consists of a ceiling fan, exhaust fan, and electric heater. The Chlorine Dioxide Room is located between the Sodium Chlorite Room and the Chlorine Room, and is directly open to the Chlorine Room via several missing masonry blocks in the dividing wall. The Chlorine Room is equipped with a davit crane; however, the room is very small and maneuvering chemical containers with the crane is difficult.

The carbon dioxide storage tank and evaporator are located adjacent to the Chemical Feed Building. The equipment appears to be in good condition although it is unknown at this point whether or not it can be automated. The bottom of the storage tank and some of the piping were covered with a coating of ice.

Lagoon Pump Stations
The pump station for the surge lagoon, which receives waste filter backwash water and residuals blowdown from the basins, is located on the west side of the surge lagoon. The pump station is equipped with two submersible pumps. The vault structure is cracking and the roof slab shows severe spalling. The electrical panels are mounted outside above the vault and are corroded.

The surge lagoon pump station pumps the residuals to the lime storage lagoons. The decant from these lagoons flows to a pump station located in a vault south of the eastern-most lime lagoon, from which it is pumped off site to the wastewater treatment plant. The vault structure appears to be in generally good condition. The electrical panels mounted above the vault show minor corrosion.

General

The plant has a telephone/paging system that appears to be in good operating condition. Lighting is less than adequate in some areas of the plant but for the most part is acceptable. If these areas of the existing building are incorporated into the final plan, it would be appropriate to replace the fixtures with newer more efficient models. Conduit is rigid galvanized steel. It is routed both exposed and concealed. No accurate records exist of concealed conduit locations. There are no major concerns over corrosion.

The plant has a freight elevator located in the northeast corner of the Filter Building, adjacent to the loading dock. The loading dock elevation is too low to facilitate unloading of delivery trucks; no dock leveling equipment is available. In general, limited facilities are available to assist plant staff in handling equipment throughout the plant.

Recommendations

It is recommended that the power distribution system receive attention during the plant upgrade/replacement. Preliminary alternatives indicate a driveway for chemical delivery in the location of the existing utility transformers. The service should be rerouted to accommodate traffic. B&V will coordinate with AmerenCIPS to determine the best location and alleviate to power quality problem.

The following paragraphs discuss modifications that should be made to the existing facilities if they are to be incorporated into the final plans for the expanded plant.

The Filter Building MCC is in good condition and is expected to remain in service. Automatic transfer between the utility and engine-generator would require extensive modifications to the existing controls and line-up. It is recommended that manual switchover capabilities be maintained. An automatic switchover can be incorporated upon future replacement of the MCC.

If the existing filters are maintained, the wash water trough elevation should be raised to allow for better media expansion during backwash. Changing filter valve actuators to electric operation rather than pneumatic should be considered. The filter control consoles should be replaced with equipment that allows for a higher level of remote monitoring and control. Raising the trough elevations may not be practical due to hydraulic profile limitations upstream.

The Laboratory should be increased in size to provide more open counter and work space for lab staff. This could be accomplished by expanding the room into the open space directly west of the Filter Building or, if the existing filters are not maintained, by constructing additional lab space over the west filter bay.

The Lime Building MCC should be demolished and replaced with an outdoor, protected aisle lineup. This will reduce the number of hazards and improve personnel safety. The existing arrangement does not meet National Electric Code (NEC) requirements. It is also recommended that the electrical equipment in the basement be replaced with NEMA 4x rated enclosures. This will extend the life of the units. An additional lime feeder/slaker and alum metering pump should be provided for reliability.

Basin drive equipment does not need replacement. The basins should be enclosed to prevent collection of windblown debris and for improved security. The basin residuals piping should be replaced with larger diameter piping, equipped with automatic flushing capability, to minimize plugging problems. A positive means of splitting flow between the basins, either by the use of weirs or throttling valves with flow metering, should be provided to optimize basin performance.

Additional recarbonation basin capacity should be provided to optimize stabilization of the water prior to filtration. Baffling should be provided in the recarbonation basin to minimize the potential for short circuiting.

It is recommended that upgrades be made to the Chemical Feed Building to meet code requirements in regards to personnel safety, including ventilation requirements, emergency shower and eyewash station, and accessibility. The electrical equipment appears to be in good condition. However, there is a need to provide further gas detection and alarm lights/horns.

Proposed modifications to the High Service Pumps include installation of additional adjustable frequency drives to assist in adjusting plant output to better follow system demands. Space in a conditioned room is at a premium. A location in the Electrical Room will be preliminarily ear-marked. The constant speed motors are not inverter duty rated. It is recommended that those to be driven by AFDs be replaced.

All equipment in the Raw Water Pump Station needs replacement. Initial evaluation indicates that AFDs for each pump may be beneficial in eliminating the need to shut the plant down when demand for treated water is less than the raw water pump capacity. The drives cannot be located in the existing pump station. A new building will need to be provided or they could potentially be located in the Aeration Building. One drawback to this option is modification that would be necessary to the existing building HVAC equipment to accommodate the additional heat load.

Automation is severely lacking at the WTP. Monitoring and controlling functions currently available to the staff are very limited and outdated. It is recommended that a plant control system, which includes programmable logic controllers (PLC), human-machine interfaces (HMI), and SCADA, be provided. There are several levels of automation and these are best addressed once the treatment process has been determined. As a general rule, all new equipment and instrumentation will be provided with automatic control and monitoring functions. Existing instrumentation that has digital/analog output capabilities will be interfaced with the plant control system. Remaining equipment, including the filter consoles, motor starters, and feed pumps, will be evaluated in respect to the automation philosophy and modified/upgraded appropriately.

A final item is the inclusion of the City's 1 MG water tower into the plant control system. The tower is located approximately 2 ½ miles from the plant. It is possible to integrate the tower's controls and monitoring instrumentation to the plant control system. A preliminary evaluation suggests that radio is the most likely option for communication between the two sites.

As apparent by the level of modifications required to upgrade the existing facility to meet the City's needs and comply with code requirements, it may be more practical and potentially more economical to construct all new facilities. A new facility would also simplify maintaining the plant in operation throughout the construction period, reducing the overall construction schedule and associated cost.

The opinion of probable construction costs for the improvements to the Charleston Water Treatment Plant is consistent with the level of engineering of the Design Memorandum The costs are estimated from the conceptual designs available at this time. Accuracy of estimates should not be assumed to be based on final design features. Costs were derived based on the information presented in the Design Memorandum. These costs include the construction of two 2.5 mgd treatment trains within a pre-engineered Operations building, the conversion of the existing 48-foot diameter softening basin for use as a presedimentation basin. The treatment trains in the operations building consist of a flow splitter, two softening basins, two recarbonation basins, ozone generation equipment, four dual media/deep bed filters, high service pumps, washwater supply and equipment, sludge pumps, chemical feed systems, electrical equipment , instrumentation and control equipment, and chemical feed systems. Costs for an UV disinfection system, lagoon modifications, washwater recovery basins, and a new scraper mechanism for the presedimentation basin have been included as optional costs. A discussion of the cost estimate is presented below.

General Requirements. Items included within general requirements are mobilization, supervision, equipment rental, temporary facilities, and temporary utilities needed during construction. These items can not be determined at this stage and have been roughly estimated to be approximately 7 percent of the total cost of construction.

Sitework and Yard Piping. Approximate quantities for site work and yard piping were developed based on the conceptual understanding of piping systems based on this design memorandum. Unit costs were derived from the RSMeans Building and Construction Cost Data, 58th Annual Edition, and from similar projects designed and constructed by Black & Veatch. Quantities are conceptual estimates.

Process Equipment (includes Piping, Pumps, Chemical Feed Systems, Electrical Systems, Instrumentation and Controls, and necessary appurtenances). Equipment costs were obtained from manufacturers where possible based on the process design developed in the Design Memorandum. If budget costs were not available from the manufacturer, equipment costs were developed based on similar projects designed and constructed by Black & Veatch as well as RSMeans Electrical Cost Data, 23rd Annual Edition. Electrical and Instrumentation costs were based on projects of similar size and complexity, adjusted to reflect expected electrician labor rates in Central Illinois based on input from various contractors and predicted based on a electrical system consisting of simplified controls, wiring and equipment arrangement. Costs are not based on full detailed specifications of actual equipment that will be furnished, rather manufacturers planning level of budget estimates.

Operations Building. Costs for the construction of a new operations building were derived from the RSMeans Building and Construction Cost Data, 58th Annual Edition, and from projects similarly designed and constructed by Black & Veatch. Cost is based on a conceptual floor plan and the expectation that during final design a more efficient, compact, layout will be accomplished requiring an enclosed area of approximately 21,000 square feet under roof.

Contingencies. A contingency has been added to the total probable construction cost to account for items which may have been inadvertently overlooked, underestimated, or seen as negligible. This contingency also allows for any unforeseen changes that may arise during the detailed design of the water treatment plant improvements.

CHARLESTON, ILLINOIS
WATER TREATMENT PLANT IMPROVEMENTS

DESIGN MEMORANDUM LEVEL
OPINION OF PROBABLE CONSTRUCTION COST
APRIL 24, 2001

SUMMARY OF COSTS	
GENERAL REQUIREMENTS	$470,000
SITEWORK	$225,000
YARD PIPING	$320,000
RAW WATER PUMP STATION	$230,000
RAPID MIX CHAMBER	$20,000
PRESEDIMENTATION BASIN	$130,000
FLOW SPLITTER	$15,000
SOFTENING BASINS	$505,000
SLUDGE PUMPING	$75,000
RECARBONATION BASINS	$85,000
OZONE GENERATION EQUIPMENT	$475,000
DUAL MEDIA/DEEP BED GAC FILTERS	$835,000
HIGH SERVICE PUMPS	$205,000
CHEMICAL FEED SYSTEMS	
LIME FEED	$100,000
ALUM	$40,000
SODIUM HYPOCHLORITE	$35,000
CARBON DIOXIDE FEED	$20,000
CALCIUM THIOSULFATE	$10,000
POLYPHOSPHATE	$35,000
SODIUM HYDROXIDE	$10,000
AMMONIA	$25,000
FLUORIDE	$10,000
CORROSION INHIBITOR	$10,000
LIQUID OXYGEN	$50,000
WASHWATER SUPPLY	$45,000
ELECTRICAL	$850,000
INSTRUMENTATION AND CONTROL	$580,000
OPERATIONS BUILDING	$1,290,000
SUBTOTAL - SUMMARY OF COSTS	$6,700,000
CONTINGENCIES	$600,000
TOTAL PROBABLE CONSTRUCTION COST	**$7,300,000**

OPTIONAL COSTS including General Requirements & Contingency

Lagoon Modifications	$400,000
UV Disinfection System	$400,000
New Scraper Mechanism in Presed. Basin	$215,000
Washwater Recovery	$225,000

B&V Project 49807.100
B&V File A

This memorandum provides the basis for the Construction Costs for the Charleston, Illinois Water Treatment Plant.

Item Description	Quantity	Unit	Unit Cost $	Total Cost $
GENERAL REQUIREMENTS				
Assume approximately 7 % of Total	470000			470,000
Total - General Requirements				470,000
Use				**470,000**
SITEWORK				
Bulk Excavation	5000	CY	10	50,000
Bulk Site Fill	5000	CY	7	35,000
Import Site Fill	1500	CY	20	30,000
Paving	2000	SY	30	60,000
Sidewalk	1800	SF	4	7,200
Seeding	3600	SY	1	3,600
Grading	9000	SY	1.25	11,250
Landscape		Lump Sump		25,000
Site Prep		Lump Sump		5,000
Miscellaneous		Lump Sump		2,500
Total - Sitework				229,550
Use				**225,000**
YARD PIPING				
24" DIP Pre-Sed Bypass	155	LF	100	15,500
18" x 24" Reducer	1	Each	2500	2,500
18" x 18" Tapping Sleeve and Valve	1	Each	7000	7,000
30" x 24" Tee	1	Each	3500	3,500
24" DIP to Flow Splitter	170	LF	100	17,000
24" DIP 90 Bend	2	Each	2850	5,700
24" x 16" Reducer	2	Each	2500	5,000
24" Wall Pipe	1	Each	3000	3,000
Wash Water Piping				
18" DIP Washwater Drain	170	LF	100	17,000
18" x 12" reducer	1	Each	1500	1,500
12" x 12" Tapping Sleeve and Valve	1	Each	6000	6,000
6" DIP WWRB to Splitter	375	LF	40	15,000

6" DIP Sludge to replace ex 4"	850	LF	40	34,000
6" DIP Force Main from Accelator	120	LF	40	4,800
6" Check Valve	2	Each	900	1,800
Valve Vault 4' Manhole	1	Each	5000	5,000
6" DIP Recarb Drain	100	LF	40	4,000
6" Gate Valve	6	Each	800	4,800
54" Ozone Pipe	335	LF	250	83,750
54" 90 Bend	4	Each	5000	20,000
Curb Inlet	3	Each	2500	7,500
24" RCP Storm Sewer	450	LF	100	45,000
Miscellaneous		Lump Sum		10,000
Total - Yard Piping				319,350
Use				**320,000**

RAW WATER PUMP STATION

Pumps - 4 Vert. Pumps various sizes				
5 MGD	1	Each	20000	20,000
2 MGD	1	Each	11150	11,150
1.5 MGD with AFD	2	Each	10000	20,000
Pump Installation		Lump Sum		9,000
Process Piping (from similar pump stations in Bloomington & Lakeville)				42,300
Structure (20 x 25 x $120/SF) (Bldg, Slab on grade, HVAC & Plumbing)				90,000
Wetwell		Lump Sum		25,000
Miscellaneous		Lump Sum		10,000
Total - Raw Water Pump Station				227,450
Use				**230,000**

PRESEDIMENTATION RAPID MIX

Assume 30 seconds at 0.8 mgd, 10 Hp mixer

Concrete Floor (1 CY x $350/CY)	350
Concrete Walls (4 CY x $450/CY)	1,800
Concrete Susp Slab (1 CY x $550/CY)	550
Rapid Mix Equip (From IWC Quote for 10 Hp Mixer)	15,000
Excavation (15 CY x $10/CY)	150
Backfill (11 CY x $7/CY)	100
Miscellaneous	2,500
Total - Rapid Mix Chamber	20,450
Use	**20,000**

PRESEDIMENTATION BASIN

Demolish Existing Equipment	5,000
Raise Existing Walls (28 CY x $450/CY)	12,600
Launder Suspended Slab (17 CY x $550/CY)	9,400
Launder Walls (15 CY x $450/CY)	6,800
V-notch Weir (135 LF x $40/LF)	5,400
Modify sludge hopper & sludge piping	13,000
Modify Inlet Piping	16,000
Aluminum Basin Cover (1810 SF x $30/SF)	55,000
Miscellaneous	2,500
Total Presedimentation Basin	125,700
Use	**130,000**

FLOW SPLITTER

Concrete Floor Slab (9 CY x $350/CY)	3,000
Concrete Walls (25 CY x $450/CY)	11,000
Miscellaneous	1,000
Total - Flow Splitter	15,000
Use	**15,000**

SOFTENING BASINS

Equipment Quote from IDI for 2 - 2.5 mgd basins	345,000
Equipment Installation (30% of material cost)	100,000
Painting (Based upon cost of $115000 to paint 130' basin)	60,000
Total - Softening Basins	**505,000**

SLUDGE PUMPING

Assume 1 pump per basin train plus 1 standby	
Three sludge pumps (similar pumps at Bloomington & Jo.Co.)	50,000
Piping	25,000
Total - Sludge Pumping	**75,000**

RECARBONATION BASINS

Equipment Quote from US Filter for 2 - 2.5 mgd basins)	40,000
Installation Cost 30% of material	12,000
Painting (Based upon cost of $115000 to paint 130' basin)	35,000
Total - Recarbonation Basins	87,000
Use	**85,000**

OZONE GENERATION EQUIPMENT

Based on quotes from various equipment suppliers	
Lox - Ozone generation equipment 2-5 mgd units @ 150lb/day	460,000
Miscellaneous	15,000
Total - Ozone Generation Equipment	
Use	**475,000**

DUAL MEDIA/DEEP BED GAC FILTERS

Unit price for filters is derived from the Eden Prarie MN plant (10mgd) unit price of $780/SF and the Fargo, ND (30 mgd) unit price of $670/SF. The unit price includes the structure, media, piping, and valves.
Charleston will have deeper beds and will use GAC instead of anthracite, therefore for budgetary estimates the unit price is adjusted to $825/SF.
Air/Water Backwash price is based upon Lakeville MN (10 mgd) cost of $171,600

Filters, including structure, media, piping, and valves:	
(870 SF x $825/SF)	717,750
Air/Water Backwash Equipment	100,000
Miscellaneous	17,500
Total - Dual Media/Deep Bed GAC Filters	835,250
Use	**835,000**

HIGH SERVICE PUMPS

Pumps - 4 Horiz. Pumps various sizes				
5 MGD	1	Each	27000	27,000
1 MGD	1	Each	15000	15,000
1.5 MGD	2	Each	12000	24,000
Pump Installation				30,000
Piping (from similar pump station in O'Fallon)				100,000
Miscellaneous				8,000
Total - High Service Pumps				204,000
Use				**205,000**

LIME FEED

Average dose of 165lb/mlb
Average feed rate of 165x8.34x2.5mgd = 3440
10 days storage = 24 tons
Use two 1000lb/hr feeders for redundancy

30 ton lime bin (from Fargo ND plant)	25,000
one 1000 lb/hr feeders (from Manhattan KS) (reuse exist)	45,000
Installation (incld relocation of ex feeder)	30,000
Total - Lime Feed	**100,000**

ALUM

Provide bulk storage tank and metering pumps feeding directly from tanks	
Avg. dose = 33lb/mlb x 8.34 x 2.5 mgd = 688.05 lb/day	
30 days storage = 4000 gallons (truckload)	
Storage Tank ($5/gallon x 4000 gallons)	20,000
Two metering pumps @ 10,000 each (from CO springs)	20,000
Total - Alum	**40,000**

SODIUM HYPOCHLORITE

Total - Sodium Hypochlorite	**35,000**

CARBON DIOXIDE FEED

Relocate ex tank and re-pipe to new basin train	20,000
Total - Carbon Dioxide Feed	**20,000**

CALCIUM THIOSULFATE

Based on drum feed system

Total - Calcium Thiosulfate	**10,000**

POLYPHOSPHATE

Requires bulk tank, day tanks, and pump

Total - Polyphosphate	**35,000**

SODIUM HYDROXIDE

Based on drum feed system

Total - Sodium Hydroxide	**10,000**

AMMONIA

Provide new scale for remote indication and new feeders

Scales (IWC Ford Road)	13,000
50lb/day feeder and ancillary equipment	5,000
Installation	7,000
Total - Ammonia	**25,000**

FLUORIDE

Reuse existing metering pump and add spare pump	
Spare peristaltic metering pump	5,000
Piping and Accessories	5,000
Total - Fluoride	**10,000**

CORROSION INHIBITOR

Based on drum feed system

Total - Corrosion Inhibitor	**10,000**

LIQUID OXYGEN

Recent projects indicate $30,000 for similar size tanks	30,000
Installation and Piping	20,000
Total - Liquid Oxygen	**50,000**

WASHWATER SUPPLY

Assume that the clearwell will be used for non-chlorinated backwash water

Provide one pump to supply water	30,000
Interconnect to High Service Pumping	10,000
Miscellaneous	5,000
Total - Washwater Supply	**45,000**

WASHWATER RECOVERY

Washwater Recovery Facilities will consist of a holding basin with washwater return pumping equipment.
The recovery facilities would be similar to Lakeville MN. The Lakeville filters measure 24'x24' compared to 15'x15' for the charleston filters, 40% of the Lakeville filters. The total cost for the washwater recovery basin for the Lakeville plant was $300000.
Assume that the washwater return pumping equipment can be downsized from Lakeville cost of $200,000 or 66%.

Washwater Recovery Basin	200,000
Total - Washwater Recovery	**200,000**

LAGOON MODIFICATIONS

Bulk Lagoon Excavation	12620	CY	10	126,200
Bulk Lagoon Fill	12620	CY	7	88,340
Import Fill	3060	CY	20	61,200
Grading	18000	SY	1.25	22,500
6" Pipe	210	LF	40	8,400
6" Valves	7	Each	800	5,600
Overflow Structure	7	Each	4000	28,000
Manholes	7	Each	2500	17,500
Drain Piping	210	LF	40	8,400
Total - Lagoon Modifications				**375,000**

ELECTRICAL

Raw Water Pump PS			
Power Distribution equipment			10,000
AFD - 2 @ 50 hp			20,000
Cable, condiut & misc			12,000
Ozone Generation equip			
Isolation Transformers	2		6,500
Filters			
Valve Control panels	3		10,500
High Service Pumps			
AFD - 2 @ 50 hp			20,000
Cable, condiut & misc			10,000
Chemical Feed modifications			
MCC w/outdoor enclosure	4	sections	100,000
Cable, condiut & misc			5,000
Washwater Return Equipment			
AFD - 1 @ 5 hp			5,000
Accelator, basin equipment, chem feed			
MCC and power distribution equip	8	sections	144,000
Cable, condiut & misc			50,000
Lights & Receptacles in Process Area			5,000
Miscellaneous			5,000
Installation Overhead and Profit			450,000
Total - Electrical			853,000
Use			**850,000**

INSTRUMENTATION AND CONTROL

Programmable Logic Controllers		
Chemical Feed Area	1	15,000
Filter Area	1	30,000
Raw Water Pumping Station	1	10,000
Ex. Equipment, Ozone	1	20,000
Workstations		
Office	1	5,000
Filter Area	1	5,000
Control Room	2	10,000
SCADA Software	1	40,000
Instruments		
Level Sensors	10	10,000
Magnetic flowmeters @ $1000/inch	100"	100,000
Analyzers	15	15,000
Miscellaneous		20,000
Installation, Overhead and Profit		300,000
Total - Instrumentation and Control		**580,000**

OPERATIONS BUILDING

200' x 105' x 30' eave height

Footings, Slab on Grade	600	CY	350	210,000
Gravel Floor Basement		Lump Sum		60,000
Funish and Install Shell	21000	SF Floor	12	252,000
Doors	16	Each	1000	16,000
Masonry Walls	6000	Sq Foot	12	72,000
Glass Walls		Lump Sum		6,000
Drywall Partitions	500	Sq Foot	8	4,000
Miscellaneous Metals	1	Lot		30,000
Floor/Ceiling finishes, painting, coatings	1	Lot		45,000
Elevator - Freight, Hydraulic (from Means Guide)				41,800
Plumbing	9000	Sq Foot	8	72,000
HVAC - conditioned areas	4500	Sq Foot	18	81,000
HVAC - electrical areas	250	Sq Foot	50	12,500
Ventilation - process areas	18000	Sq Foot	5	90,000
Unit price derived from O'Fallon WTP project, total price of $39500, for 10300 sq ft				
Fire Sprinkler System	45000	Sq Foot	3	13,500
Process Piping				125,000
Includes ozone piping, valves, piping between flow splitter, softening basins and recarb basins				
Bridge Crane				100,000
Miscellaneous				55,000
Total - Operations Building				1,285,800
Use				**1,290,000**

EXHIBIT C
CRYPTOSPROIDIUM AND GIARDIA DATA

ANALYSIS FOR WATERBORNE PARTICULATES

CH Diagnostic and Consulting Service, Inc.
214 SE 19th Street, Loveland, CO 80537
Keith W. Hancock, President
(970) 667-9789

Invoice 20010306

Laboratory Information
Federal Express; 5/30/01; 0930 Hrs; Good; Carboy
Results submitted by:
Tricia Klonicki

Customer 991024
City of Charleston
2600 McKinley
Chaleston, IL 61920

Sample Identification: Raw Tap, Raw water

Sample Information: SOURCE: Lake or Reservoir; Unchlorinated; pH 7.9; 20°C; 21.3 NTU

Sample Date & Time: 5/29/01 01:44 PM —» 5/29/01 01:45 PM **Sampler:** Bill Bosler

Amount: 11 L **Filter Color:** N/A **Filter Type:** Filta-Max™ Filter

Date/Time Eluted: 6/1/01 11:50 AM **Centrifugate:** 4.55 mL/100 L

RESULTS OF 1623 GIARDIA AND CRYPTOSPORIDIUM ANALYSIS

Amount of sample assayed: 11 L

		Total IFA Count	Empty	Amorphous Structure	1 Internal Structure	>=2 Internal Structure	Internal Structure	DAPI+ (nuclei stained)	DAPI+ (Intense internal staining)	DAPI-
Giardia	detected	0	0	0	0	0		0	0	0
	# / L	<0.09	<0.09	<0.09	<0.09	<0.09		<0.09	<0.09	<0.09
Cryptosporidium	detected	0	0	0			0	0	0	0
	# / L	<0.09	<0.09	<0.09			<0.09	<0.09	<0.09	<0.09

This sample was analyzed for *Giardia* and *Cryptosporidium* by the method outlined in: Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA. 1999. USEPA, Washington D.C., EPA-821-R-99-006. All limitations stated in the method apply. Detection limit calculated from volume assayed. If capsule or foam filter was received, method was modified by filtering sample through a Gelman Envirochek™ capsule or IDEXX Filta-Max™ filter at the sample site. If Microscopic Particulate Analysis was also performed, particulate extraction was modified.

EXHIBIT D
PERMITS

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
2200 Churchill Road, P.O. Box 19276,
Springfield, IL 62794-9276

Division of Public Water Supplies Telephone 217/782-9470

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

SUBJECT: CHARLESTON (Coles County - 0290100)

Permit Issued to:
Mayor and Council
520 Jackson Avenue
Charleston, Illinois 61920

PERMIT NUMBER: 1111-FY1997 DATE ISSUED: March 11, 1997
Proposed Improvement PROJECT LOG NUMBER: 97-1111

The issuance of this permit is based on plans and specifications prepared by the engineers/architects indicated, and are identified as follows:

FIRM: Mark E. Dwiggins, P.E.
NUMBER OF PLAN SHEETS: One
TITLE OF PLANS: "City of Charleston - North Tower Booster Sta"

PROPOSED IMPROVEMENTS:

Construct/install: Altitude valve and booster pump station (one pump of 900 gpm at 97.5 ft TDH) at the North Elevated Storage Tower; complete with controls and appurtenances

ADDITIONAL CONDITIONS:

1. There are no further conditions to this permit.

DD:RWB:tml

CC: Mark E. Dwiggins, P.E.
Champaign Regional Office

permit is issued for the construction and/or installation of the pub- ater supply improvements described above, in accordance with provisions of the "Environmental Protection Act," Title IV, Sections hrough 17, and Title X, Sections 39 and 40, and is subject to the ditions printed on the reverse side of this page and the ADDI- NAL CONDITIONS printed above.

Don Dillenburg, P.E.
Acting Manager, Permit Section
Division of Public Water Supplies

File

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY • DIVISION OF PUBLIC WATER SUPPLIES • PERMIT SECTION
2200 Churchill Road, P.O. Box 19276, Springfield, IL 62794-9276

The Agency is authorized to require the information under Ill. Rev. Stat., 1979, Chapter 111 1/2 Section 1039. Disclosure of this information is required and failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

APPLICATION FOR OPERATING PERMIT

1. Permit Issued to:
Mayor and Council
520 Jackson Avenue
Charleston, Illinois 61920

2. Subject: CHARLESTON (Coles County - 0290100)

3. Permit Number: 1111-FY1997 Date Permit Issued: March 11, 1997

4. Firm: Mark E. Dwiggins, P.E.

5. Title of Plans: "City of Charleston - North Tower Booster Sta"

6. Project Completion Date Thursday, March 27, 1997

7. Certified Water Supply Operator designated in responsible charge.

Name Mark Donnelly Class and Certificate Number A 5837

8. Certificate by Owner of Completed Project (or his agent)

I/We hereby certify that the project named and described in items 3 to 4 above has been constructed in accordance with the plans and specifications approved by the Illinois Environmental Protection Agency and will be operated in accordance with the provisions of the Illinois Environmental Protection Act and the Rules and Regulations adopted by the Illinois Pollution Control Board pursuant to provisions of the Act.

Name of Owner of the Completed Project City of Charleston, Illinois

520 Jackson Ave. Charleston Illinois 61920
Street City State Zip Code

Signature [signature] Date 3/27/97

Title Mayor

for IEPA use only — for IEPA use only — for IEPA use only

OPERATING PERMIT

This application when approved by the Illinois Environmental Protection Agency, constitutes the Operating Permit. This permit is issued under authority granted by the Illinois Pollution Control Board Regulations, 35 Ill. Adm. Code, Subtitle F, Part 602: Permits.

This Operating Permit, No. 1111- FY19 97/98 is issued on April 21, 1993 and is valid until revoked. This permit is valid only for the work completed under the Construction Permit named in item 3 of the application for this permit.

[signature]
Don Dillenburg, P.E.
Acting Manager, Permit Section
Division of Public Water Supplies

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
2200 Churchill Road, P.O. Box 19276,
Springfield, IL 62794-9276

Division of Public Water Supplies Telephone 217/782-9470

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

SUBJECT: CHARLESTON (Coles County-0290100)

Permit Issued to:
Mayor and Council
520 Jackson Ave.
Charleston, IL 61920

PERMIT NUMBER: 2064-FY1996
Proposed Improvement

DATE ISSUED: September 11, 1996
PROJECT LOG NUMBER: 96-2064

The issuance of this permit is based on plans and specifications prepared by the engineers/architects indicated, and are identified as follows:

FIRM: Mark Dwiggins, P.E.
NUMBER OF PLAN SHEETS: 5
TITLE OF PLANS: "PW-96-04 (Plans Approved as Location Sketches Only)"

PROPOSED IMPROVEMENTS:

Replace high service pump #1 at same location with new variable drive pump (capacity 1000-3000 gpm @ 250 ft. TDH)

ADDITIONAL CONDITIONS:

1. There are no further conditions to this permit.

DD:DD:dsv

CC: Mark Dwiggins, P.E.
Champaign Regional Office

RECEIVED
SEP 16 1996
By________

This permit is issued for the construction and/or installation of the pub- ter supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17, and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

Don Dillenburg, P.E.
Acting Manager, Permit Section
Division of Public Water Supplies

IL 532-0168

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

2200 Churchill Road, P.O. Box 19276,
Springfield, IL 62794-9276

Division of Public Water Supplies

Telephone 217/782-9470

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

SUBJECT: CHARLESTON (Coles County-0290100)

Permit Issued to:
Mayor and Council
520 Jackson Avenue
Charleston, IL 61920

PERMIT NUMBER: 1933-FY1996
Proposed Improvement

DATE ISSUED: August 20, 1996
PROJECT LOG NUMBER: 96-1933

The issuance of this permit is based on plans and specifications prepared by the engineers/architects indicated, and are identified as follows:

FIRM: Mark E. Dwiggins, P.E.
NUMBER OF PLAN SHEETS: 11
TITLE OF PLANS: "PW-96-03"

PROPOSED IMPROVEMENTS:

Install reservoir aeration and hydrogen peroxide feed systems

ADDITIONAL CONDITIONS:

1. There are no further conditions to this permit.

DD:DCC:dsv

CC: Mark E. Dwiggins, P.E.
Champaign Regional Office

This permit is issued for the construction and/or installation of the pub- ater supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17, and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

IL 532-0168
PWS 065 Rev. 6/93

Don Dillenburg, P.E.
Acting Manager, Permit Section
Division of Public Water Supplies

090-000

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
2200 Churchill Road, P.O. Box 19276,
Springfield, IL 62794-9276

Mark

Division of Public Water Supplies | Telephone 217/782-9470

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

CORRECTED PERMIT

SUBJECT: CHARLESTON (Coles County - 0290100)

Permit Issued to:
Mayor and Council
520 Jackson Avenue
Charleston, IL 61920

PERMIT NUMBER: 1849-FY1993 | DATE ISSUED: September 14, 1993
Proposed Improvement | PROJECT LOG NUMBER: 93-1849

The issuance of this permit is based on plans and specifications prepared by the engineers/architects indicated, and are identified as follows:

FIRM: Mark E. Dwiggins, City Engineer
NUMBER OF PLAN SHEETS: Four
TITLE OF PLANS: "PRZ Device & Booster Pump Installation for Chemical Feed"

PROPOSED IMPROVEMENTS:

Install reduced pressure zone backflow prevention device and a booster pump (35 gpm) to increase the water pressure and volume to the chemical feeders.

ADDITIONAL CONDITIONS:

1. There are no further conditions to this permit.

DD:JSK:jmm/405P/23

cc: Mark E. Dwiggins, City Engineer
Champaign Regional Office

This permit is issued for the construction and/or installation of the public water supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17 and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

Don Dillenburg

Don Dillenburg, P.E.
Acting Manager, Permit Section
Division of Public Water Supplies

IL 532-0188
PWS 05 (Rev. 2/88)

090-000

R 6/28/93

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

2200 Churchill Road, P.O. Box 19276,
Springfield, IL 62794-9276

Division of Public Water Supplies — Telephone 217/782-9470

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

SUBJECT: CHARLESTON (Coles County - 0290100)

Permit Issued to:
Mayor and Council
520 Jackson Avenue
Charleston, IL 61920

PERMIT NUMBER: 1694 - FY1993 — DATE ISSUED: June 24, 1993
Proposed Improvement — PROJECT LOG NUMBER: 93-1694

The issuance of this permit is based on plans and specifications prepared by the engineers/architects indicated, and are identified as follows:

FIRM: City of Charleston
NUMBER OF PLAN SHEETS: Specifications Only
TITLE OF PLANS: "Specifications Only"

PROPOSED IMPROVEMENTS:

Installation of: a finished water chlorine monitor and recorder; one finished water turbidity monitor and recorder and (4) filter water turbidity monitors and recorders.

ADDITIONAL CONDITIONS:

1. There are no further conditions to this permit.

DD:LMD:drk:278P/40

cc: City of Charleston
Champaign Regional Office

This permit is issued for the construction and/or installation of the public water supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17, and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

Don Dillenburg, P.E.
~~Donald E. Sutton, P.E.~~
Acting Manager, Permit Section
Division of Public Water Supplies

IL 532-0168
PWS 65 (Rev. 2/88)

090-000

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
2200 Churchill Road, P.O. Box 19276,
Springfield, IL 62794-9276

Division of Public Water Supplies — Telephone 217/782-9470

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

SUBJECT: CHARLESTON (Coles County - 0290100)

Permit Issued to:
Mayor and Council
520 Jackson Avenue
Charleston, IL 61920

PERMIT NUMBER: 1279 - FY1993 — DATE ISSUED: June 7, 1993
Proposed Improvement — PROJECT LOG NUMBER: 93-1279

The issuance of this permit is based on plans and specifications prepared by the engineers/architects indicated, and are identified as follows:

FIRM: Mark E. Dwiggins, City Engineer
NUMBER OF PLAN SHEETS: Specifications Only
TITLE OF PLANS: "Powdered Activated Carbon Eductor Feed System"

PROPOSED IMPROVEMENTS:

Install increased capacity carbon feed system

ADDITIONAL CONDITIONS:

1. There are no further conditions to this permit.

DD:DCC:drk:240P/85

cc: Mark E. Dwiggins, City Engineer
Champaign Regional Office

This permit is issued for the construction and/or installation of the public water supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17, and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

Don Dillenburg, P.E.
~~Donald E. Sutton, P.E.~~
Acting Manager, Permit Section
Division of Public Water Supplies

IL 532-0168
PWS 65 (Rev. 2/88)

090-000

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

2200 Churchill Road, P.O. Box 19276,
Springfield, IL 62794-9276

Division of Public Water Supplies — Telephone 217/782-9470

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

SUBJECT: CHARLESTON (Coles County - 0290100)

Permit Issued to:
Mayor and Council
520 Jackson Avenue
Charleston, IL 61920

PERMIT NUMBER: 1849 - FY1993 — DATE ISSUED: February 14, 1993
Proposed Improvement — PROJECT LOG NUMBER: 93-1849

The issuance of this permit is based on plans and specifications prepared by the engineers/architects indicated, and are identified as follows:

FIRM: Mark E. Dwiggins, City Engineer
NUMBER OF PLAN SHEETS: Four
TITLE OF PLANS: "RPZ Device & Booster Pump Installation for Chemical Feed"

PROPOSED IMPROVEMENTS:

Install reduced pressure zone backflow prevention device and a booster pump (35 gpm) to increase the water pressure and volume to the chemical feeders.

ADDITIONAL CONDITIONS:

1. There are no further conditions to this permit.

DD:JSK:jmm/405P/23

cc: Mark E. Dwiggins, City Engineer
Champaign Regional Office

This permit is issued for the construction and/or installation of the public water supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17, and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

Don Dillenburg
Don Dillenburg, P.E.
Acting Manager, Permit Section
Division of Public Water Supplies

IL 532-0168
PWS 85 (Rev. 2/88)

090-000