

CCA
Water Treatment
Alternatives
Evaluation

Wells #5 & #8



March 16, 2011



Agenda



- **Available Treatment Technologies**
 - UV Disinfection
 - Microfiltration Membranes
- **Needed Site Improvements**
- **Timing of Improvements**
- **Financing of Improvements**
- **Action Items**



Background



- **Violation Notice – received November 3, 2010**
 - For a failure to provide an assuredly safe source of raw water due to the presence of total coliform in Well #2, Well #5 and Well #8
- **Proposed CCA – submitted to IEPA on December 22, 2010**
- **IEPA Acceptance of CCA – received January 21, 2011**



Background (Continued)



- **CCA Items completed to date**
 - Disconnected Well #2 from system – January 28, 2011
 - Currently in progress on second CCA item - Submit evaluation of treatment options, commit to installation of one of the options at Well #5 and Well #8



Well No. 2 Well House Building



Farrell Road Pump Station Site

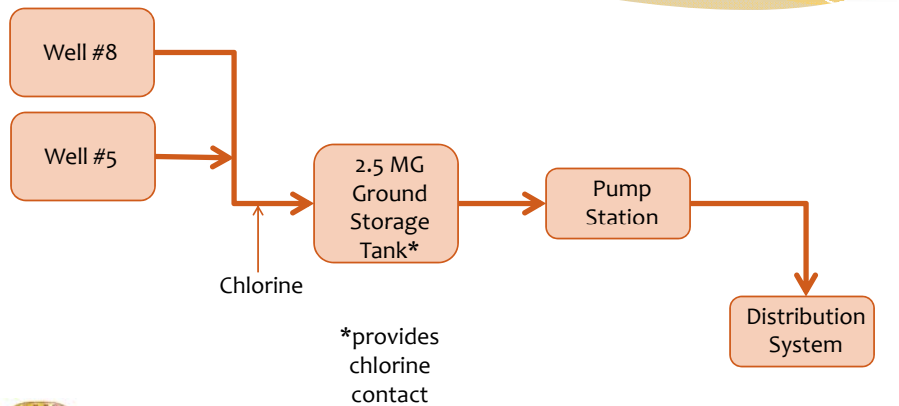
- **Farrell Road Pump Station site**
 - Well #5 and Well House #5
 - Well #8
 - 2.5 MG Ground Storage Tank
 - Pump Station
- **Well #5**
 - Constructed in 1973
 - VFD pump rated at 600 gpm
- **Well #8**
 - Constructed in 2000
 - VFD pump rated at 400 gpm
- **Wells #5 & #8 combine and discharge into the 2.5 MG Ground Storage Tank**
- **Chlorine is added to the combined well line prior to entering the tank**

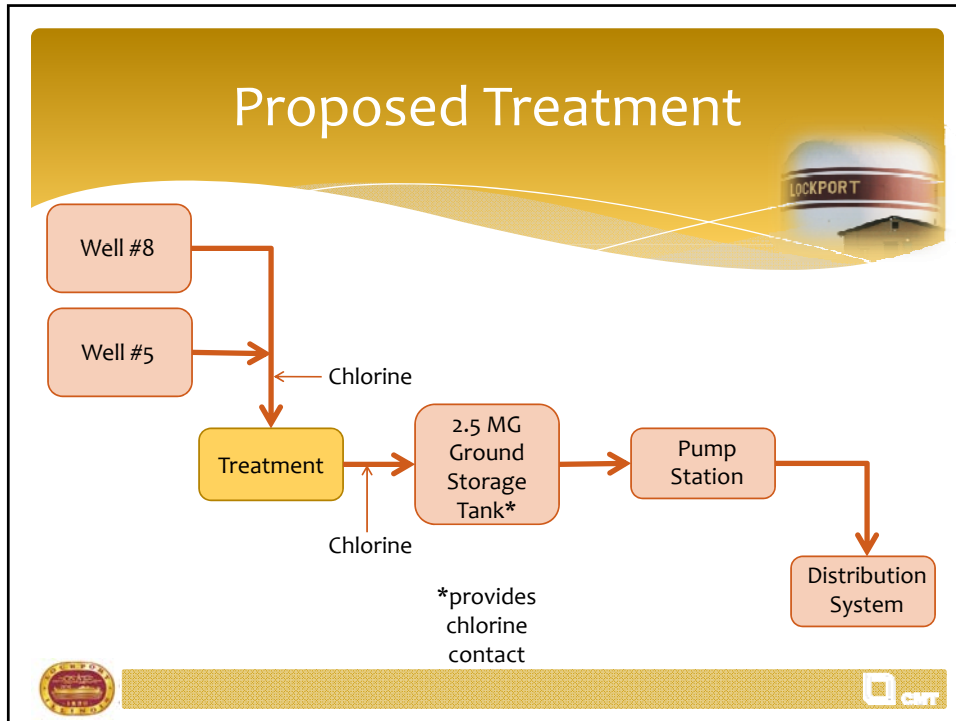


Well No. 5 Well House Building in foreground, 2.5 MG Ground Storage Tank in the background



Existing Operation





Available Treatment Technologies

(Continued)

- **UV Disinfection**
 - UV light penetrates cell wall
 - UV permanently alters the DNA structure of the microorganism
 - The microorganism is “inactivated” and unable to reproduce or infect
 - Inactivation effectiveness of UV peaks at 254 nm

Trojan UVSWIFT™

UV Disinfection unit photo provided by Trojan UV

Available Treatment Technologies

(Continued)

LOCKPORT

UV Disinfection

- Medium Pressure Lamps with electronic ballast
- Chemical/mechanical cleaning system

UV Disinfection lamp photo provided by Trojan UV



Available Treatment Technologies

(Continued)

LOCKPORT

Microfiltration Membranes

- 0.1 micron pore size
- Absolute Filtration

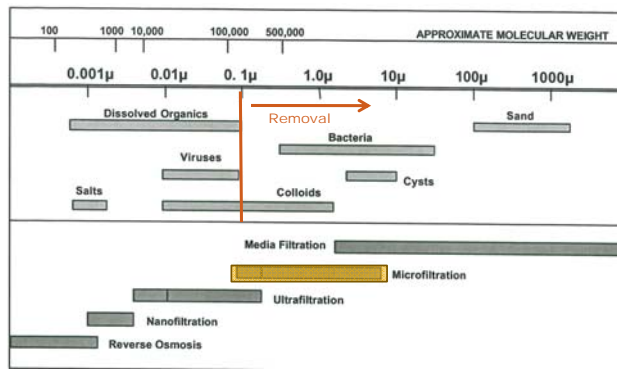


Figure 1. Membrane Process Classification



Available Treatment Technologies

(Continued)



Microfiltration Membranes

- Pressurized system consisting of hollow fiber modules mounted on a skid

Microfiltration membrane photo provided by Pall Corporation

AP (ARIA Packaged)



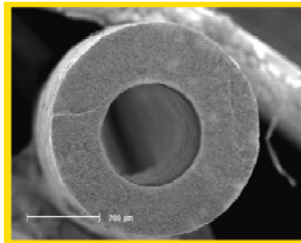
Available Treatment Technologies

(Continued)



Microfiltration Membranes

- Hollow center fiber
- Outside-in flow



Microfiltration membrane unit photo provided by Siemens



Available Treatment Technologies

(Continued)

Microfiltration Membranes



Membrane
backwash
video provided
by Siemens



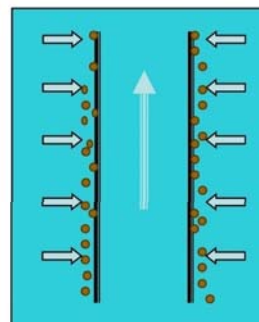
UV versus Membranes

Treatment Method

- UV – Inactivation
- Membranes - Removal

Finished Water Quality

- UV - no change in water quality
- Membranes
 - Turbidity <0.1 NTU
 - Silt Density Index <2
 - Microbiological Removal – bacteria, cryptosporidium



Microfiltration membrane graphic
provided by Pall Corporation



UV versus Membranes

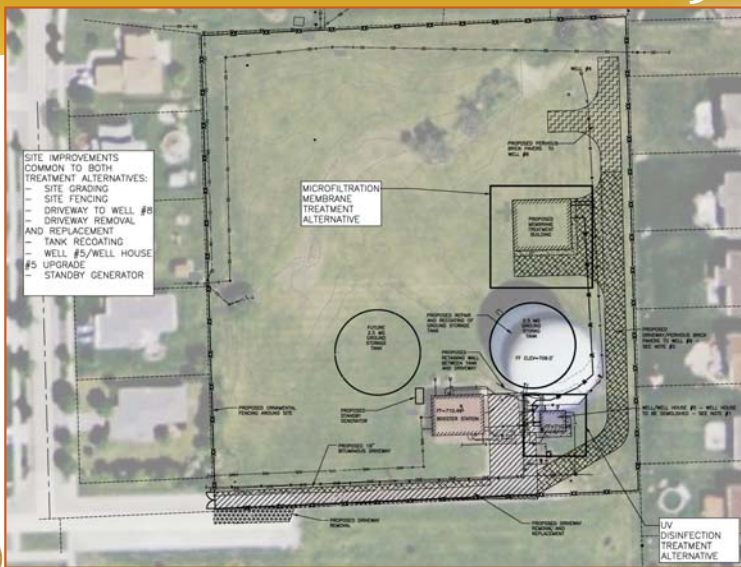
(Continued)



- **Application history with untreated groundwater**
 - UV – no permanent applications on untreated groundwater
 - Membranes – used on untreated groundwater in past 10 years
- **Future Implications**
 - Regulations
 - Water Quality



Treatment Alternatives for Wells #5 & #8



UV - Advantages & Disadvantages

Advantages

- Compact unit size
- Least expensive treatment option
- Treatment verification provided by manufacturer

Disadvantages

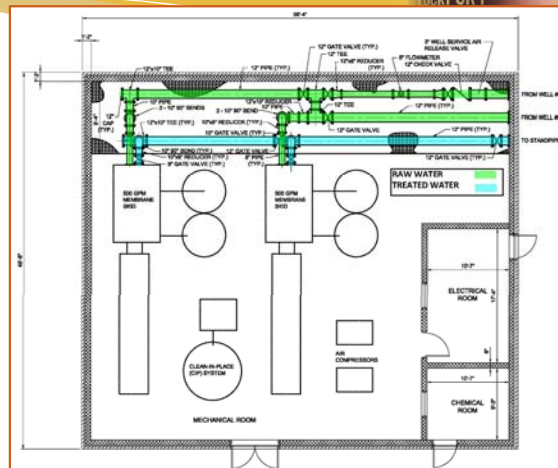
- * Only change in water quality is microbial
- * Operation costs (electrical)
- * Treatment verification required after installation
- * Future Implications




Microfiltration Membranes for Wells #5 & #8

▪ Description

- New building to house membrane units
- Route Well #8 piping to new building
- Route Well #5 piping to new building
- Combined treated water line from new building to Tank





Membranes - Cost




Item	Description	Unit	Quantity	Unit Price	Amount
1	Membranes (Including Spares & Installation)	LF	1	\$2,930,675	\$2,930,675
2	Construction Contingency (20%)				\$586,325
Total Estimated Construction Cost					\$3,517,000
Engineering (15%)					\$528,000
Total Estimated Project Cost					\$4,045,000

	1000	\$10	10,000
Construction Cost Subtotal			\$2,930,675
Contingency (20%)			\$586,325
Total Estimated Construction Cost			\$3,517,000
Engineering (15%)			\$528,000
Total Estimated Project Cost			\$4,045,000

Membranes - Advantages & Disadvantages





Advantages


- Removes suspended solids & bacteria (higher level of protection)
- Flexibility for future water quality treatment (removal of organics and inorganics with chemical treatment)

Disadvantages


- * More expensive treatment option
- * Equipment and operation costs (chemical & electrical)
- * Backwash waste stream disposal

Needed Site Improvements





- **Site Grading**
 - Finished grade should be at least 6" below tank foundation
 - Site has several areas of ponding
- **Driveway to Well #8**
 - For maintenance of well
- **Site Fencing**
 - For water system security




Well #8 location

The drainage ditch has a small berm obstructing the natural surface water flow north of Well #8.





Needed Site Improvements



(Continued)




- **Tank Recoating**
 - Tank inspection performed 2-3 years ago
 - Including tank inlet piping modifications
- **Well #5/Well House #5 Upgrade**
 - Building replacement
 - Well motor replacement with variable frequency drive
 - Electrical upgrade
- **Standby Generator**
 - To have fire protection upon loss of power





Inlet and outlet pipes inside the 2.5 MG Ground Storage Tank

Timing of Improvements





- **CCA Schedule**
 - Submit evaluation of treatment options, and commit to installation of one of the options
 - **May 1, 2011**
 - Submit schedule for obtaining permits required and for installation of chosen treatment option
 - **June 1, 2011**



Timing of Improvements

(Continued)

```

    graph LR
      A[Begin Preliminary Design  
June 2011] --> B[Submit SRF Loan Project Plan to IEPA  
Sept 2011]
      B --> C[Begin Final Design  
Sept 2011]
      C --> D[Submit to IEPA for permitting  
March 2012]
      D --> E[Advertise for Bids  
April 2012]
      E --> F[Submit Bid to IEPA for approval  
June 2012]
      F --> G[Begin Construction  
July 2012]
      G --> H[Construction Completion  
Oct 2013]
  
```

Timing of Improvements

(Continued)



- **Site grading should be complete before tank is recoated**
- **Taking 2.5 MG tank out of service for recoating is an issue**
 - Farrell Road Booster Pump Station/Tank provides fire protection to Middle and Downtown Pressure Zones (80+% of system)
 - Recoating/repairs will take the tank out of service for 4-6 months during peak water usage (April-October).
 - Downtown Pressure Zone elevated storage tank construction prior to recoating
 - **Need to start land acquisition and design**
 - **Construction will take ~12 months**
 - **Estimated Project Cost (not including land acquisition) - ~\$5,500,000**



Water and Sewer Rate Increase



- **Several High Priority Water System Improvements need to be completed**
- **Improvements noted above were included in the Water and Sewer Rate Study completed by Sikich**
- **SRF loan program**
 - Low interest (1.25%) loans
 - SRF loan pre-application to be submitted for Treatment Improvements and Downtown Elevated Storage Tank by March 31, 2011 for 2012 Fiscal Year (beginning October 1, 2011)



Action Items



- **Need direction from Council on treatment option to be installed (UV or Membrane) by April 6, 2011 City Council Meeting in order to meet CCA Schedule**

