“Innovative Surface Water Plant Filter Control and Filter Optimization Solutions

Fayette County Water System

This presentation is a case history of a unique filter control system upgrade at the Crosstown Road WTP

Mark Romers
President of ICS & Filter Magic
The Crosstown Road WTP Filter Upgrade Project 2016
Fayette County Water System, Fayette County, Georgia

- Plant was expanded from 4 to 8 filter in 1994
- Average plant flow - 6.8 MGD
- Filter System - 3 GPM/SF
  - Surface Wash
  - Clay tile & wheeler underdrains
  - Traditional anthracite, sand and gravel
  - Hydraulic filter control consoles
  - Hydraulic cylinder actuators
  - Manual control of filters by operators
  - Extremely limited communication to a very limited plant SCADA system – Only Turbidity
  - No remote monitoring or control
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Existing Filter System Conditions

• 22 year old system
• Outdated manual hydraulic filter control system.
• Each backwash subject to operator unique opinions!
• No historical data for consistent water quality treatment
• 60 – 80 Hour filter run times @ 3GPM/SF
• Substantial backwash water & related FTW water wasted every backwash
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Existing Filter System Conditions

- Outdated or obsolete hydraulic cylinders for valve control
- Maintenance intense
- Unreliable operation
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Goals, Objectives & Decisions

Upgrade entire filter system including filter underdrains, media, backwash system, air scour system, valve actuators, valves, controls & other chemical system & treatment system improvements within a $5,000,000 budget

• Replace existing underdrains with low profile stainless steel underdrains eliminating gravel & increasing freeboard in existing filter tanks by 18 inches
• High rate filters from 3 GPM/SF to 5 GPM/SF for a 40% increase in production
• Increase average plant flow from 6.8 MGD to 9.5 MGD
• Replace anthracite with ultra lite Puracite eliminating need to upgrade existing backwash system saving $900,000
• Increase filter runtimes and backwash efficiency
The Crosstown Road WTP Filter Upgrade Project 2016
Goals, Objectives & Decisions

Upgrade entire filter system including filter underdrains, media, backwash system, air scour system, valve actuators, valves, controls & other chemical system & treatment system improvements within a $5,000,000 budget

• Replace existing hydraulic actuators & valves with pneumatic vane actuators, valves, air header system & air compressor
• Replace instrumentation & filter control system with the latest innovative technology available including automatic control for filtering water & backwashes
• Implement filter backwash optimization technology that monitors and controls backwashes to minimize or eliminate excess backwash water and related FTW water
• Replace existing SCADA system with latest technology that allows complete historical trending and modeling of new filter system
The cost to upgrade the entire filter system including filter underdrains, air scour system, media, valve actuators, valves, controls & other chemical system & treatment system improvements came in below budget at $4,600,000 while meeting the clients goals and exceeding their expectations!

“The Ultimate Filtration Solution”
The Crosstown Road WTP Filter Upgrade Project 2016
“The Ultimate Filtration Solution”

The new filter system includes:

- Low profile stainless steel underdrains with integral air scour system that eliminated the gravel & increased freeboard by 18 inches
- Air scour system including blower
- Media including ultra lite Puracite that eliminated need to upgrade existing backwash system
- Pneumatic vane actuators, control valves & air compressor system
- Instrumentation & innovative prepackaged preprogrammed & proven filter control system
- Eliminated 85% of traditional conduit & wire tree between filter, instrumentation & valve actuators
- Integral filter backwash optimization water saving technology
The Crosstown Road WTP
Filter Upgrade Project 2016
“The Ultimate Filtration Solution”

Enhanced Filter System Performance:
• Increased filter flow rate from 3 GPM/SF to 5 GPM/SF
• Increased filter runtimes from 60 to 80 hours to in excess of 200 hours at a 40% increase in flow rate
• Automatic control of all filter backwashes including filter backwash optimization:
  • Consistent water quality across all filters
  • Monitor & control precise media expansion
  • Monitor & control backwash turbidity to truncate backwash at precise return-to-service turbidity value
• Decreased filter backwash water & related FTW water from 80,000 gallons to 30,000 gallons per backwash
• Substantially reduce total wastewater at plant
• Increased filter production efficiency by 3% to 5%
The Crosstown Road WTP
Finished Filter Plant Conditions

Filter Gallery

Filter Pipe Gallery
The Crosstown Road WTP
Finished Filter Plant Conditions

Filter Pipe Gallery

Filter Effluent ROF Controller
The Crosstown Road WTP
Finished Filter Plant Conditions

Backwash Media
Analyzer

Air Scour System
Filter Backwash Optimization can save a substantial water at almost every water plant while providing many client’s a significant Return On Investment (ROI) almost immediately.

Annual water savings depend on a client’s cost of producing their water & how much time that they over wash their filters during a backwash. Production cost of water varies from less than $1.00 to more than $3.50 per 1000 gallons. Excess backwash durations range from 3 minutes to more than 12 minutes in many cases. Excessive backwashing also exasperates FTW causing this step to run much longer to re-season media.

All of this translates to many millions of gallons of water being needlessly wasted throughout the year at tremendous production cost & operational efficiency to the municipality. Instead of being sold to consumers, it is being treated as wastewater, again at a tremendous cost.
In the case of Crosstown Road WTP, Filter Backwash Optimization will:

- Save the plant 100,000,000 gallons of excess backwash water & related FTW water annually.
- At 6.8 MGD, this water, if saved, translates to 14.7 days of production or one-half of a month of production water being sent to their clearwell instead of to their wastewater treatment systems.
- Their filter system efficiency increased from 92.5% to 97.5%.
- It substantially reduced the plants wastewater treatment costs.
- Their cost of production was $1.58 per thousand gallons of water.
- Saving this water for consumption translates to an annual Return On Investment (ROI) to the municipality of $158,000.00 per year or easily $1,000,000.00 over a decade.

In today’s world, every drop of water counts!!!
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