PIONEERING PELLET SOFTENING TREATMENT IN PENNSYLVANIA

April Winklmann
Authority Manager, MTJMA

Jared Hutchins
Engineering Manager, Black & Veatch
AGENDA

Project Background and Drivers
Process Equipment Procurement and Facility Design
Construction Update
PROJECT BACKGROUND AND DRIVERS

APRIL WINKLMMANN

AUTHORITY MANAGER, MTJMA
Manor Township Joint Municipal Authority (MTJMA)

• Armstrong County, PA
• 5 staff
• Customers: Manor Township, Manorville Borough, and Ford Cliff Borough, as well as some areas of Rayburn, Bethel, Valley, and Kittanning Townships
• +2 Consecutive Systems
PROJECT LOCATION
MTJMA WATER TREATMENT PLANT
ADDRESS: 134 RIVERSIDE DRIVE
FORD CITY, PA 16226

SERVICE AREA
Project Drivers

• Brine discharge from current ion exchange process to be discontinued
• Lack of redundancy at existing WTP
• No clearwell at existing WTP
• Aging WTP infrastructure
• Limited ability to expand for future demand
• Additional demand by consecutive systems
Pellet Softening Enters the Picture

- April Winklmann hired as MTJMA Manager in 2012
  - Prior investigation of process for manganese removal
  - Recommended the process be investigated for calcium hardness
- Pilot Study in 2012
- Double blind taste test
- RFP for Engineering Services
- Open communications with PADEP
Technology Evaluation

- Technology Evaluation by Black & Veatch in 2014
- Proven technology capable of meeting performance requirements
- Pool of qualified vendors

Pellet Softening Technology Recommended for Detailed Design
Challenges - Timing

• Condition of existing plant
• New consecutive system being built simultaneously
• Timing of changes from old plant to new plant and well pump selections
Challenges – Facility Space & Existing Conditions

• Limited space at existing WTP
• Three of four wells at WTP site
• Residential setting
• Soil conditions
• Varied size of pellet softening equipment
Challenges – Budget

• Anticipated rate increases
• PennVest Loan
• ~$8.5M, Project at over $9M
Challenges – Board Acceptance

• Taste is important!
• Resistance to chemical usage
• Clearwell, wet well, pumping modification
• Cost and rates
Challenges – Staff & Technology

• Previously unseen technology for veteran employees
• Young staff, still gaining experience
• Limited training/coursework availability
Challenges – Other

- Ability to start and stop operations
- Caustic injection point
- Lime requirement from pilot would have changed outcome
- High freezing points for caustic and sulfuric acid
- Recarbonation vs. sulfuric acid
- Gravity vs. pressure filter
## WTP Design Flows and Anticipated Raw Water Quality

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Average Day</th>
<th>Maximum Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0.6 MGD</td>
<td>1.3 MGD</td>
</tr>
<tr>
<td>Design</td>
<td>0.6 MGD</td>
<td>1.4 MGD</td>
</tr>
<tr>
<td>Future</td>
<td>1.4 MGD</td>
<td>2.1 MGD</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (standard units)</td>
<td>7.5</td>
<td>7.3 – 7.6</td>
</tr>
<tr>
<td>Alkalinity (mg/L as CaCO3)</td>
<td>115</td>
<td>90 - 150</td>
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<tr>
<td>Calcium Hardness (mg/L as CaCO3)</td>
<td>160</td>
<td>110 - 200</td>
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<tr>
<td>Total Hardness (mg/L as CaCO3)</td>
<td>210</td>
<td>130 - 280</td>
</tr>
<tr>
<td>Iron (mg/L)</td>
<td>0.25</td>
<td>&lt;0.02 – 1.97</td>
</tr>
<tr>
<td>Manganese (mg/L)</td>
<td>&lt;0.02</td>
<td>&lt;0.02 – 0.04</td>
</tr>
</tbody>
</table>
Basis of Design

- 1.4 MGD initial capacity
- Expandable to 2.1 MGD
- New facility located adjacent to existing WTP
- Raw water feed from four existing wells
Process Schematic

Procured Equipment

- WELL PUMPS
- REACTOR
  - SULFURIC ACID
  - SAND & SODIUM HYDROXIDE
- FILTER
  - SPENT FILTER BACKWASH
- CLEARWELL
- BACKWASH PUMPS
- HIGH SERVICE PUMPS
- PELLET DISCHARGE
- SODIUM HYPOCHLORITE
- SODIUM HYDROXIDE
- SAND & SODIUM HYDROXIDE
- BACKWASH PUMPS
Equipment Procurement

- STSFE
- Conical Pellet Softening Reactors
- Horizontal Enclosed Filters
- Ancillaries, Controls
- Pump Units

Startup, Commissioning & Training Support, Performance
Site Location
Process Layout
Building Configuration
Pellet Softening Reactors

- 0.7 MGD per unit
- 2 units, space for a third
- 8.5 ft diameter
- 24.5 ft in height

Supplied by WesTech
Filter Vessels

- 2 filter cells per vessel
- 2 vessels installed initially, space for future third
- Two vessels rated for 1.4 MGD with one cell in standby
- Dual medial with anthracite and sand

Supplied by WesTech
Sand Feed

- Seed material for pellet generation
- Fine silica sand
- Initial loading, then periodic recharge after blowdown
- Sand slurry injection with plant service water

Vertical Reciprocating Conveyor promotes sand recharge from top
Chemical Feed Systems

- Caustic, Sulfuric Acid by STSFE Supplier
- Sodium Hypochlorite Feed System
- Provisions for chemical deliveries
- Chemical pipe flushing
- Containment drains
Pellet Discharge

• Slurry discharge to Indoor Pellet Drainage Area
• Discharge based on operational experience
• Discharge pellets for reuse in agricultural applications
Filter Backwash

- Backwash Holding Tank
- Gravity setting
- Pumps recycle up to 10% of process flow to head of WTP
- 31,200 gallon capacity
- 1.65 to 3.34 backwash cycles
Disinfection

- Two independent clearwells and wet well providing ~300,000 gal
- 12.5% concentration sodium hypochlorite delivered by PD peristaltic tube pumps
CONSTRUCTION UPDATE

APRIL WINKLMANN

AUTHORITY MANAGER, MTJMA
Construction Team

- General – Thomas Construction, Inc.
- HVAC – East West Manufacturing
- Plumbing – Enders Plumbing, Inc.
- Electrical – Bronder Technical Solutions
- MTJMA – Owner/Inspector
- Black & Veatch – Construction Administration

Total Construction Contract Award $8.4M
Construction Schedule

- Notice of Award – 2/18/16
- Construction NTP – 4/11/16
- Substantial Completion – 7/14/2017
- Final Completion – 8/14/2017
Filter Units and Piping
Upcoming Milestones

- PEMB Installation – April 2017
- New Well Pumps – May 2017
- New Plant Startup and Commissioning – Aug/Sept 2017
- New Plant Online – Sept 2017
Contact Us

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