Realtime Control Implementation
City of Grand Rapids, Wastewater Treatment Plant
Michael Lunn, Environmental Service Manager
MWEA Conference 6/23/2015
About Grand Rapids
Agenda

• Online Analyzers
• Nitrogen Control
• Phosphorus Control
• Sewer Modeling
• Plant Modeling
• Load Equalization
• HVAC - Unitary Controls
• Future
• Scoring Points
Online Analyzers

- Hach Amtax
  - Clean Monthly (30 min)
  - Chemicals – 2 months
- ZAPS
  - Clean Weekly – Monthly (5 minutes)
- Hach Probe
  - Clean Weekly (10 minutes)
  - Change Head – (6 Months)
Plant Loadings - Daily
Ammonia Measurement

- Probe
- Analyzer
- ZAPS (NH₃ Only)
NH₃ n(not +NH₄)
## Real Time Nitrogen Control (RTNC) System

<table>
<thead>
<tr>
<th>Year</th>
<th># of Days OOS (Manual Mode)</th>
<th>Total Days</th>
<th>% OOS (Manual Mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>17</td>
<td>210</td>
<td>8%</td>
</tr>
<tr>
<td>2014</td>
<td>111</td>
<td>365</td>
<td>30%</td>
</tr>
<tr>
<td>2015 (through 6/18/15)</td>
<td>46</td>
<td>169</td>
<td>27%</td>
</tr>
<tr>
<td>Total</td>
<td>174</td>
<td>744</td>
<td>23%</td>
</tr>
</tbody>
</table>
UV Dosage
<table>
<thead>
<tr>
<th>Year</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>Sept.</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>1,696,433</td>
<td>1,773,372</td>
<td>1,981,304</td>
<td>2,028,345</td>
<td>1,900,937</td>
<td>1,900,937</td>
<td>1,801,600</td>
<td>1,791,793</td>
<td>1,948,393</td>
<td>2,256,902</td>
<td>2,055,167</td>
<td>23,081,879</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>1,065,600</td>
<td>1,681,592</td>
<td>1,782,702</td>
<td>1,763,191</td>
<td>1,904,012</td>
<td>1,937,297</td>
<td>1,826,757</td>
<td>2,020,654</td>
<td>1,861,710</td>
<td>1,797,836</td>
<td>1,890,018</td>
<td>21,359,964</td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>630,833</td>
<td>91,780</td>
<td>198,602</td>
<td>183,505</td>
<td>124,333</td>
<td>(36,360)</td>
<td>74,180</td>
<td>(219,054)</td>
<td>(36,802)</td>
<td>86,683</td>
<td>459,066</td>
<td>165,149</td>
<td>1,721,915</td>
</tr>
</tbody>
</table>

**GRWWTP – 2013 vs 2014 Electrical Usage**
Historical Electrical Usage
Historical Natural Gas Usage
Plant Model

- Primaries North and South
- North aeration
- Aeration control
- GRVBA
- Centrifuges
- South aeration

Measured (dots) and modelled (lines) effluent phosphate results
Sewer Flow Monitoring
Sewer Flow Monitoring

- Level
- cfs
- fps
Sewer Flow Monitoring
Sewer Flow Monitoring

- Raw Data
- Gravel Adjustment
- Roughness Adjustment
HVAC
Lighting Update

<table>
<thead>
<tr>
<th></th>
<th>Fixtures</th>
<th>Parts</th>
<th>Labor</th>
<th>Rebate</th>
<th>Savings</th>
<th>Payback</th>
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</thead>
<tbody>
<tr>
<td>Outdoor</td>
<td>270</td>
<td>$64,000</td>
<td>$10,500</td>
<td>$10,600</td>
<td>$10,500</td>
<td>4.6</td>
</tr>
<tr>
<td>Tunnel</td>
<td>137</td>
<td>$2,050</td>
<td>$1,700</td>
<td>$1,800</td>
<td>$1,800</td>
<td>1.3</td>
</tr>
<tr>
<td>Garage</td>
<td>27</td>
<td>$2,100</td>
<td>$3,300</td>
<td>$1,500</td>
<td>$2,500</td>
<td>1.6</td>
</tr>
</tbody>
</table>

- Annualized Savings assume $0.09 per kilowatt
Solar Power

- Proposals Received
  - PPA’s
  - $0.08 – 0.10 kwh
  - 2.1%-2.6% Escalator
  - Avg $200,000 year savings
    - 15 yr – 25 yr Term
- Standby Rate
- Interview with Top 3
- Selection in July
Real Time Load Control – VFA’s
Real Time Load Control – VFA’s

- Outside Concentrated Waste
- Dewatering Centrate
- Thickening Centrate
- Other Recycle Streams

- Plant
- Future
  - Treatment
  - Digestion
  - Other
Score Points

CSWEEK Innovation Award

2nd Place Biggest Loser

CSWEEK Innovation Award

2015 Award of Excellence

The Public Relations Society of America Central Michigan Chapter recognizes City of Grand Rapids Environmental Services Department for outstanding public relations success in Social Medium for "No Wipes in the Pipes"
Questions?

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Environmental Services Department Manager

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