City of Medford
Phased Approach to Upgrade
Large Control System

Wisconsin Wastewater Operators Association
October 8, 2014

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Brian Akason - Energenecs
City of Medford

“It’s not the edge of the world, but you can see it from there”
John Fales
City of Medford

“It’s always sunny and 72 degrees in Medford”

John Fales
Technical Partners

Thank you

Allen Bradley Compact Logix PLC’s
Clear SCADA Software
Schneider Trio Radios
Hach WIMS Report Software

Pieper Electric – Fiber Installation
DB Wireless Ethernet Installation
The Problem?

Various components obsolete
Existing wiring of WWTP challenging
Filter control program not available
   Alarms not organized
   No centralized data
Cost to upgrade fairly expensive
Another Problem?
How Fund Project?

Cost was split between 2 utilities over 3 years
Due to size, cost, and complexity was spread over 3 years

Equipment Replacement Fund
SCADA Systems are Professional Services
Conduct Meetings & Interviews
Photos

Let's Take a
Quick Picture Tour
Medford Water Pollution Control Facility
CITY OF MEDFORD, WISCONSIN
WASTEWATER TREATMENT FACILITIES
Back to the Problem

How Fund Project?

Cost was split between 2 utilities
Due to size, cost, and complexity was spread over 3 years

Equipment Replacement Fund
SCADA Systems are Professional Services
Conduct Meetings & Interviews
Phase I

Water Control System Upgrade
$66,330

Award in budget year 2012
Complete & Invoice in budget year 2012
Phase II

Wastewater Treatment Facility
Main Control Room
$56,575

Award in budget year 2012
Complete & Invoice in budget year 2013
Phase III

Wastewater Treatment Facility
PLC Control Panels
$263,000

Award in budget year 2013
Complete & Invoice in budget year 2014

Award in budget year 2012
Complete & Invoice in budget year 2012
Summary

2012 Funded $ 66,330
2013 Funded $ 56,575
2014 Funded $ 263,000
Total Project $ 385,905
SCADA Software

- Graphical Interface
- Monitor
- Control
- Alarms
- Trends
- Reports – Hach WIMS eDMR & water monthly pumping
Communications

- Fiber – Used in WWTP
- Ethernet 2.4 GHz (3 locations)
- UHF radio
- Spread Spectrum 900MHz
- Internet
- Phone Lines
- Cellular
2014 Pictures
<table>
<thead>
<tr>
<th></th>
<th>DPW</th>
<th>Elevated Tank 1</th>
<th>Elevated Tank 2</th>
<th>Elevated Tank 2</th>
<th>Well #5</th>
<th>Well #8</th>
<th>Well #9</th>
<th>Well #9</th>
<th>Well #10</th>
<th>Well #11</th>
<th>Well #11</th>
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<tbody>
<tr>
<td>Communication Fail</td>
<td>Elevated Tank 1 Level High</td>
<td>Elevated Tank 2 Comm. Fail</td>
<td>Elevated Tank 2 PLC Fail</td>
<td>Well 5 Pump Run Fail</td>
<td>Well 8 Surge Tripped</td>
<td>Well 9 Comm. Fail</td>
<td>Well 9 Unauthorized Entry</td>
<td>Well 10 PLC Fail</td>
<td>Well 11 Comm. Fail</td>
<td>Well 11 Station Flood</td>
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<tr>
<td>Control Power Fail</td>
<td>Elevated Tank 1 Level Low</td>
<td>Elevated Tank 2 Control Power Fail</td>
<td>Elevated Tank 2 Station Flood</td>
<td>Well 6 PLC Fail</td>
<td>Well 8 Temp. Low</td>
<td>Well 9 Control Power Fail</td>
<td>Well 9 Chemical Rm. Temp. Low</td>
<td>Well 10 Station Flood</td>
<td>Well 11 Control Power Fail</td>
<td>Well 11 Unauthorized Entry</td>
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</tbody>
</table>

**Alarm History**

**Announcer 1 Alarm List**

**Server Status**
- **DPW**: 0 - Invalid
- **WWTP**: 0 - Invalid
<table>
<thead>
<tr>
<th>Run Times (Hours)</th>
<th>Starts (Events)</th>
<th>Flow Totals (Gal. x 1000)</th>
<th>Sodium Hypochlorite (Lbs.)</th>
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<tbody>
<tr>
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<td>WELL 5</td>
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<td>WELL 8</td>
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<td>WELL 10</td>
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<tr>
<td>WELL 11</td>
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## RAW PUMP CONTROL MATRIX - SP's

<table>
<thead>
<tr>
<th>Stages</th>
<th>Wet Well Select</th>
<th>Start Delay Setpoint (Seconds)</th>
<th>Start Setpoint (Feet)</th>
<th>Stop Setpoint (Feet)</th>
<th>Pump Select</th>
<th>Pump Alternate Button</th>
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<tbody>
<tr>
<td>Stage 1</td>
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<td>Stage 2</td>
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<td>Stage 6</td>
<td>1</td>
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<td></td>
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<td>STAGE 6</td>
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</tbody>
</table>

### Raw Wet Well Setpoints

- **Upper Range Value**: Wet Well 1 Feet
- **Upper Range Value**: Wet Well 2 Feet
- **High Level Alarm**: Wet Well 1 Feet
- **High Level Alarm**: Wet Well 2 Feet
- **Low Level Alarm**: Wet Well 1 Feet
- **Low Level Alarm**: Wet Well 2 Feet

### Step Screen/Wash Press/Wash Solenoid Setpoints

- **Screen Off Time**: Minutes
- **Run Fail Delay**: Seconds
- **Wash Solenoid Off Delay**: Seconds

### Server Status

- **DPW**: 0 - Invalid
- **WWTP**: 0 - Invalid
### Flow Rates

<table>
<thead>
<tr>
<th>Flow Type</th>
<th>Daily (GPM)</th>
<th>Yesterday (GPM)</th>
<th>Accum. Total (GPM)</th>
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<tbody>
<tr>
<td>Influent</td>
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<td>Recycle</td>
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<tr>
<td>South RAS</td>
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<tr>
<td>WAS 1</td>
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<td>WAS 2</td>
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</tr>
<tr>
<td>Effluent</td>
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### Flow Totals

<table>
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<tr>
<th>Flow Type</th>
<th>Daily (Gallons)</th>
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<td>WWTP Influent</td>
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<tr>
<td>WAS 2</td>
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<tr>
<td>WWTP Effluent</td>
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</table>

### Influent pH

<table>
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<tr>
<th>Influent pH</th>
<th>S.U.</th>
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<tr>
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</tbody>
</table>

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**Server Status**

- **DPW**: 0 - Invalid
- **WWTP**: 0 - Invalid
Get Involved

- Describe the Logic …… programmers are smart ….. but need to be told how you want something to operate.
Results

- Modern comprehensive control system
- Redundant across the network
- Utilized existing panels & hardware
- Reliable communications – Fiber & Radio
- Data routed to central location
- Alarms are handled properly by w/ww staff
- DNR reporting
- Sets the stage for future improvements
Thank You

Questions?