OUTLINE

• Who is WaterTectonics?
• What is EC and how does it work?
• What types of facilities are using EC?
• How much does EC cost?
Since 1999, WaterTectonics has designed, manufactured, and installed industrial-grade water treatment systems for clients across the United States and Canada.

We provide a range of simple-to-advanced solutions that can be customized to meet site-specific conditions and water quality goals.

Our in-house design and lab services help with technology selection and treatability testing to validate the selected approach.

Our local field team provides year-round field service support to ensure long-term client success.
HOW DOES EC WORK?
EC TREATMENT CHEMISTRY

1. DISSOLUTION
   - Anode
   - Cathode
   - Electron Flow
   - Me⁺ and OH⁻
   - Water Flow
   - H₂

2. DESTABILIZATION/COAGULATION
   - Anode
   - Cathode
   - Suspended Solids & Emulsified Oils
   - Water Flow
   - H₂

3. FLOCCULATION
   - Anode
   - Cathode
   - Water Flow
   - H₂
EXAMPLE INDUSTRIAL PROJECT
EXAMPLE INDUSTRIAL PROJECT
EXAMPLE INDUSTRIAL PROJECT
EXAMPLE INDUSTRIAL PROJECT
EXAMPLE INDUSTRIAL PROJECT

Influent Source Pump
EXAMPLE INDUSTRIAL PROJECT

480V, 3 Phase Single Strike Power

Hydraulic Interconnect Piping
EXAMPLE INDUSTRIAL PROJECT

Standard 40’ Shipping Container

10,000 Gallon Poly Tanks
CASE STUDY: GALVANIZING

- **Application:** Hot-Dip Zinc Galvanizing
- **Year Installed:** 2014
- **Equipment:** pH Adjustment, Electrocoagulation, Settling, Media Filtration
- **Processing Rate:** 100 gallons per minute
- **Site Activities:** Galvanizing, materials storage
CASE STUDY: GALVANIZING

Effluent Total & Dissolved Zinc

mg/L

% Dissolved

0 50 100 150 200 250

0 10 20 30 40 50 60 70 80 90 100

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

Total  Dissolved  % Dissolved

Confidential & Proprietary
# CASE STUDY: GALVANIZING

<table>
<thead>
<tr>
<th>Units in mg/L</th>
<th>Dissolved Zinc</th>
<th>Total Suspended Solids</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/6/13</td>
<td>21.6</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Treatment Installed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/17/14</td>
<td>0.0485</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>12/4/14</td>
<td>0.110</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>3/20/15</td>
<td>0.0479</td>
<td>16.5</td>
</tr>
<tr>
<td>3/30/15</td>
<td>0.102</td>
<td>&lt; 5</td>
</tr>
<tr>
<td><strong>Average Result</strong></td>
<td>0.0771</td>
<td>&lt; 7.9</td>
</tr>
</tbody>
</table>
CASE STUDY: SHIPBUILDING

- Application: Marine Shipbuilding
- Year Installed: 2013
- Equipment: pH Adjustment, Electrocoagulation, Settling, Media Filtration
- Processing Rate: 400 gallons per minute
- Gallons Processed Since Install: 6,066,024
- Total Consumables Cost: $11,633
- Cost Per Gallon: $0.00192
- Cost Per 1,000 Gallons: $1.92
- Labor Estimate (by client operator): 2 hours per week @ $50/hr wage rate = $4,800/year
### Case Study: Shipbuilding

<table>
<thead>
<tr>
<th>mg/L</th>
<th>TSS</th>
<th>Aluminum</th>
<th>Copper</th>
<th>Iron</th>
<th>Lead</th>
<th>Zinc</th>
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</thead>
<tbody>
<tr>
<td><strong>Permit Limit</strong></td>
<td>100</td>
<td>0.75</td>
<td>0.02</td>
<td>1.0</td>
<td>0.04</td>
<td>0.120</td>
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<tr>
<td><strong>Median</strong></td>
<td>5</td>
<td>0.23</td>
<td>0.0056</td>
<td>0.202</td>
<td>0.000133</td>
<td>0.0924</td>
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<tr>
<td><strong>Average</strong></td>
<td>5</td>
<td>0.3679</td>
<td>0.0083</td>
<td>0.466</td>
<td>0.0004011</td>
<td>0.17056</td>
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<tr>
<td><strong>Min</strong></td>
<td>5</td>
<td>0.05</td>
<td>0.0019</td>
<td>0.025</td>
<td>0.0001</td>
<td>0.0171</td>
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<tr>
<td><strong>Max</strong></td>
<td>5</td>
<td>1.25</td>
<td>0.021</td>
<td>1.81</td>
<td>0.00208</td>
<td>0.93</td>
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</table>
CASE STUDY: METALS RECYCLING

- **Application:** Metals Recycling
- **Year Installed:** 2012
- **Equipment:** pH Adjustment, Electrocoagulation, Settling, Media Filtration, Granular Activated Carbon
- **Processing Rate:** 300 gallons per minute
- **Site Activities:** Metal recycling, crushing, transfer
CASE STUDY: METALS RECYCLING

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>Influent</th>
<th>Benchmark</th>
<th>Effluent</th>
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<tbody>
<tr>
<td>TSS</td>
<td>mg/L</td>
<td>535</td>
<td>100</td>
<td>14</td>
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<tr>
<td>HEM</td>
<td>mg/L</td>
<td>14,800</td>
<td>15</td>
<td>&lt; 5</td>
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<tr>
<td>COD</td>
<td>mg/L</td>
<td>1,340</td>
<td>100</td>
<td>88.3</td>
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<tr>
<td>Aluminum, Total</td>
<td>µg/L</td>
<td>2,140</td>
<td>750</td>
<td>490</td>
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<tr>
<td>Copper, Total</td>
<td>µg/L</td>
<td>310</td>
<td>63.6</td>
<td>7.6</td>
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<tr>
<td>Iron, Total</td>
<td>µg/L</td>
<td>29,000</td>
<td>1000</td>
<td>68</td>
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<tr>
<td>Lead, Total</td>
<td>µg/L</td>
<td>97</td>
<td>81.6</td>
<td>0.55</td>
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<tr>
<td>Zinc, Total</td>
<td>µg/L</td>
<td>1,500</td>
<td>117</td>
<td>13</td>
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</table>
HOW MUCH DOES EC COST?

- Capital cost typically between $600-$1,200 per gpm of treatment capacity (lower flow systems more expensive on a cost per gpm basis)
- Biggest capital cost drivers = containerization, control automation, real-time water quality data, custom engineering, freeze protection
- Average operating cost of $2 per 1000 gallons treated
THANK YOU

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