Onsite Chlorine Generation
What We Have Learned

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Highlighted Project  Bubbling Springs Well Station

Location:  River Road, Conshohocken, PA

Ultimate Capacity:  2.4 mgd
Design Chlorine Demand:  3 mg/L

2.4 MG/day x 8.34 lb-L/mg-MG x 3 mg/L = 60 lb/day

75 lb/day unit was selected
Introduction How does it work?

\[ \text{NaCl} + \text{H}_2\text{O} + 2\text{E} = \text{NaOCl} + \text{H}_2 \]
Introduction Three Main Topics

- Design
- Installation
- Operation
Design Severn Trent Services ClorTec®

Manufacturer’s Drawings

• Skid Arrangement
  – Footprint Dimensions
  – Height
  – Clearance
Fig. 2a - Typical medium size (CT-75 to CT-300) Hypochlorite generator system mounted on a blue powder coated skid frame.
Design Severn Trent Services ClorTec®

Manufacturer’s Drawings

- P&ID
  - What’s coming in?
  - What’s going out?
Underground Brine tank in driveway
Underground Brine tank in driveway when done
Remote notification of level
Installation / Construction Requirements

Room Design
• Plumbing
  – Drains
• Ventilation
  – Air Changes
• Hydrogen Vent Stack
  – Specifics
• Hydrogen Detection
• Controls
  – Integrated with Station PLC
Operation of OSGs: It is not just mixing Salt and Water

OSGs use 3 pounds of salt + 15 gallons of softened water + 2 kWh of electrical energy to make one pound chlorine.

- Brine Solutions are about 2.8 pounds of Salt per gallon
- Water must be softened to less than 51.3 mg/l or 3 grains of hardness
- Salt Specifications
  - Calcium & Magnesium as Calcium < 8.0 ppm
  - Moisture < 0.020%
  - Sodium Chloride 99.99%
ClorTec® unit at work
The MIOX® unit at Bell Tavern
A MIOX® and ClorTec® Cell
Finished 0.8% Sodium Hypochlorite Bulk Tank at Bubbling Springs Well
### Operational Cost Comparison at Bubbling Springs Well Station

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water pumped out to system</td>
<td>2MGD</td>
</tr>
<tr>
<td>Amount of sodium hypochlorite per day</td>
<td>18.2 Pounds</td>
</tr>
<tr>
<td>Cost of small bulk delivered</td>
<td>$2.09 Gallon</td>
</tr>
<tr>
<td>Total for cost of the bulk sodium hypochlorite</td>
<td>$38.04/day</td>
</tr>
<tr>
<td>OSG Electricity cost</td>
<td>$0.14 kWh</td>
</tr>
<tr>
<td>Electrical use</td>
<td>36.4 kWh/day</td>
</tr>
<tr>
<td>Daily Electric cost</td>
<td>$5.10</td>
</tr>
<tr>
<td>Daily Brine cost</td>
<td>$13.28</td>
</tr>
<tr>
<td>Daily Dry Salt cost</td>
<td>$7.30</td>
</tr>
<tr>
<td>Savings of OSG with Brine to Sodium Hypochlorite</td>
<td>$20.00 per day</td>
</tr>
<tr>
<td>Savings of OSG with Dry Salt to Sodium Hypochlorite</td>
<td>$25.64 per day</td>
</tr>
</tbody>
</table>

**Daily Cost Savings at Current Chlorine Demand**
## Operational Cost Comparison at Bubbling Springs Well Station

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<th>Description</th>
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<tbody>
<tr>
<td>Water pumped out to system</td>
<td>2 MGD</td>
</tr>
<tr>
<td>Amount of sodium hypochlorite per day</td>
<td>75 Pounds</td>
</tr>
<tr>
<td>Cost of small bulk delivered</td>
<td>$2.09 Gallon</td>
</tr>
<tr>
<td>Total for cost of the bulk sodium hypochlorite</td>
<td>$156.75/day</td>
</tr>
<tr>
<td>OSG Electricity cost</td>
<td>$0.14 kWh</td>
</tr>
<tr>
<td>Electrical use</td>
<td>150.0 kWh/day</td>
</tr>
<tr>
<td>Daily Electric cost</td>
<td>$21.00</td>
</tr>
<tr>
<td>Daily Brine cost</td>
<td>$54.75</td>
</tr>
<tr>
<td>Daily Dry Salt cost</td>
<td>$30.08</td>
</tr>
<tr>
<td>Savings of OSG with Brine to Sodium Hypochlorite</td>
<td>$81.00 per day</td>
</tr>
<tr>
<td>Savings of OSG with Dry Salt to Sodium Hypochlorite</td>
<td>$105.67 per day</td>
</tr>
</tbody>
</table>

### Possible Maximum Savings

This is with the OSG unit making the maximum amount of Chlorine of 75 pound a day.
Advantages to using an OSG

• Environmentally Safer
• Cost Effective
• Steady Chemical State
• Easy to Maintain
Acknowledgements

- Bill McGinty, Aqua, Manager of Treatment/QC
- Mike Convery, Aqua, Project Manager
- Dave Pyrz, Pyrz Water, Vendor
- Severn Trent Services, Manufacturer
- Cope Salt Company, Supplier
- Joey Koehler, Allan A. Myers, Contractor/Installer
Questions / Comments