We’re in this together

Disaster Planning for California Hospitals
What Happens When the Taps Run Dry? Emergency Water Planning Best Practices

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What Happens When the Tap Runs Dry?

Emergency Water Planning
Best Practices

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Recent Disasters Highlight Hospital Sensitivity to Water and Power Infrastructure

CHRISTCHURCH: February 22, 2011
Everyday Problems Matter Too

**Expected**
- Maintenance Events
- Fire Suppression Exercises
- Disaster Drills

**Unexpected**
- Water Main Breaks
- Municipal Maintenance / Other Outages
- Contamination / Boil Orders
24x7 vs. Emergency Water Use
Proportions of Water Use Change

Large Hospital Daily Water Usage
- Industrial: 172,000 Gallons / Day
- Potable: 238,000 Gallons / Day

Emergency Water Usage
- Industrial: 160,000 Gallons / Day
- Potable: 105,000 Gallons / Day

Note: Data taken from a 700+ bed medical facility.

Hospital Evacuation Decision Guide

The Critical Role of Water
Children's Hospital of New Orleans withstood Hurricane Katrina and the resulting flood, and had sufficient potable water, generator fuel, staff, and supplies to shelter-in-place for many days. The hospital sits atop a levy, which floodwaters did not reach, and was essentially unscathed by the storm or the flood. When city water failed, however, it became impossible to fill the cooling tower, and the hospital lost air conditioning, forcing an evacuation in the heat of the Louisiana summer.

Also in the aftermath of Hurricane Katrina, Kindred Hospital in New Orleans had power, but the hospital’s water supply was cut off, which meant air conditioners could not operate. The loss of water necessitated evacuation of the hospital, including 50 ventilator-dependent patients.
Demand Varies by Number of Beds at Hospital

### Average Demand Per Bed (GPD)

<table>
<thead>
<tr>
<th>Number of Beds</th>
<th>Average Demand per Bed (GPD)</th>
<th>Average Potable Demand per Bed (GPD)</th>
<th>Average Industrial Demand per Bed (GPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitals with &lt;99 beds</td>
<td>120</td>
<td>69</td>
<td>51</td>
</tr>
<tr>
<td>Hospitals with 100-199 beds</td>
<td>295</td>
<td>121</td>
<td>174</td>
</tr>
<tr>
<td>Hospitals with 200-299 beds</td>
<td>269</td>
<td>115</td>
<td>154</td>
</tr>
<tr>
<td>Hospitals with 300+ beds</td>
<td>211</td>
<td>78</td>
<td>140</td>
</tr>
<tr>
<td>Overall</td>
<td>240</td>
<td>102</td>
<td>139</td>
</tr>
</tbody>
</table>
So What is the Typical Approach?

CHALLENGES
- Volume, volume, volume
- Cannot feed cooling towers
- Regular inventory swap-out
- Control in Emergency

- Volume, volume, volume
- Tankers oversubscribed and/or subsumed by disaster authority
- Tankers need to “dump and go”
- Connections / Pressure issues
- Emergency power connections
- Excess Chlorination
Another Typical Approach

CHALLENGES

- Cost
- Linkage with existing plumbing
- Seismic security
- Space, particularly for urban facilities
ReThink H2Os Approach – Seek Water Independence

Assess Current State
- Usage
- Sources
- Vulnerabilities

Identify Alternatives
- Groundwater (Wells, Sumps)
- Storm Water / Rain Water Capture/Nearby Surface Sources
- Condensate and Blow Down Reuse
- Waste Water

Optimize Solutions
- Separate industrial from potable
- Determine needs and regulatory requirements
- Develop solutions for each
- Apply emergency solutions to daily operations, if feasible
Typical Emergency Water Treatment System Design

Readily Available Alternate Water Sources
- Groundwater
- Storm Water / Rain Water Capture
- Condensate and Blow Down Reuse
- Waste Water
- Nearby Surface Sources

5,000 – 10,000 gallon buffer tank

Pump & Bladder Tank

Micron Filter

Media Filter

Ultra Filter(s) & chlorinator

To portable fill station or potable water distribution line

To industrial water distribution lines
Case Study (Simple): Virginia

**CHALLENGE:**
Ready small 25 bed hospital for realistic, cost effective emergency water delivery

**SOLUTION:**
Standard connection; tank to allow “dump and go”, modest particulate filter, pump and pressure tank to ensure steady flow (<$25k)

5,000 Gallon Storage Tank

Micron Filter, booster pump and pressure tank.
Case Study (Moderate): DCH Tuscaloosa

**CHALLENGE:**
Utilize onsite well (200gpm) to feed both industrial and potable needs of hospital in emergency post devastating 2011 tornado

**SOLUTION:**
Core treatment regime, industrial treatment for cooling towers everyday and potable treatment loop for emergency (~$250k with 3 year payback)
Tools Section (see separate documents)

- Checklist for Facility Water Information
- Alternative Sources Inventory
- Hospital Connections / Emergency Power Inventory
- Tanker Checklist
- Joint Committee Points of Interest
Questions?
Contact Information

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ReThinkH2O was founded by Jim Siplon and Chris Tuffli to serve businesses interested in addressing the challenge of water in the 21st century. Water costs are a largely unaddressed area financially and operationally despite years of businesses focus on cost cutting in other sectors. ReThink H2O seeks to provide large scale industrial and commercial clients with objective and optimal engineering advice on water issues.

- Worked on emergency water plans for over 100 facilities throughout the United States
- Our focus is unbiased, solution-agnostic problem solving of your individual, water needs and opportunities
- We have an extensive data base of water usage information we can use to benchmark and compare client information against variety of water process, content and cost parameters
- We’re not selling equipment – we integrate disparate technologies with common control systems to address each unique client’s individual needs, taking advantage of deep relationships and experience in all facets of the water treatment space to bring the most cost effective solutions to bear for our clients
- We also incorporate water technology into client production and operational processes – we’ve run operations and know the challenges facing executives
- Many of our projects provide payback on capital in 3-5 years
- Ability to team with other professional and engineering organizations and models as flexibly as client needs dictate