City of Santaquin
Utah Reuse Program

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Norm Beagley, P.E. – Santaquin City
In the spirit of full disclosure...

- First speaker
  - Engineer of Record – Santaquin WRF (treatment side)
  - While at J-U-B Engineers; 2006-2014
  - Now employed at Brown and Caldwell, SLC

- Second speaker
  - Engineer of Record – Santaquin WRF (offsite facilities)
  - While at J-U-B Engineers; 2006-2014
  - Currently City Engineer – Santaquin City
The lay of the land...
...and why its important

1995 Conservation and Use of Sewage Effluent Act
- Upstream water right holders maintain the water rights

Great Salt Lake
- Terminal inland salt sea
- Facing challenges similar to other resources that have ‘dried up’

Utah Lake
- Active phosphorus TMDL
- Public scrutiny due to algal blooms
## Reuse framework – water quality perspective

<table>
<thead>
<tr>
<th>Design Criteria</th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public contact</td>
<td>Likely</td>
<td>Not likely</td>
</tr>
<tr>
<td>Treatment level</td>
<td>Tertiary (filtration)</td>
<td>Secondary</td>
</tr>
<tr>
<td>Turbidity, NTU</td>
<td>Average &lt; 2</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>If &gt; 5 then alternative discharge or disposal is required</td>
<td></td>
</tr>
<tr>
<td>BOD, mg/L</td>
<td>&lt; 10</td>
<td>&lt; 25</td>
</tr>
<tr>
<td>TSS, mg/L</td>
<td>(turbidity intent is &lt; 5 mg/L TSS)</td>
<td>&lt; 25/35</td>
</tr>
<tr>
<td>E-coli org/100 mL</td>
<td>Median - Non detect</td>
<td>&lt; 126</td>
</tr>
<tr>
<td></td>
<td>No sample &gt; 9</td>
<td></td>
</tr>
</tbody>
</table>
Santaquin, UT
• Strong growth (1995-2007)
• Lagoon system out of capacity
• After some ‘challenges’ the City elected to move forward with a full reuse system
Santaquin WRF had higher initial cost...and more long term benefits

<table>
<thead>
<tr>
<th>Option Description</th>
<th>20 Year Life Cycle</th>
<th>Adds to water supply portfolio</th>
<th>Gets away from Utah Lake discharge?</th>
<th>Meets City land use planning objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Regionalize with nearby facility</td>
<td>$23M-$25M</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Expand lagoons, store, land apply</td>
<td>$18M-$20M</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3. Advanced reuse facility (includes filtration)</td>
<td>$25M-$27M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
“Secondary Water” has been a common practice in Utah (before it was called purple pipe)

1970s until today
- Conversion of ag water supplies (untreated) to “secondary supplies”
- Mostly pressurized
- Common selling point for residential homes
Overall Process
1. Headworks/dewatering
2. Biological process
3. Membrane filtration
4. UV disinfection
5. Reclaimed water pumping
6. Biofilter
Historical context, performance and impact on Santaquin’s water supply portfolio
Santaquin . . . Agreements

City Extent Prior to 1995

Population - Approx 2,572
(US Census 1995 estimate)
Households - Approx 808
Land Area - 1730 Acres
Santaquin . . . Agreements ’00 to ‘03

Between ’00 and ’03
20 annexations
Development Agreements for 4,260
lots (88% yet to be built)

2004 Population - Approx 6,545
Households - Approx 1764
Land Area – 4,617 Acres
Santaquin ... 2004 to 2010

Between ’04 and ’10
5 annexations and Development Agreements for 1,756 lots
(98% yet to be built)

2011
2010 Population – 9,128
Households– 2,508

Total Lots Remaining to be built – 5,482
Santaquin . . . Waste Water History

- **Pre-1991**: septic systems

- **1991-1995**: City evaluates options and plans, bonds, and builds 0.49 mgd lagoon and winter storage system; all disposal via land application

- **2001-2003**: Very fast growth, regional studies considered, additional winter storage is constructed at lagoon location
  - Did not include any additional treatment
  - Did not include discharge permit or any additional land for land application

- **2005**: further review of mechanical options
2006-2009: Engineering study and facility plan to reconsider long-term treatment options and mechanical plant technologies before funding additional expansions while facing system failure concerns.
• 2009: City Council adopted a resolution selecting the option for a new mechanical Membrane Bio Reactor (MBR) treatment plant (with reuse) to be built north of the City
• 2011: Residents & some nearby residents move to stop/block funding for constructing the new MBR plant
• 2011 (November): Referendum Vote
  • First defeated by 3 votes
  • After a (2nd) recount by the court, passes by 3 votes
  • Moving wastewater treatment facility ends up being very contentious issue
• 2012: Construction begins on Water Reclamation Facility (WRF)
WRF Performance

- GE/Zeeweed 500
  - No turbidity excursions to date
  - Maintenance cleans
  - Periodic CIP
- UV Disinfection
  - No coliform exceedances
- Operations staff
  - Two operators
  - No staff at nights or on weekends
### Distribution Strategies and TDS Management

<table>
<thead>
<tr>
<th>Water Source</th>
<th>TDS, mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canyon/Runoff Irrigation Supplies</td>
<td>180-200</td>
</tr>
<tr>
<td>Santaquin WRF</td>
<td>500-600 mg/L</td>
</tr>
<tr>
<td>Blend*</td>
<td>300-400 mg/L</td>
</tr>
</tbody>
</table>

* Over 2,500 feet of additional distribution pipe was installed to move reclaimed water into large distribution main line to provide mixing.
Storage and Distribution

- Reclaimed water introduced in the Citywide pressure irrigation system April 2014
- Lagoons decommissioned as lagoons, now winter storage for Type 1 water

Reclaimed from WRF to Storage

Irrigation water to distribution system
Santaquin had control

- Either by good luck or good management, or a combination of the two, Santaquin never obtained a discharge permit to the waters of Utah.

- With no discharge to State waters, Santaquin retained full water rights to wastewater effluent. (6,000 a.f. with 5,300 a.f. reuse)
Reclamation and Reuse

• Reuse has become a boon for Santaquin City
• During 2014 & 2015 irrigation seasons, reuse water was very much needed
• During 2015 more than 20% - 22% of water used in the City’s secondary pressure irrigation system was Type 1 water
• This percentage will increase as growth continues to occur

IRRIGATION SEASON NOTICE: Santaquin Residents, remember the irrigation water that comes out of our pressurized irrigation system is NOT potable water. It should NOT be used for drinking, filling kiddie pools, or other human consumption. The water is safe for human contact, agricultural and residential uses excluding human consumption. It is normal for the irrigation water to smell different than drinking water because it originates from a pond. Please educate your children by explaining the proper use of the irrigation water.

www.santaquin.org
Key to Santaquin’s water supply portfolio and future

• Santaquin City has obtained a groundwater recharge permit
  • In the future, Santaquin plans to recharge type 1 water for winter storage (waiting on a recovery permit to make use of recharged water)
• Water reuse in Utah will be important in the future as water resources continue to be strained due to continued growth
Utilizes hollow fiber membrane filters to separate biological solids from reclaimed water.
Project highlights

- 5 funding partners
- No discharge permit; 100% reuse in secondary irrigation system
- No off spec water in over 5 years of operation
- Currently adding a fourth membrane train due to community growth
Over 500 improved lots yet to be built upon.

Over 200 additional lots on approved preliminary plats.