Demand-Side Management

- Water Conservation and Drought Response
- Water Reclamation Initiative (Direct Reuse Program)
- Drought-related Operational Impacts
- Water Loss Management: Infrastructure Leak Index (ILI)/Water Loss Tracking
Water Conservation and Drought Response

Staff Presentation
**What’s the Right Approach?**

<table>
<thead>
<tr>
<th>Conservation</th>
<th>Drought Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term</td>
<td>Short-term</td>
</tr>
<tr>
<td>Slower implementation</td>
<td>Quickly implemented</td>
</tr>
<tr>
<td>Savings realized gradually</td>
<td>Savings realized immediately</td>
</tr>
<tr>
<td>Focus on cost-effective strategies</td>
<td>Focus on amount of possible savings</td>
</tr>
<tr>
<td>Emphasis on technology</td>
<td>Emphasis on behavior</td>
</tr>
</tbody>
</table>
Austin’s Conservation Programs

• Started in early 1980s

• Expanded in mid-90s with focus on consumer incentives & household conservation

• 2006-2007 Task Force renewed interest
  – Council goal: Reduce Peak Use 1% annually over 10 years (25 MGD)
  – Achieved an estimated 35 MGD peak reduction by 2011
  – Mandatory watering restrictions, acceleration of reclaimed water lines, plumbing code changes, irrigation design requirements
Austin’s Conservation Programs

• 2009 Resolution & Citizen Task Force
  – **Council goal:** Reduce average use to 140 GPCD by 2020
  – Evaluated existing, pending and new strategies
  – Recommended cost-beneficial, flexible programs
  – Found most savings strategies were already implemented or recommended

• 2011 Resource Management Commission Workgroup
  – Met with 3-member panel of RMC to present accomplishments, unify various MGD/GPCD goals
  – Continue to update with monthly reports and quarterly presentations
Documented Savings in 2011

- Multivariate regression analysis developed to support baseline adjustment to pro-rata curtailment plan
- Models used historical data to predict monthly consumption by customer class as a function of weather, growth and conservation measures
- Verified total impact of programs, not individual measures

<table>
<thead>
<tr>
<th>Contribution</th>
<th>Source</th>
<th>Savings (AF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation Efforts</td>
<td>Econometric Models</td>
<td>18,196</td>
</tr>
<tr>
<td>Reclaimed Water</td>
<td>Meter Data &amp; Eng. Calcs.</td>
<td>4,989</td>
</tr>
<tr>
<td>Water Loss Reduction</td>
<td>Meter Data &amp; Eng. Calcs.</td>
<td>3,081</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>26,266</strong></td>
</tr>
</tbody>
</table>
Savings Estimates

• Three primary sources:
  – National end-use and bench-testing studies
  – Results from other cities adjusted for Austin
  – Pilot testing & bill analysis of AWU customers

• Examples:
  – Rainwater harvesting
    • Initial estimates based on TWDB manual not realized post-installation; need to adjust for cost-benefit
  – “Evolve” showerhead adapter
    • Manufacturer savings claims; preliminary data shows water increase
Estimated Breakdown of Savings

- Regulation: 39%
- Rates: 20%
- Reclaimed: 14%
- Incentives: 11%
- Education: 1%
- Operations: 15%
Major Conservation Efforts

- Accelerated plumbing fixture replacement
- Plumbing code efficiency & irrigation design requirements
- Voluntary & mandatory irrigation evaluations
- Car wash efficiency requirements
- Year-round irrigation & water waste restrictions and enforcement
- Aggressive residential pricing structure & seasonal commercial rates
- Reclaimed water system expansion
- Faster leak response & proactive leak detection
- Accelerated water line replacement
- Incentives for landscape conversion and rainwater harvesting
- Incentives for commercial audits & upgrades
- Universal metering, separate irrigation meters
- Public & school education
Drought Contingency Planning

- Record low inflows to Highland Lakes in 2011
- Once/week watering creating pressure on distribution system
- Potential for pro-rata curtailment
- Then-current Stage 3 would have virtually eliminated outdoor watering
- Public calls for earlier drought response
Drought Plan Changes

• Stronger conservation measures outside of drought
  – Commercial irrigation evaluations & car wash standards, towel/linen reuse & water on request, max. 2x/week watering, water waste prohibited

• Stronger restrictions in early drought
  – Earlier trigger point at 1.4 MAF – 5% reduction target

• Status quo in moderate/severe drought
  – Continue to go to 1x/week watering at 900,000 AF – 15% reduction target

• Less stringent in catastrophic conditions
  – Allow some watering at 600,000 AF – 20% reduction from baseline year

• Align precisely with LCRA triggers
  – Maximizes media coverage, minimizes impact to citizens
Drought Stage 3 Measures

• Reduced irrigation hours (10-15 to 6)
• Reduced patio mister hours (4pm-8pm)
• No filling of spas
• Restrictions on splash pads
• Increase in violation fine amounts
Emergency Stage 4 Measures

- No outdoor irrigation, no system testing or repair
- No vehicle washing
- No fountains, splash pads, misters
- No water use to repair or operate pools, spas, fountains
- No washing of outdoor surfaces
- Athletic fields for health/safety; variances possible for foundation, tree disease treatment, pest control
- Increase in violation fine amounts
## Fines for Violations
### (Residential/Commercial)

<table>
<thead>
<tr>
<th></th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2</td>
<td>$75 / $200</td>
<td>$150 / $400</td>
<td>$300 / $500</td>
<td>$500</td>
</tr>
<tr>
<td>Stage 3</td>
<td>$150 / $300</td>
<td>$300 / $500</td>
<td>$450 / $500</td>
<td>$500</td>
</tr>
</tbody>
</table>
Future Demand Projections

- 5-yr financial forecast assumes Stage 2
- Estimated water use reductions by customer class and drought stage through 2019
- Adjusted for diversion, pumping, billing variance

<table>
<thead>
<tr>
<th>Projected Diversions in Thousand Acre-Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Stage 2</td>
</tr>
<tr>
<td>Stage 3</td>
</tr>
<tr>
<td>Stage 4</td>
</tr>
</tbody>
</table>

* As of 5/2014, estimates subject to change
Daily Average Pumpage – May through October

Pumpage – Million Gallons per Day (MGD)

- 2006 - No restrictions
- 2009 - Twice per week

www.austintexas.gov/water
2013 GPCD
13 pts under target
5-year average
GPCD dropped
17% since FY06
Questions and Discussion
Water Reclamation Initiative (Direct Reuse Program)

Staff Presentation
What is Reclaimed Water?

- Highly treated wastewater effluent
- Quality – akin to river water
- Demand management tool
- Major uses
  - Irrigation
  - Cooling
  - Manufacturing
  - Toilet flushing
The Current System

Miles of trans. main – 48
Customers – 61
Annual use – 1.47 billion gallons (FY13)

How much water is that?

2,186 olympic-sized swimming pools
29 million car washes
0.9 billion toilet flushes
Reclaimed Water Customers

Existing (60)
- Clay/Kizer Golf Course
- Sand Hill Energy Center
- Hornsby Bend
- Mueller Shopping Center
- Krieg Fields
- HEB Mueller
- BAE Systems
- University of Texas
- Frost Bank
- ABIA
- Thinkery

Planned (300+)
- Central Library
- State Capitol
- Governor’s Mansion
- Republic Park
- State Cemetery
- Travis County Complex
- Capital Complex
- Downtown
- Guerrero Park
- ACC Riverside
- ACC Rio Grande

Using purple to keep Austin green
Using purple to keep Austin green

27
Completing the Core

• Near-term construction program, $5-8 million/yr
• 19 miles of main, one tank and pump station
• Improve customer service
• Increase customers to 135
• Increase volume to 2.2 BG/yr
Projects Under Design

- Montopolis Tank and Pump Station
- Burleson Road Pressure Conversion
- Capitol Complex Main
- Junction 420 Main
- Cemetery Main
- FM 973 Relocations
Projects Under Construction

- Walnut Tank and Pump Station Upgrade
- UT Medical Center (Red River)
- Smith Road Extension
- 2nd Street (Library)
- $5-8 million /year

Using purple to keep Austin green
2007 Water Cons. Task Force Projects

- UT Transmission Main
- ABIA Transmission Main
- Smith Road Extension
- Main to Colorado River Park (aka Montopolis Main)
- 24” Main Rehabilitation
- 12” Main Rehab – Clay/Kizer
- 12” Main Rehab – Hwy 183
Plans and Opportunities

Miles of trans. main – 130
Annual use – 8.34 billion gallons

How much water is that?

12,400 olympic-sized swimming pools
208 million car washes
5.21 billion toilet flushes
### Bulk Water Fill Stations

<table>
<thead>
<tr>
<th>Station Location</th>
<th>Annual Usage (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hergotz Lane</td>
<td>847,870</td>
</tr>
<tr>
<td>Hornsby Bend</td>
<td>24,360</td>
</tr>
<tr>
<td>PARD</td>
<td>1,424,900</td>
</tr>
<tr>
<td>Walnut Creek WWTP</td>
<td>under construction</td>
</tr>
</tbody>
</table>

*Using purple to keep Austin green*
Questions and Discussion
Drought-related Operational Impacts

Staff Presentation
Process Overview

- Raw Water Influent
- Mixing Well (Rapid Mix Zone)
- Sedimentation Zone
- Floculation Zone
- Clearwell
- Distribution
- Settled Water Collection

Chemicals:
- Carbon
- Chlorine
- Fluoride
- Ammonia
- Ferric Sulfate
- Lime (Optional)
- Carbon Dioxide
- Sodium Hex.
- Chlorine (Optional)

Source: www.austintexas.gov/water
Water Treatment Impacts

• Raw Water Quality Changes
  – Higher levels of algae that can lead to taste and odor
  – Increased total trihalomethane formation
  – Increased hardness

• Chemical Demand Increase
  – Powdered Activated Carbon
  – Chloramine
2004 Algae Related Taste & Odor Event

T&O Calls and Blue Green Plankton Counts

Blue-green Algae Count

Date

T&O Calls

PAC FEED INITIATED

10/11/2004
10/13/2004
10/15/2004
10/17/2004
10/19/2004
10/21/2004
10/23/2004
10/25/2004
10/27/2004
10/29/2004
10/31/2004
11/2/2004
11/4/2004
11/6/2004

BGPlankton

T&O Calls

www.austintexas.gov/water
2009 Algae Related Taste & Odor Event

T&O Calls and Blue Green Plankton Counts

Blue-Green Algae Count

T&O Calls

Date


Blue Green Plank (org/ml)
2013 Algae Related Taste & Odor Event

T&O Calls, Dinobryon & Blue Green Plankton Counts

Blue-Green Algae & Dinobryon Count

T&O Calls

PAC FEED STARTED

Blue Green Plank (org/ml)  Dinobryon  Taste & Odor Complaints
Algae Taste & Odor Events Summary

• Variety and Counts
  – Counts increased: 1,000 to 16k to 20k, more variety

• Duration
  – Increasing: 2 wks to 2 months to 6 months

• Cost
  – Increasing: $50k to $100k to $250k
Increased Trihalomethanes
Increased Hardness
System Impacts

• Lower flows lead to longer water age

• Longer water age in warmer temperatures leads to decline in chlorine residuals
  – Prior to FY 2010, target for chlorine residual leaving the plant was 2.2 mg/l
  – In December 2010, increased the target for chlorine residual leaving the plant to 2.5 mg/l
  – In 2013, raised the target to 2.75 mg/l for 4 months
  – 2014, will monitor system and make decision accordingly
Impacts to Wastewater System

- Increased strength of influent stream to wastewater treatment plants
- Dillo Dirt sales down due to outdoor water restrictions
- Experienced delays in land application on contracted site due to inability to move livestock with lack of grasses with drought
Questions and Discussion
Water Loss Management

Infrastructure Leak Index (ILI)/Water Loss Tracking

Staff Presentation
Summary

• Terminology
• Water Losses – Apparent and Real
• Real Loss Management Strategies – PM, ALC, Speed/Quality, R&R
• Real Loss Management Strategies - Austin Water
• Leak Management Performance
• Questions?
Terminology

• Real Water Loss – Physical losses of water from leakage from pipes, joints, fittings, reservoirs, hydrants etc.

• Apparent losses – Accounting losses of water that is being used but not billed. This is caused by inaccuracies with customer metering, consumption and billing data handling errors, assumptions of unmeasured use, and any unauthorized use such as theft.
WATER LOSS MANAGEMENT

APPARENT LOSS MANAGEMENT

REAL LOSS MANAGEMENT

Active Leakage Control

• Leak detection Services – 5 year program starting point (20% per year) completed 2012.
• Last 2 years – 1500 miles inspected using acoustic technology.
• Large diameter leak detection started three years ago.
Renew Austin - Water Main Rehabilitation and Replacement

- In 2012, Austin Water launched Renewing Austin
- Five year program to upgrade aging water mains
- Approx. $125 Million investment to rehabilitate or replace about 75 miles of water pipe
Leak Response and Repair

• In FY 2009, Austin Water added a second shift to its leak response

• Most leaks now repaired in one day or less.

• Valve Exercising Initiatives
Leak Work Order Repair Times

Improvement in Leak Repair Times

Number of Leak Work Orders

- Same Day
- 1 Day
- 2-3 Days
- > 3 days

FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14
Pressure Management

• Overflow Control
• Monitoring Tank Levels, pressure points (SCADA)
• Calibration of tank level sensor
• Calculating or trending water loss from overflows
Austin Water
Leak Performance Indicators

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Infrastructure Leak Index (Ratio)</th>
<th>Water Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td>2009</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td>2010</td>
<td>3</td>
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<tr>
<td>2011</td>
<td>3</td>
<td>5.7</td>
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<tr>
<td>2012</td>
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</tr>
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Questions and Discussion