Approaching Water Sustainability through Water/Wastewater Reductions

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USACHPPM - Surface Water and Wastewater Program
Sustaining the Army Mission

- FORSCOM initiative
  - Identify environmental issues that could compromise future mission
  - Develop long range goals in coordination with stakeholders
  - Tie these goals to resources and implement
Ft Lewis Water Sustainability Goals

- **By 2025**
  - Cascade water use to achieve zero discharge of wastewater
  - Reduce potable water consumption by 75%
  - Contribute no pollutants to groundwater and remediate all contaminated groundwater

- **By 2012,** develop effective regional aquifer and watershed management program
Reducing Wastewater Discharges

- Conservation
- Reclamation and Reuse
- Augmentation
Conservation

EO 13123, Greening the Government Through Efficient Energy Management
Water Conservation Goals

- Water Management Plan
- 4 (or more) water efficiency BMPs
- ACSIM (Army) Deadline
  - Water Management Plan – Oct 04
  - Implemented BMPs - 2010:
APG Potable Water Usage

- Housing: 31%
- Commercial - workers: 14%
- Commercial - food: 2%
- Commercial - support activities: 2%
- Golf courses: 5%
- Wash racks: 0%
- Steam plants: 2%
- Hydrant flushing: 2%
- Dust control: 1%
- Line losses: 14%
- Line losses: 2%
Federal Energy Management Program BMPs

- Includes
  - Operations and Maintenance Options
  - Retrofit and Replacement Options
    - < 10 year pay back
- 1 - Public Information and Education Programs
  - 10-15% annual savings in water usage
BMPs - continued

2 - Distribution System Audits, Leak Detection, and Repair
   - Audit losses > 20%

3 - Water Efficient Landscaping
   - Promising if water usage > 10%
BMPs - continued

- 4 - Toilets and Urinals
  - Fix leaking toilets
  - Replacement of old toilets
- Flushing Standards
  - < 1994, 4-7 gpf
  - currently 1.6 gpf
BMPs - continued

- 5 - Faucets and Showerheads
  - Current standard 2.5 gpm

- Other opportunities for residential water saving
  - Dishwashers
  - Clothes washers
BMPs - continued

- 6 - Boiler and Steam Systems
- 7 - Single Pass Cooling Equipment
- 8 - Cooling Tower Management
- 9 - Miscellaneous High Water Using Processes
- 10 - Water Reuse and Recycling
Reclamation and Reuse

Source Substitution
Reuse Regulations

- No Federal regulations or standards for water reclamation and reuse
  - “Guidelines for Water Reuse” - 1992
- Within the US, state agencies are responsible for water reuse standards
Requirements for Non-potable Reuse

- Conventional water and wastewater treatment technology
- Match between water quality and intended use
- Protection of human health
- Public acceptance where it is being introduced
# Reclaimed Water Match

<table>
<thead>
<tr>
<th>grade 1</th>
<th>grade 2</th>
<th>grade 3</th>
<th>grade 4</th>
<th>grade 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>secondary, filtration, disinfection</td>
<td>grade 1, plus NH3 removal</td>
<td>secondary, ultra-filtration, RO</td>
<td>grade 3 plus lime softening</td>
<td>double RO</td>
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<tr>
<td>landscape irrigation</td>
<td>cooling towers</td>
<td>low pressure boiler feed</td>
<td>potable water augmentation</td>
<td>high pressure boiler feed</td>
</tr>
</tbody>
</table>
Landscape Irrigation

- Parade fields
- Recreation fields
- Landscaped areas
- Golf courses (w/ water hazards)
- Single family/multifamily residences
Toilet Flushing

- Housing Complex
- Combined WW Flow
- WW Package Plant
- Effluent
- Recycle to Toilets
Membrane Bioreactor Configurations

In-Series

- Feed
- Biomass
- Permeate

Submerged

- Feed
- Biomass
- Permeate
- Aeration
Vehicle Washing
Industrial Applications

- Central Energy Plant
  - Cooling tower make up
  - Wet scrubbers
  - Boiler make up water
Other Opportunities

- Dust control
- Sale for agricultural uses
- Man-made Wetlands
Augmentation of Potable Water Supplies

Groundwater Recharge
Stream Augmentation
Groundwater Recharge

- Intent is to replenish groundwater
- Applications
  - Augmentation of potable water supplies
  - Storage for reclaimed water
    - Aquifer storage and recovery (ASR)
  - Establish salt-water intrusion barriers in coastal areas
Recharge Mechanisms

- Surface spreading
- Direct injection
Stream Augmentation

- Seeks to replenish a surface water

Applications
- Augments a potable water supply
- Maintains stream flow for fish, wildlife, and aesthetics

Example
- Occoquan Reservoir, Virginia
Summary

- Opportunities are available for water conservation and wastewater reuse
- Past efforts were limited.
- Now we see a more programmatic view towards water conservation and installation sustainment