



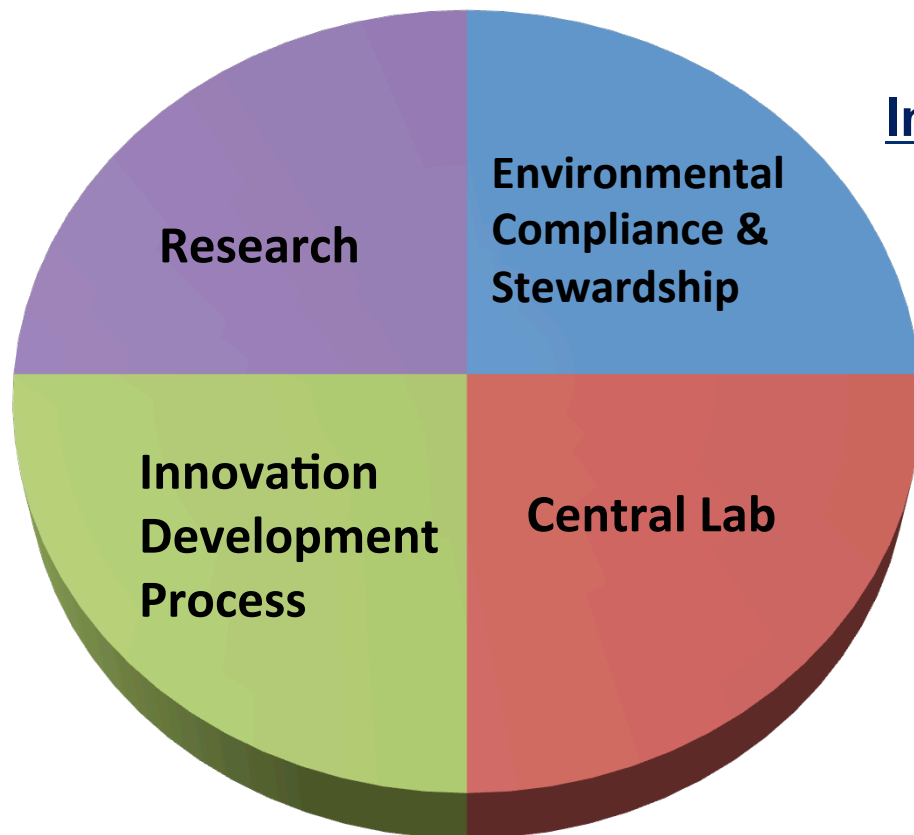
AMERICAN WATER

American Water's Innovation Development Program Delivers Results

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INNOVATION AND ENVIRONMENTAL STEWARDSHIP



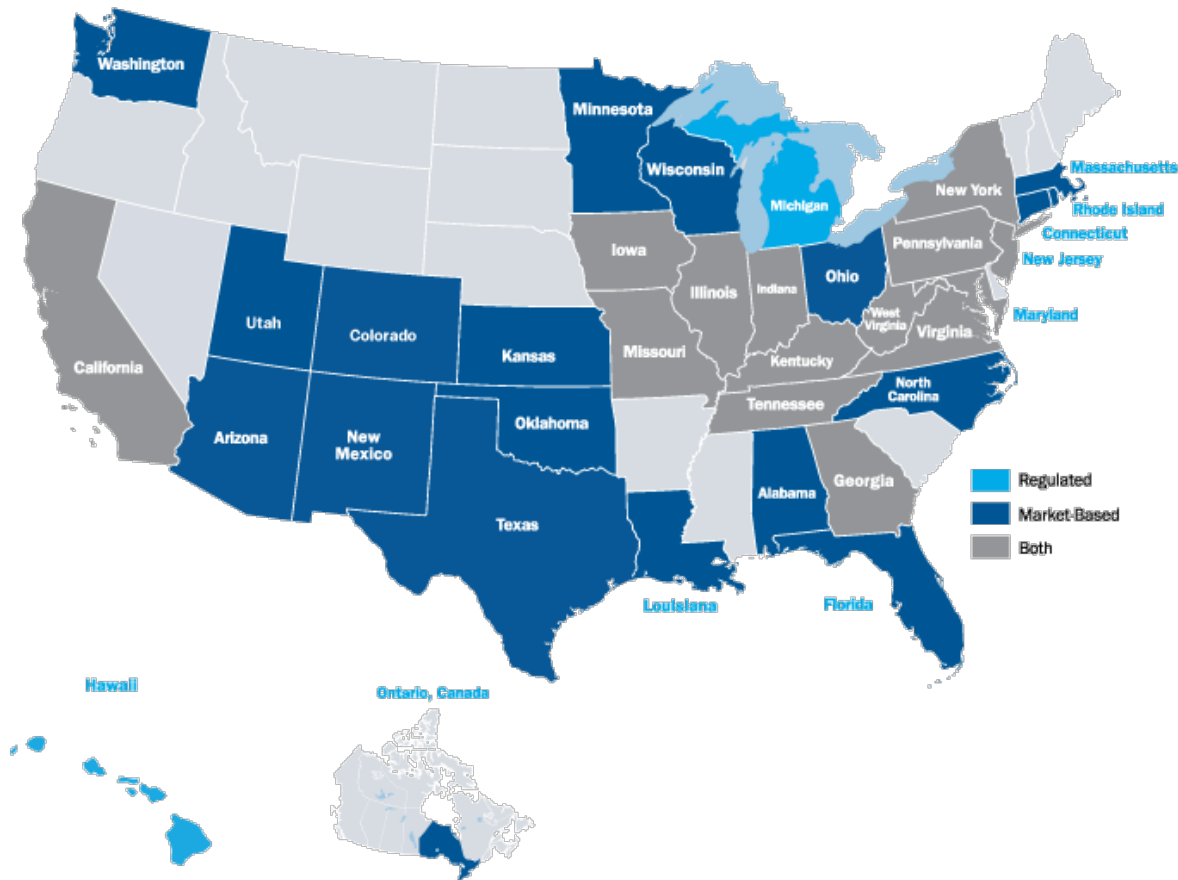
Interdisciplinary team of 40 people:

- Engineers
- Chemists
- Microbiologist
- Environmental Scientists

Objectives:

- Address emerging water quality or regulatory issues
- Evaluate & recommend new technology to enhance operations
- Support operations with technical, functional expertise
- Support Business Development
- Enhance Corporate brand

Our “Laboratory”



American Water is the largest water and wastewater services provider in North America, headquartered in Voorhees, NJ.

American Water provide services to approximately 15 million people in more than 1,600 communities in more than 40 states and in Canada; and employs about 6,500 water professionals.

American Water owns or operates over 300 drinking water systems and 200 wastewater facilities.

We treat and deliver over a billion gallons of water daily

The company conducts over one million water quality tests each year for over 100 regulated parameters, and up to 50 types of water-related tests each day.

Scope of American Water's Operations



	Owned Assets	Contract Ops	Total
Drinking water systems	264	64	328
Surface water plants	81	8	89
Ground water plants	520	62	582
Ground water sources (wells)	1037	148	1185
Wastewater Systems	131	66	197
Reclaimed Water Systems	20	15	35
Desalination	1	1	2

American Water produces over 1 billion gallons/day

Challenges to the Water Industry

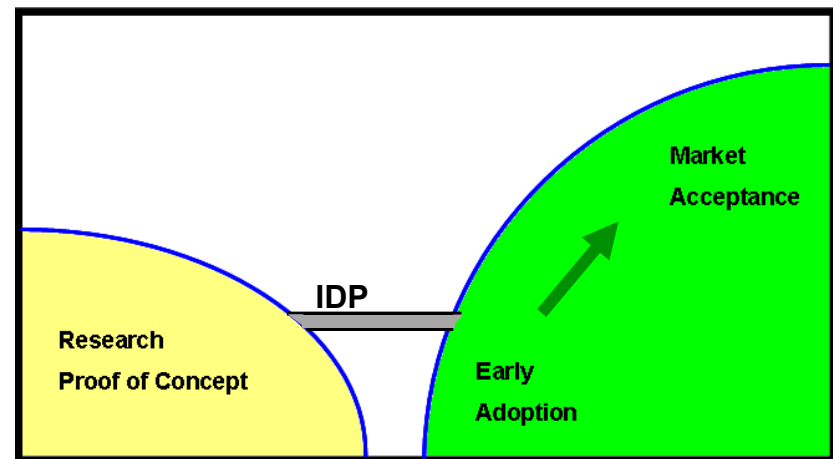
- Water scarcity
- Aging infrastructure
- Emerging contaminants
- Financially strapped municipalities
- Operational efficiency
- New environmental regulations
- Advanced treatment technologies
- Energy Efficiency / Climate change
- Environmental concerns/stewardship
- Security
- Customer satisfaction
- Automation
- & more

Need new
innovations to
address these
challenges



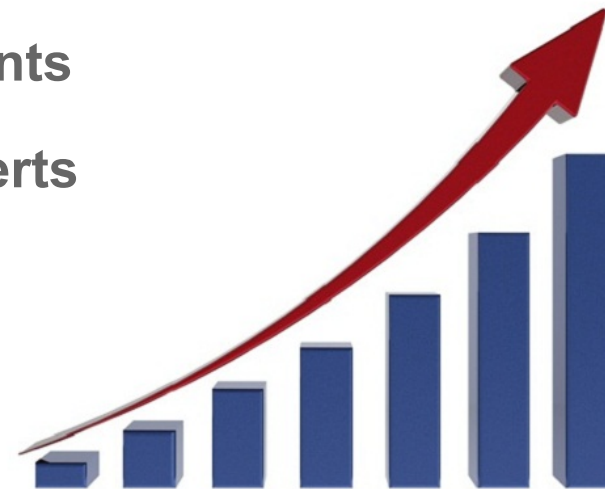
What is the “Innovation Development Process”?

- A way to leverage American Water’s research and market position to build customer and shareholder value through innovation
- A mechanism to leverage our nationwide physical assets to test and develop new opportunities
- A process to differentiate American Water from the rest of the industry
- A way to drive efficiencies (e.g., capital investment to reduce opex) into American Water and grow the business



The “Innovation Development Process”

1. Uses a Stage Gate process to screen innovations
2. Execute non-disclosure agreements
3. Technical screen by internal experts
4. Initial financial screen
5. Validation Study
6. Business case development
7. Purchase agreement
8. Marketing agreement

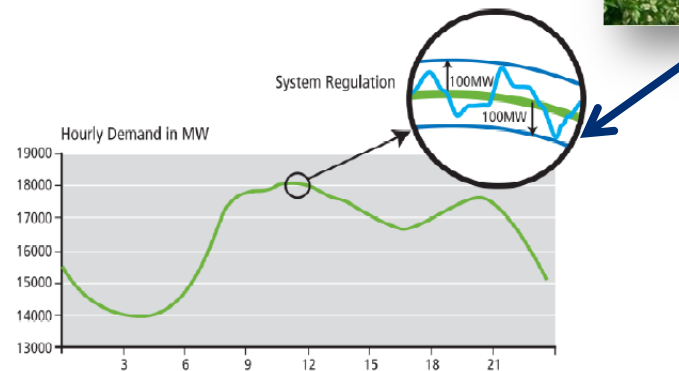


Screening Questions

1. Does it address a pressing need?
2. Is the solution scalable?
3. Could it reduce cost?
4. Is it unique or competitive?

Smart Grid

- ENBALA Power Network interfaces the electric grid with SCADA systems
- Increases or decreases power use to provide grid balance
- Seamless to operations
- Generates revenue using existing assets
- Installed in PA and NJ



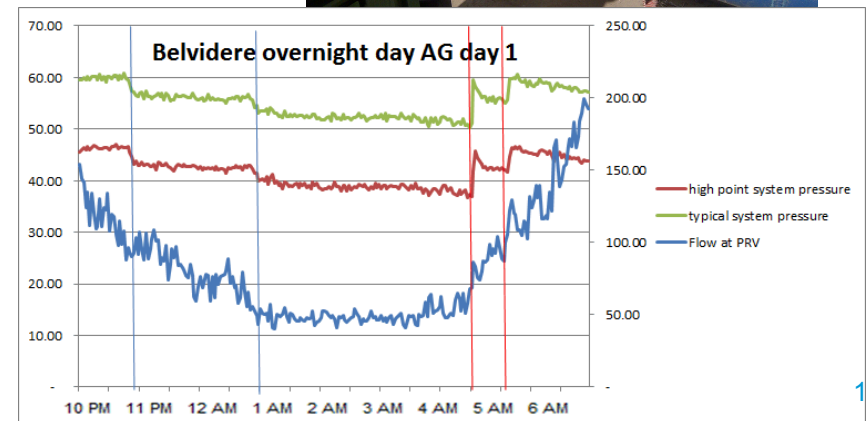
Smart Metering Systems



- Consolidation of data from 3.1 million water meters
- Commoditization of meters
- Reduction in acquisition costs
- Data analytics for stopped meters, continuous running meters, backflow
- Integrated customer service
- Improved customer interface

Smart Distribution Systems

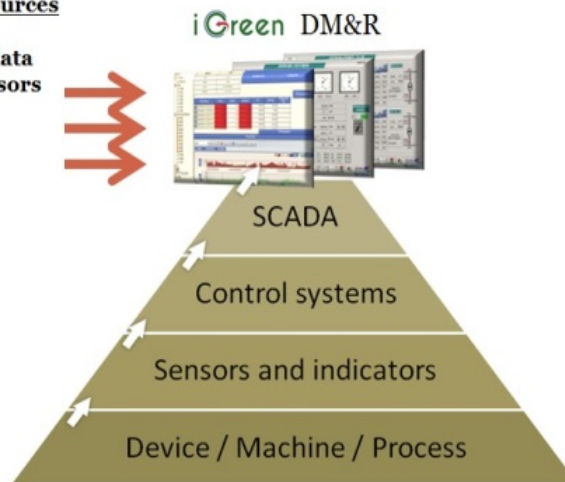
- American Water with Israeli partner Stream Control was selected by the BIRD Foundation to validate a technology for pressure management
- Turns “dumb” pressure reducing valves into “smart” devices
- Pressure management reduces leakage, reduces main breaks, prolongs asset life
- Automatically adjusts pressure with changes in flow
- Will be evaluated at five locations in NJ, MO, WV, PA, and CA
- Validate the technology and non-revenue water savings



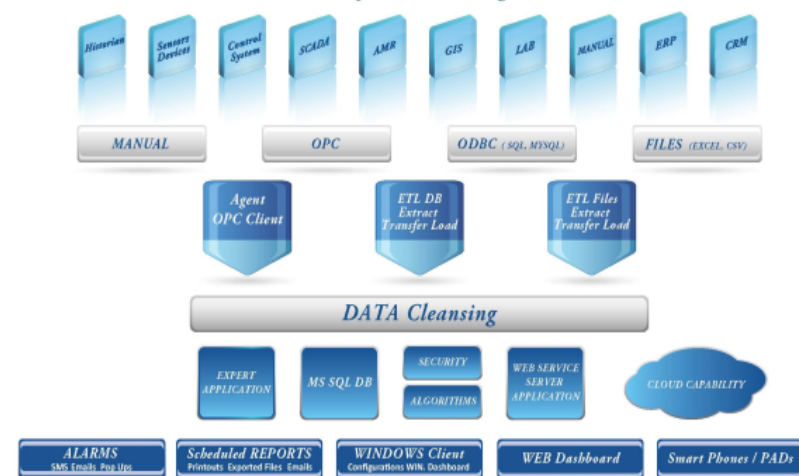
Smart Data Management

External data Sources

- Lab data
- AMR/MDM data
- External Sensors
- GIS
- ERP
- CRM
- Manual



iGreen System Block Diagram



IOSight

Collects and analyzes multiple data streams (from multiple platforms/sources) to identify system efficiencies in customized reports to reduce OPEX costs

- ◆ Optimization of chemical feeds
- ◆ Pump efficiency
- ◆ Residuals management
- ◆ Proactive/preventative maintenance

Smart Devices

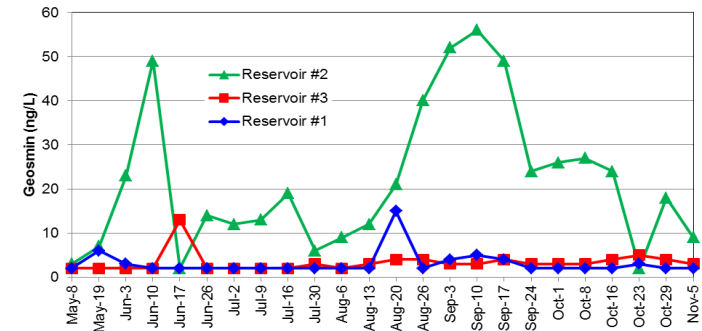
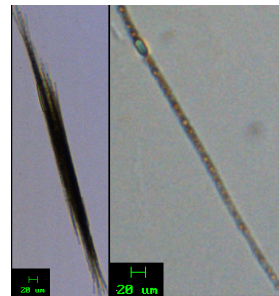
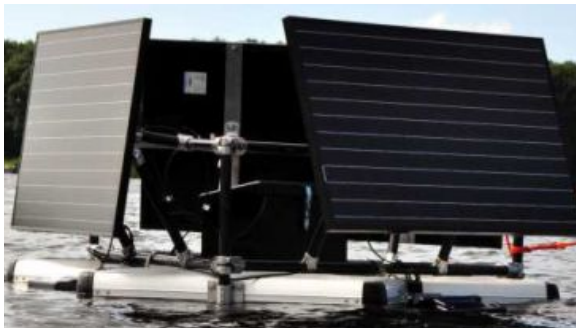
- **EDLORE - embedded chip in equipment**
- **Provides on the spot information**
 - Operation manuals
 - ◆ 3D view of equipment
 - ◆ Underground mains, utilities
 - Safety procedures
 - Maintenance history
 - Self diagnostics
 - ◆ Anomaly detection
 - ◆ Service order
 - ◆ Parts replacement
- **Trial underway at NJAWC**



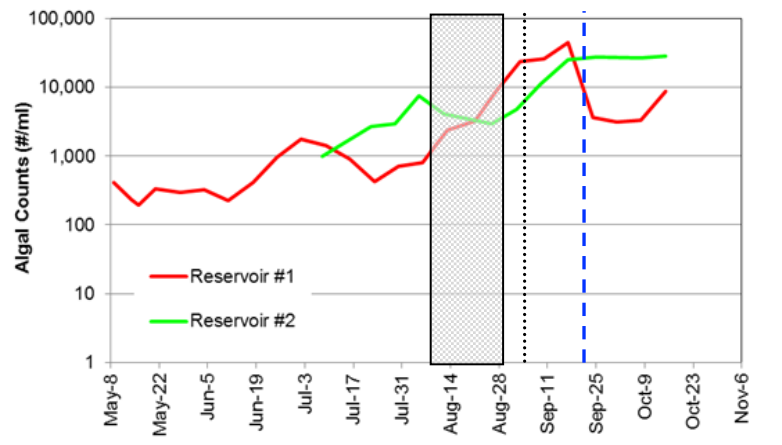
Smart Reservoir Management

Installed four LG Sonic MPC buoys in Reservoir #1 May 2014

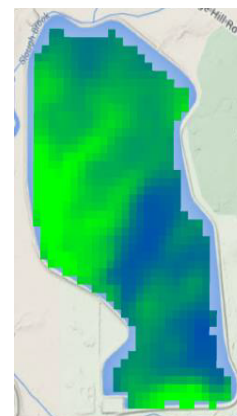
- Solar powered buoys have on-board monitors to measure algal pigments, DO, pH, Redox, turbidity
- Adjustable ultrasonic frequency to target different algae



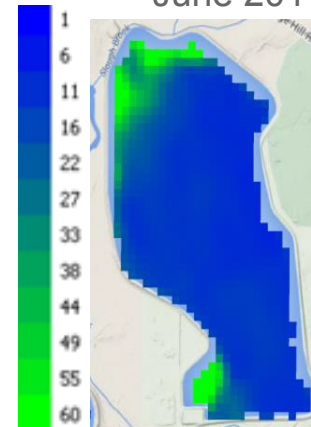
- ✓ OPEX savings of \$87,800.
- ✓ The Four LG buoys cost \$160,000
- ✓ Simple payback of 1.8 years



June 2013

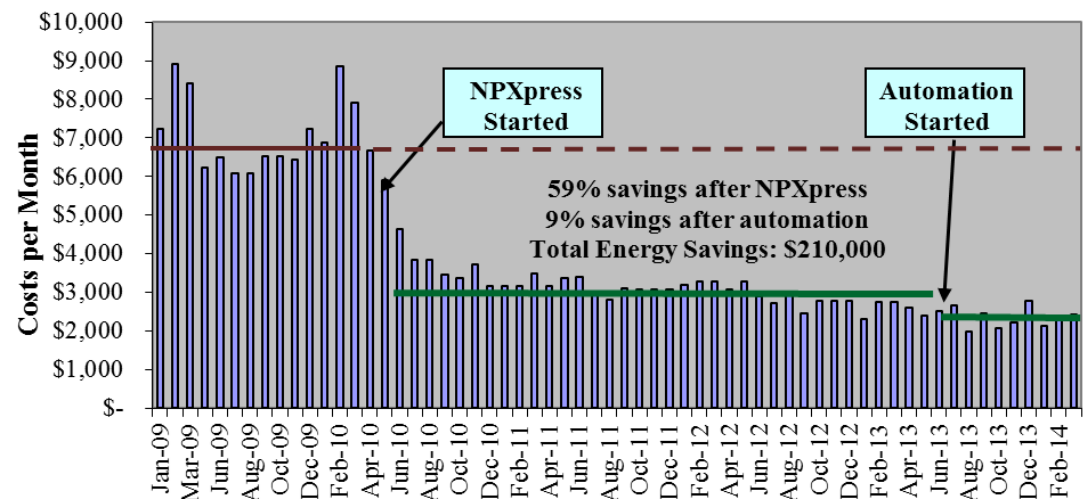


June 2014



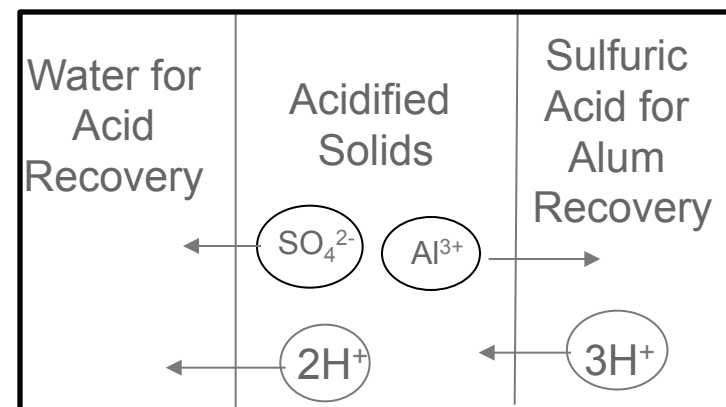
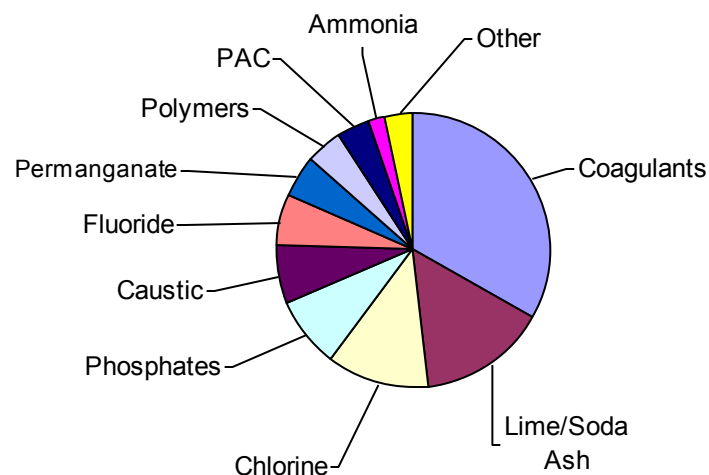
Energy Efficient Wastewater Treatment

- NPXpress is a unique nitrogen and phosphorous removal wastewater treatment that has been patented by American Water
- Significantly reduces the energy requirements to treat wastewater
- Reduce/eliminate the amount of additional carbon required for denitrification
- Reduces chemical requirements for phosphorous removal
- Testing ongoing at 7 sites.
Projected <2 year payback
- Initial 6 sites in NJ averaging 35% energy reduction, over \$400,000 in accumulated savings over a three year period - \$0.57/m³ operational cost savings



Coagulant Recovery

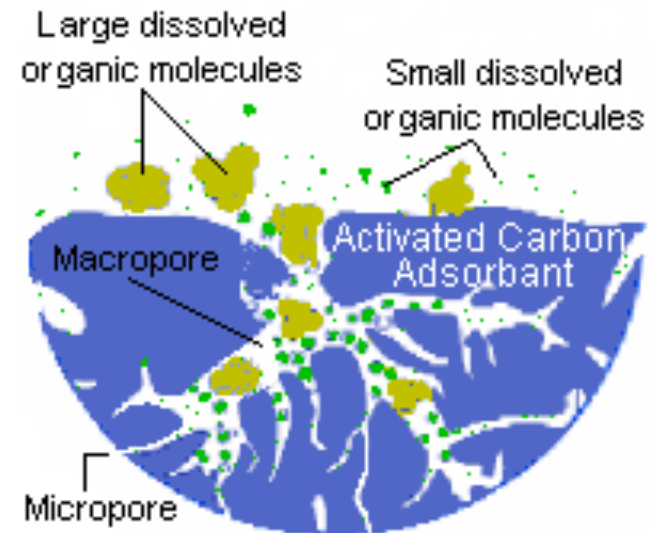
- Multi million dollar yearly expenditure on chemicals with one third of costs related to coagulants
- Water treatment plant sludge/residuals management costs high due to transportation and disposal costs
- Patent applied for related to recovery of alum or ferric from the residuals
- Sludge is acidified and thickened and a membrane system is used to separate the coagulants for reuse.
- Pilot testing being performed to determine system configuration and scale up plans



Granular Activated Carbon - Biofiltration

- AW has over 12 million pounds of GAC at 40 water treatment plants which is replaced on a 2-4 year schedule
- GAC is used to comply with specific water quality targets such as VOC's, SOC's and taste and odor compounds
- GAC acts in adsorption mode and supports biofilms
- By encouraging bacteria to colonize the filters replacement schedules can be extended with no impact on performance
- Deferred replacement would save approximately 1 million lbs/year and full biofiltration would save 2.7 million lbs/year
- Validation testing is ongoing in multiple states

How Activated Carbon Works



Innovation vs Invention

Invention is the *creation* of a new gadget, technology, or process

Innovation is the *application* of solutions, processes, or technologies better meet exist needs or new requirements

Innovation creates value



More Innovations!

- **Blissfield** Treatment to superoxygenate wastewater
- **New Limits** Wastewater lagoon ammonia treatment
- **E-Sens** Mobile "lab on a chip" – 16 parameters
- **Nanoselect** In pipe microchip sensor
- **PPI Pipe** High strength PVC pipe
- **WPE (UCLA research)** Membrane with polymeric & ceramic materials
- **ANFIRO MIT research)** RO membrane using multi-block co-polymers
- **UV Pipe disinfection** Disinfecting new pipe with UV radiation
- **Pipe Fix drone** Fix water distribution pipes while in service
- **ESRI** GIS Mapping collaboration
- **Dorot** Development of a new smart meter
- **WellToDo** Catalytic nitrate removal technology

WE CARE ABOUT WATER. IT'S WHAT WE DO.

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