

# This presentation premiered at WaterSmart Innovations

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# EPA – A Leader in Water Conservation, Reducing its Flow One Facility at a Time

## WaterSmart Innovations Conference

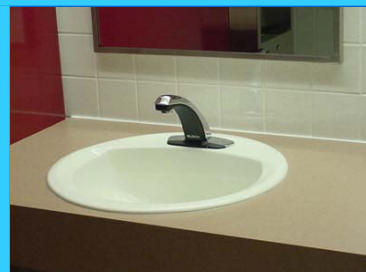
U.S. Environmental Protection Agency

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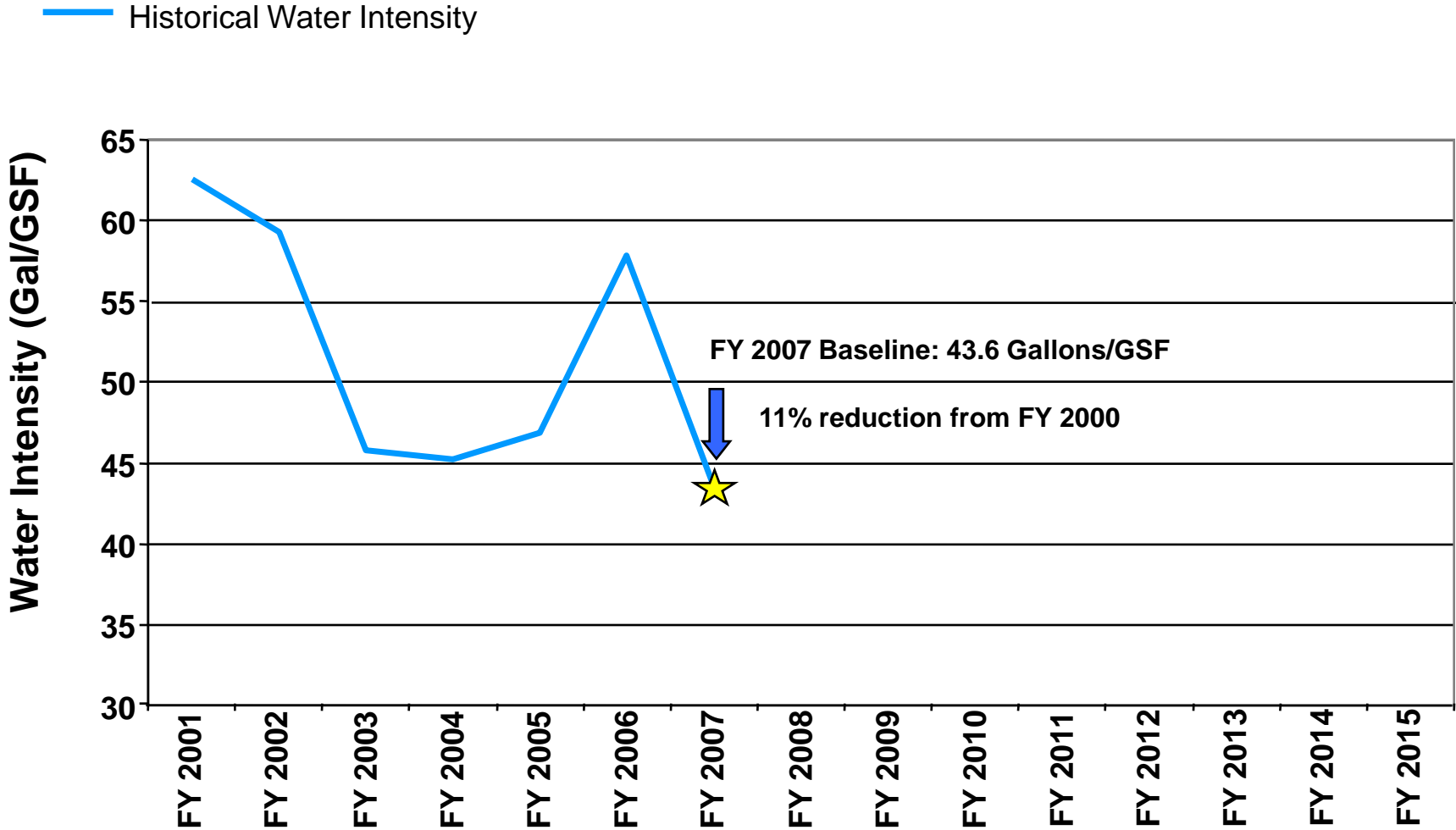
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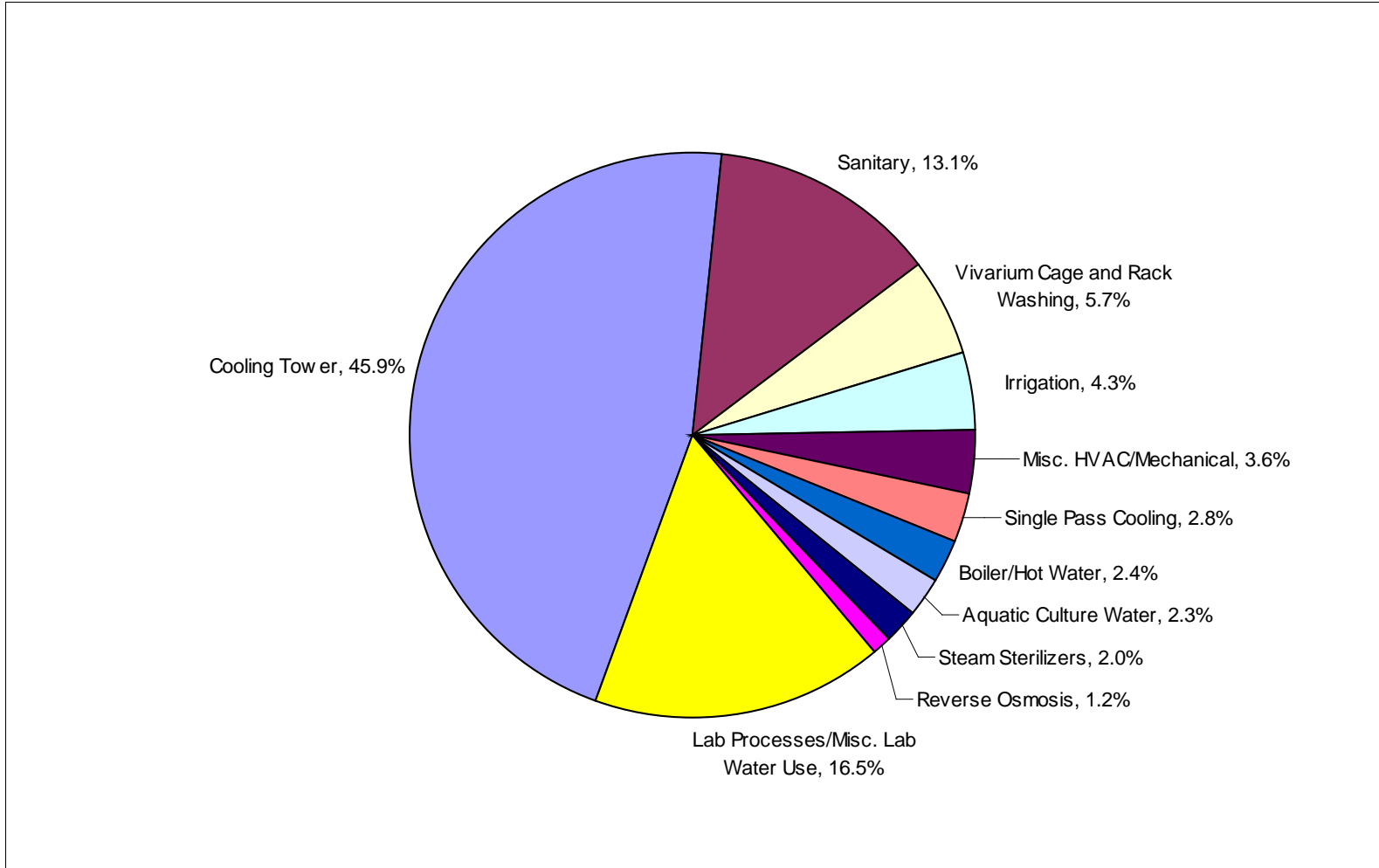
## Historical Perspective

- EPA Water Conservation: FY 2002 to FY 2007
  - All EPA reporting facilities are laboratories
  - EPA set an internal goal to reduce water use 15% by FY 2010 from a FY 2000 baseline
  - Water Management Plans completed at all 30 reporting facilities
  - Identified, established best practices
  - Reduced water use 11% by FY 2007
  - Established good understanding of status and future opportunities
  - Learned from North Carolina drought in 2007
  - 167 million gallons annual consumption (new FY 2007 baseline, established under E.O. 13423)

# EPA Average Water Intensity, FY 2001 to FY 2007



# EPA Laboratory Baseline Water Use – FY 2007



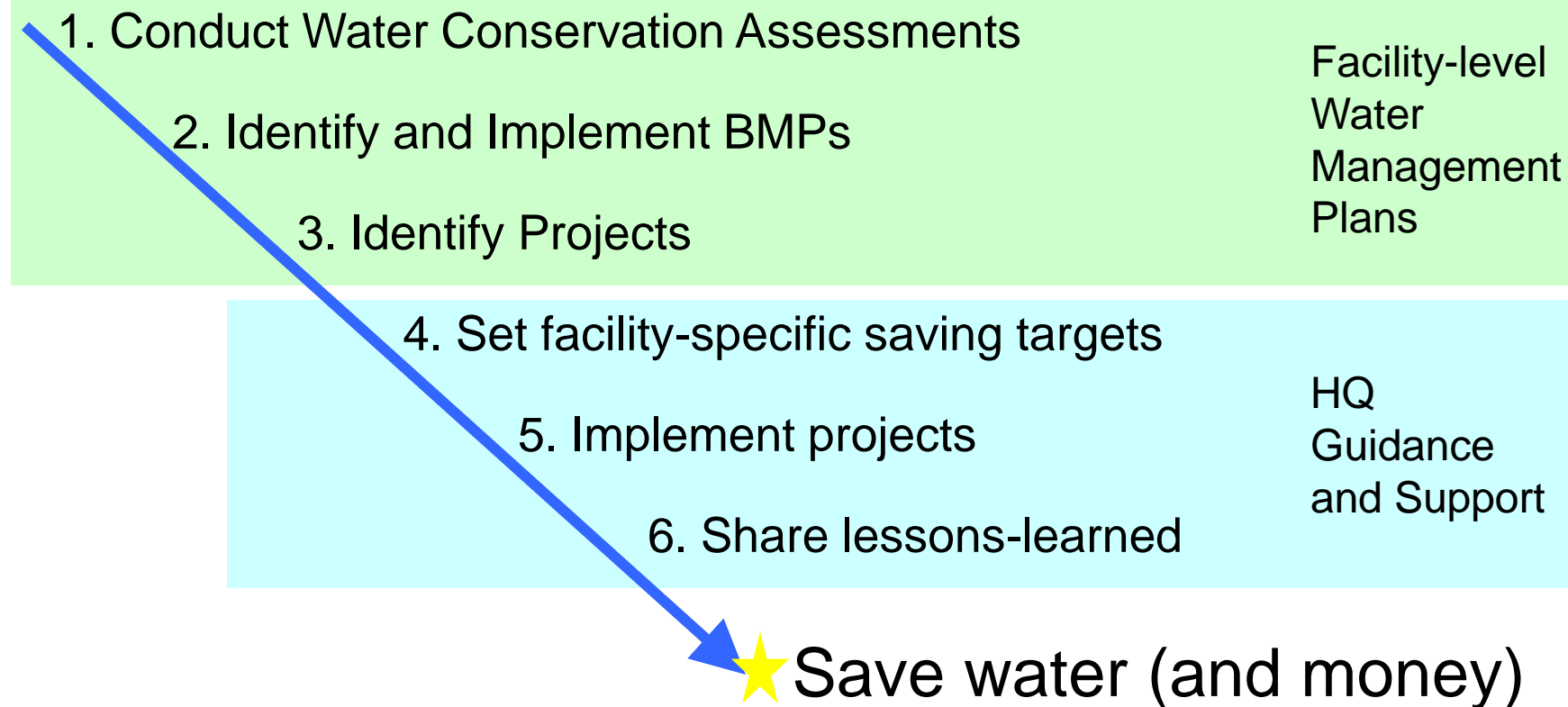
## EPA Water Conservation Strategy

- Under a 2007 Executive Order, EPA has to reduce water from 167 million gallons per year to 140 million gallons per year, a 27 million gallon reduction
- Started with good understanding of EPA's water budget
- Concerned whether EPA could meet the new goal
- Projected our potential savings for each approach and each facility
- Spreadsheet identified where opportunities were and where they weren't

# Estimated Reduction Potential

Use	Agencywide Savings Potential (FY 2007 – FY 2015) (Million Gallons)	Method
Cooling Tower	3.2	Control/Optimization
	8.7	Energy Projects
	6.2	Condensate Recovery
Sanitary	1.5	0.5 gpm Lavatory Faucets
	3.5	High-Efficiency Toilet Retrofits
	2.4	0.25 gallons per flush (gpf) Urinals
Cage Washing	1.6	Control/Optimization
Irrigation	2.2	Upgrade or Eliminate
Misc. HVAC/Mechanical	1.6	Various
Single Pass Cooling	4.4	Eliminate
Steam Sterilizers	2.6	Retrofit/Optimize
<b>TOTAL</b>	<b>38</b>	<b>Represents 23% of 2007 Baseline</b>

# EPA Water Conservation Strategy





# Executive Order (E.O.) 13423

- E.O. 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*
  - Water use intensity (gal/GSF)
    - Reduce 2% annually from FY 2007 baseline
    - 16% total between FY 2007 and FY 2015
  - Where applicable:
    - Purchase WaterSense® labeled products
    - Choose irrigation contractors who are certified through a WaterSense-labeled program



# Energy Independence and Security Act (EISA) of 2007

- EISA 2007 – Sec. 432:
  - Complete comprehensive energy and water evaluations at 25% of covered facilities each year
  - Implement life-cycle cost-effective measures
  - Measure and verify savings

# Sustainable Buildings Memorandum of Understanding (MOU) and Guiding Principles

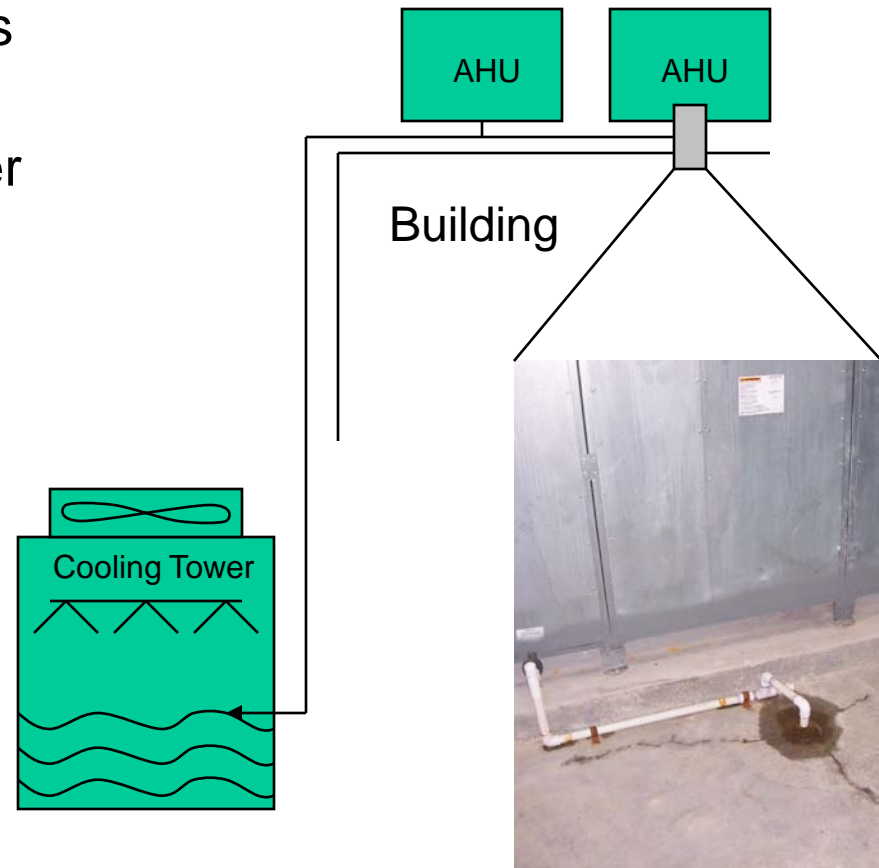
- MOU Implementation under E.O. 13423
  - Applicability:
    - 100% of new construction and major renovations
    - 15% of existing building inventory by FY 2015
  - Requirements:
    - Indoor potable water use: Reduce by 20%
      - Compared to building water use in FY 2003 or a year thereafter, or
      - Compared to a water baseline calculated using 2006 plumbing codes
    - Outdoor water: Reduce by 50%
      - Compared to conventional methods, or
      - Compared to measured irrigation water use in FY 2003 or a year thereafter

# Key Water Saving Initiatives

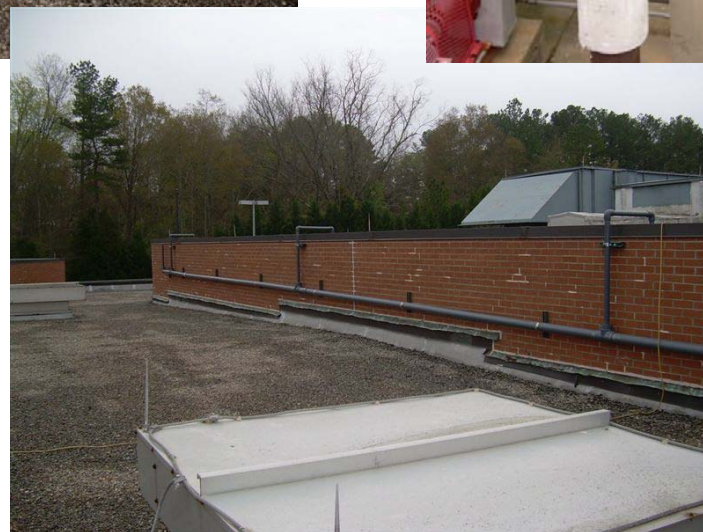
- Air handler condensate recovery
- Faucet retrofits
- Irrigation system improvements
- Full court press at largest facility
- Mechanical system upgrades
- Catch and correct problems

# Air Handler Condensate Recovery

- Projects with verified savings:
  - Athens SESD: 550,000 gallons per year
  - Houston: 1,400,000 gallons per year
  - Kansas City: 240,000 gallons per year
- Projects recently completed:
  - Edison: late 2008
  - Athens ORD: late 2008
  - Fort Meade: June 2009
- Planning underway at other locations:
  - RTP, NC: up to 6,000,000 gallons per year



# Air Handler Condensate Recovery



## Faucet Aerator Retrofits

- Most facilities had 2.2 or 2.0 gpm lavatory faucets
- Plumbing Supply Fittings Standard ASME/ANSI 112.18.1/CSA B125.1
  - Requires that public use faucets flow at 0.5 gpm
- Retrofit lavatory faucets at all facilities
  - Maximum flow rate to 0.5 gpm
  - Savings per occupant is over 250 gallons/year
- 1 million gallons of annual savings in FY 2008
- 0.5 million gallons of additional annual savings projected in FY 2009



# Irrigation Status

- Most EPA reporting facilities do not irrigate
  - Seven have native or xeric landscapes
  - Others use acculturated plants, allow turf to go dormant





## Irrigation Status

- Four facilities have significant irrigation systems
- Where automatic irrigation is installed, irrigation water makes up 30 to 70 percent of facility water use
- Conducted irrigation audits at all four facilities in FY 2008 using WaterSense partners

# Irrigation Audits



# Irrigation System Improvement

- System redesign at Golden and Ada
  - WaterSense irrigation partners preferred for design/build work
  - Water-efficient system should save facility 50% in outdoor water use
- System repair/upgrade at Houston
  - WaterSense irrigation partner preferred
  - System repairs should save facility 25%+ in outdoor water use



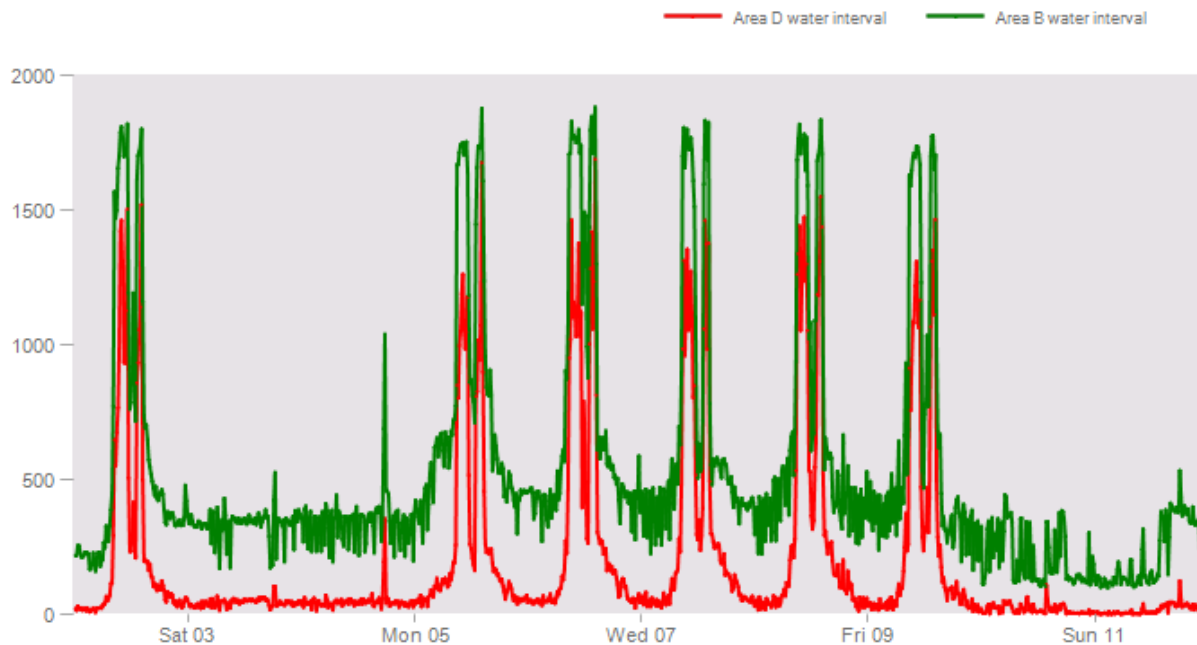
# RTP: Multiple Projects, Massive Savings

- Eliminated single-pass cooling
  - Used to cool laboratory equipment
  - By switching to recirculated, chilled water, combined savings of 500,000 gallons annually
- Steam sterilizer control optimization
  - Eliminated the continuous flow of tempering water
  - Instituted operational controls to limit cooling water flow to times when the sterilizer is being used
  - 860,000 gallons savings annually

# RTP: Multiple Projects, Massive Savings

- Cage and rack washing schedule changes
  - Adjusted the washing schedule from five days a week to four days a week
  - 1.6 million gallons savings annually

Mar 02 2007 to Mar 12 2007





## RTP: Multiple Projects, Massive Savings

- Cooling tower control
  - Optimized use and control of ancillary cooling tower
  - 1.9 million gallons savings annually
- Pre-rinse spray valve retrofits
  - Replaced three non-efficient pre-rinse spray valves in the cafeteria
  - 60,000 gallons savings annually
- Faucet aerator retrofits
  - Replaced 2.0 gpm faucets with 0.5 gpm
  - 500,000 gallons savings annually

## RTP: Multiple Projects, Massive Savings

- Vacuum pump seal flow reduction
  - Adjusted the control timer sequence and reduced the water supply to a central laboratory vacuum system by two-thirds
  - 340,000 gallons savings annually
- RTP-Main saved a total of 8.1 million gallons in FY 2008, a 15 percent reduction!

# Mechanical System Upgrades

- Vacuum Pump Replacements
  - Cincinnati: replace with dry, “claw” technology, 200,000 gallons savings annually
  - Kansas City: replace with closed-loop system, 900,000 gallons savings annually
- Reverse osmosis system reject water reuse
  - Fort Meade: 100,000 gallons savings annually



# Catch and Correct Problems

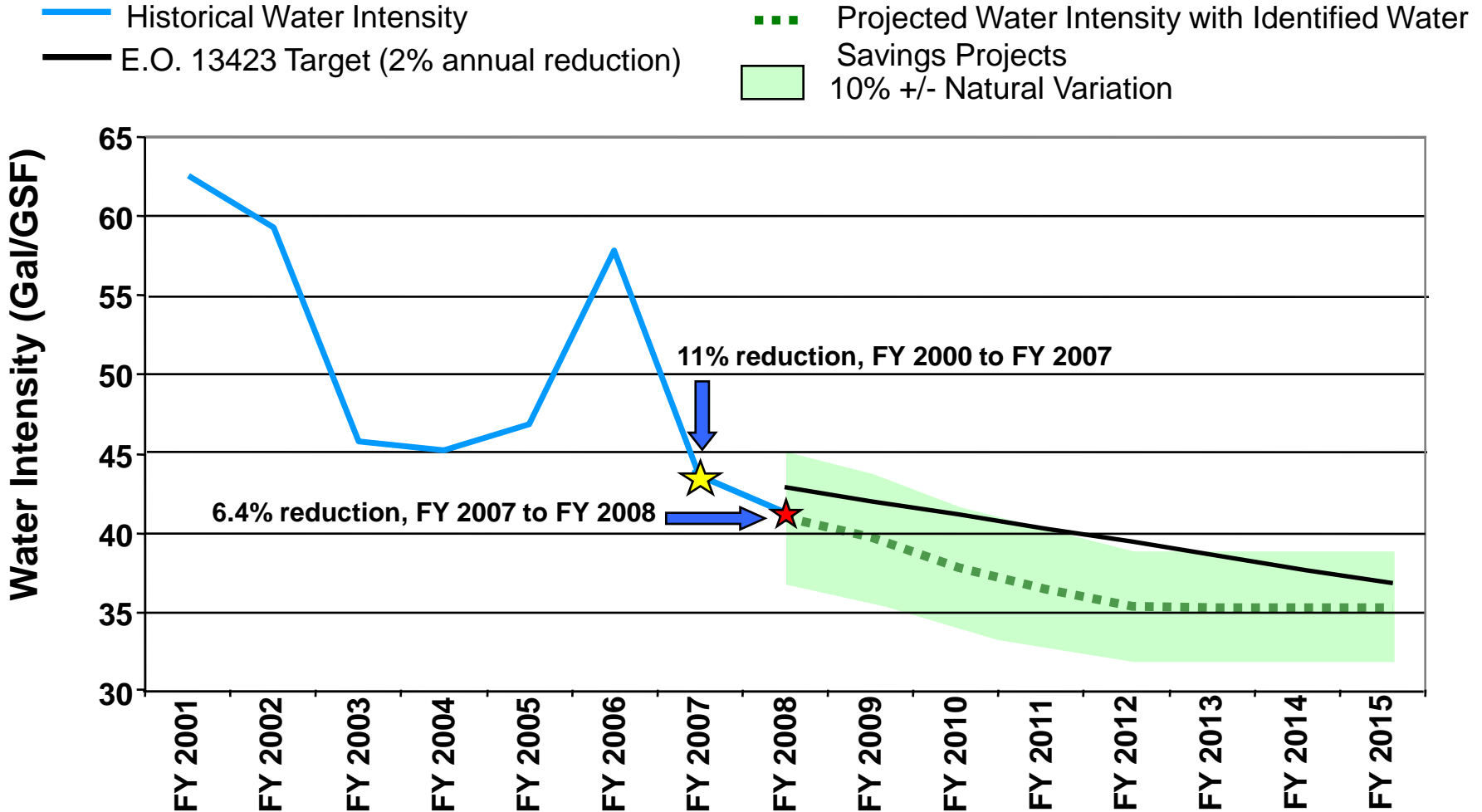
## Small Facilities Can Cause Big Problems

	FY 2007 Baseline Use (1,000 gallons)	FY 2008 Excursion (1,000 gallons)	Percent of Total	Event
Facility 1	1,166	300	26%	Failure of level sensor
Facility 2	358	2,200	615%	Potable water used as backup cooling supply
Agency Total	166,600	2,500	1.5%	

## What about Cooling Towers?

- 21 Towers in EPA portfolio
  - 18 with blowdown control using conductivity monitors
  - 5.0 median cycles of concentration – quality of supplied water plays an important role
- Operational efficiency improvement can be achieved at half
  - Under 100,000 gallons annual savings in most cases
  - Improved control yields 1,900,000 gallons annual savings in one instance
- Bigger savings will come from condensate recovery projects and energy projects that decrease load

# FY 2008 Results and Projected Future Savings



## Conclusions

- Need to know how you use water
  - True at both facility level and Agency level
  - Build strategic plan from that knowledge
  - It's not just bathrooms and irrigation
- A comprehensive approach using projects and practices can generate significant water savings
- Need to drive savings throughout the organization
- 16% or greater reduction is achievable

## Conclusions

- Water use is much more variable than energy use at EPA facilities; need to monitor performance differently
- Small facilities can have big problems
- Need to have a bigger cushion of savings to ensure meeting the E.O. 13423 goal
- Field has played a much larger role in water reductions than they traditionally have in energy reductions

## Questions?

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