

# This presentation premiered at WaterSmart Innovations

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look for



WaterSense®

# Research Paves the Way for High-Performing, Water- Saving Spray Valves

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# What Is WaterSense®?

- Voluntary partnership and labeling program launched by EPA in 2006 designed to reduce municipal water use across the country
- Simple way for consumers to identify products that use 20% less water and perform well
- WaterSense aims to increase the adoption of water-efficient products and services by consumers and organizations
- A label with integrity - third-party tested and certified, not only for efficiency, but for performance too





# WaterSense Product Evaluation Factors

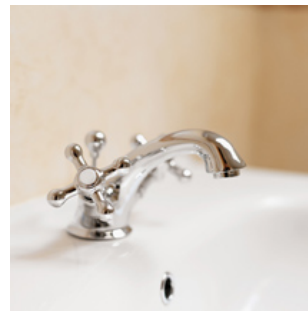


- WaterSense uses the following factors to determine which products to label. Products must:
  - Offer equivalent or superior performance
  - Be about 20 percent more water-efficient than conventional models
  - Realize water savings on a national level
  - Provide measurable results
  - Achieve water efficiency through several technology options
  - Be effectively differentiated by the WaterSense label
  - Be independently certified

# WaterSense Labeled Products



**Tank-Type Toilets**  
Labeled since 2007  
1,100 labeled models



**Lavatory Faucets**  
Labeled since 2007  
3,500 labeled models



**Flushing Urinals**  
Labeled since 2009  
140 labeled models



**Showerheads**  
Labeled since 2010  
600 labeled models



**Weather-Based Irrigation Controllers**  
Labeled since 2011  
30 labeled models

# WaterSense is Considering Pre-Rinse Spray Valves

- Pre-rinse spray valves (PRSVs) are used in commercial kitchens to remove food waste from dishes prior to dishwashing
  - Use nearly one-third of water used in the dish room
  - Use energy from heating hot water
- Many PRSVs are old and inefficient with flow rates exceeding the current federal requirement of 1.6 gpm



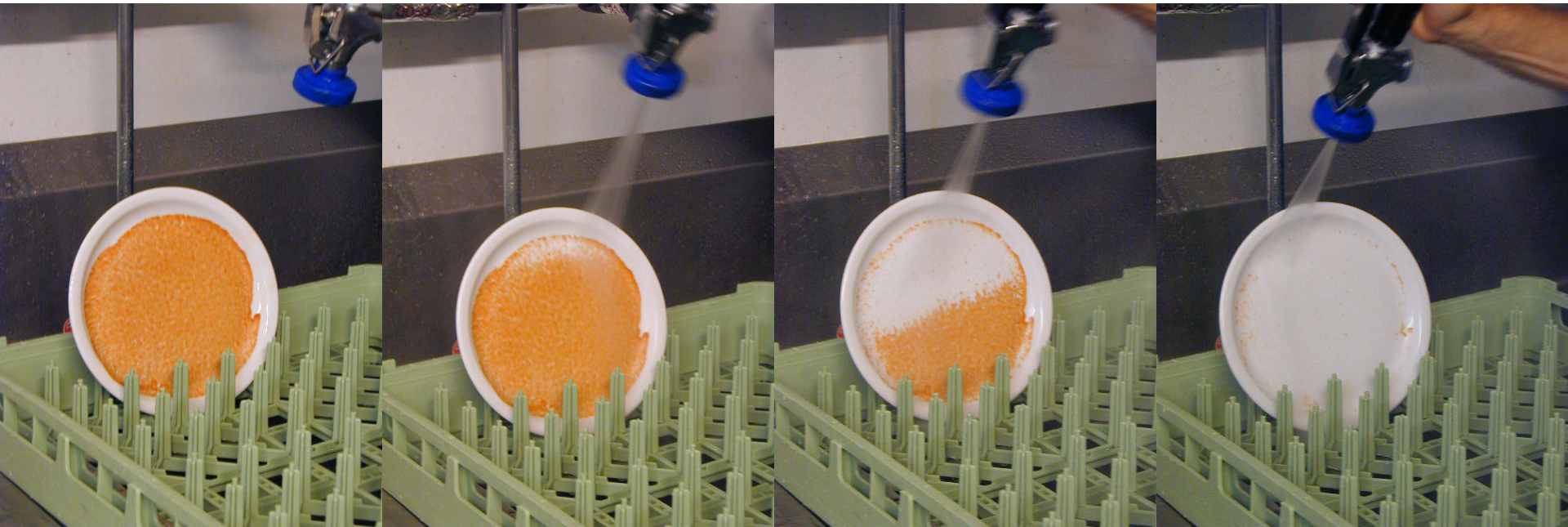
# WaterSense is Considering Pre-Rinse Spray Valves

- New products introduced with rated flow rates less than 1.0 gpm that perform well in a lab test
- To capitalize on this potential water and energy savings, EPA announced its intent to develop a specification



# Laboratory Use Time Test: Tomato Paste (Cleanability)

Testing to ASTM F2324-03 Standard Test Method for  
Prerinse Spray Valves







# The Importance of Performance and Long-Term Savings

- Small scale pilot studies indicated that PRSVs with flow rates less than 1.0 gpm are used longer and do not provide expected water savings
- In 2010, EPA commissioned a field study to investigate these findings before proceeding with specification development



# Study Objectives

- EPA developed a field study scope with the help of an ASME/CSA project team
- The objectives of the study were to determine if:
  - High-efficiency PRSVs save less water than expected because users have to spend more time rinsing dishes
  - Users are less satisfied with high-efficiency PRSVs
  - The existing ASTM F2324 cleanability test method provides an indication of PRSV performance in the field



# Study Scope

- From January through June 2010, EPA monitored PRSVs at 10 commercial and institutional kitchens in Boston, MA, and Washington, DC
- The 10 participating facilities included four university dining halls, one high school cafeteria, and five restaurants
- Facilities ranged from a small, 1,200-customers-per-week restaurant to a 35,000 customers-per-week university dining hall

# Study Scope

- Each facility's existing pre-rinse spray valve was monitored for three weeks
- Three new spray valves were also installed and monitored for three weeks each (one from each category, installed at random)
  - In total, 14 pre-rinse spray valve models were monitored in the field
  - Each individual spray valve model was tested at two or more facilities

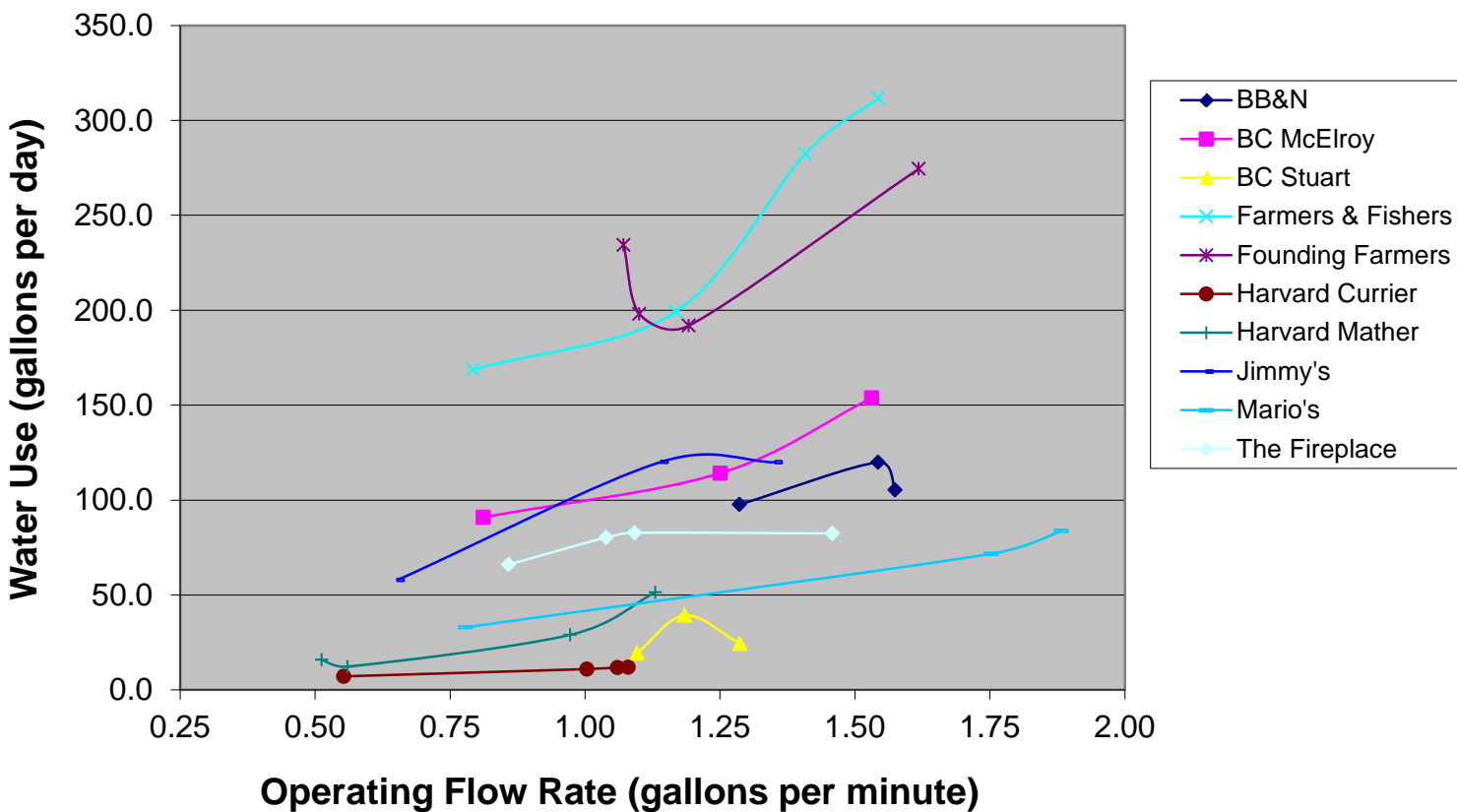
Category	Flow Rate Range	Number of Models
1	$\geq 1.25 - 1.6$ gpm	3
2	$\geq 1.0 - <1.25$ gpm	5
3	$< 1.0$ gpm	6

# Study Scope

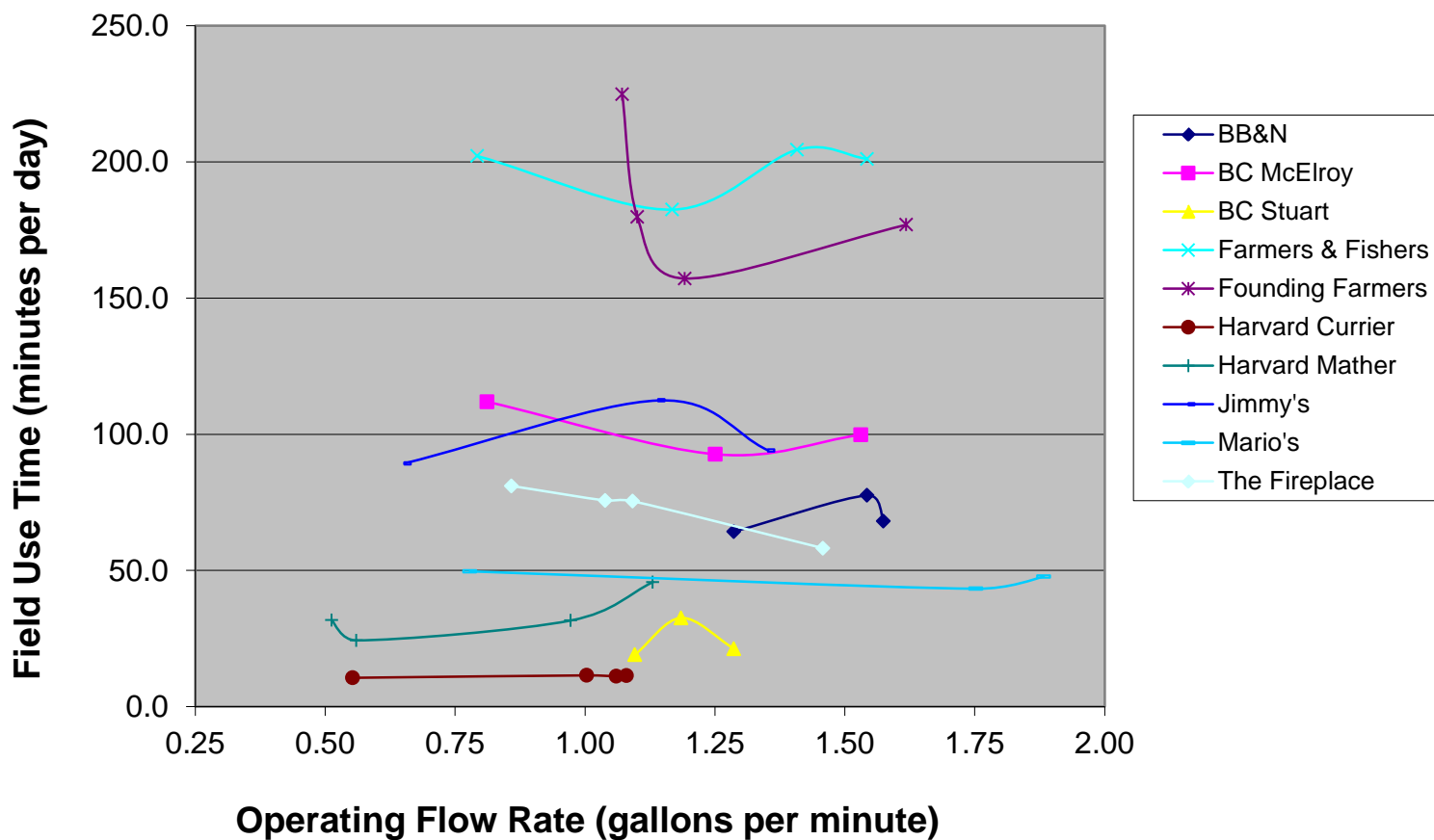
- Water meters and data loggers were installed at the 10 sites for data collection to measure and record average flow rate over time
- Temperature, flow rate, and water pressure were also tested weekly
- For each PRSV users were also asked to evaluate:
  - Pressure (spray force)
  - Ability to clean dishes
  - Spray pattern
  - Overall satisfaction



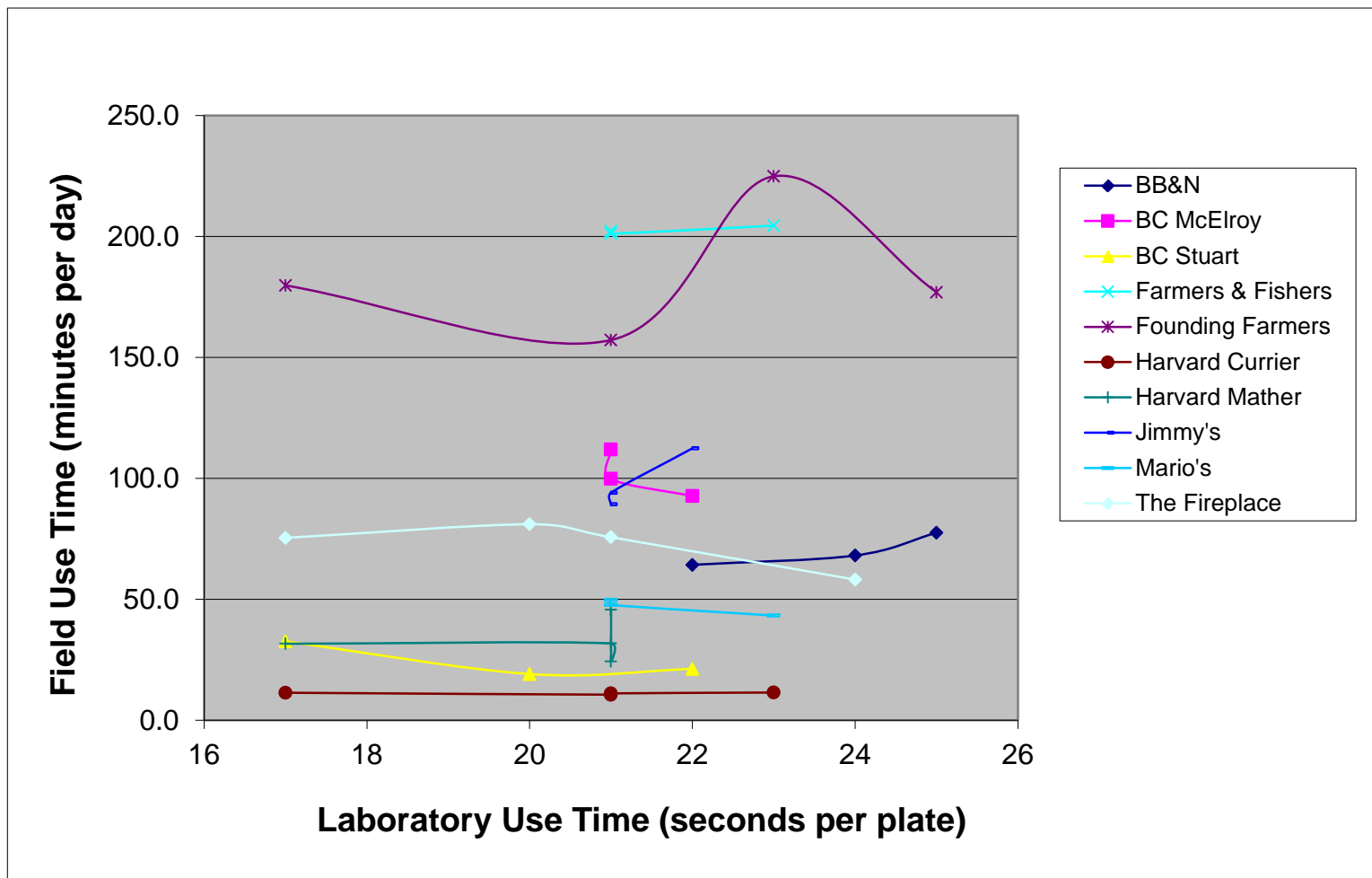
# The Results: Water Use vs Flow Rate



# The Results: Use Time vs Flow Rate



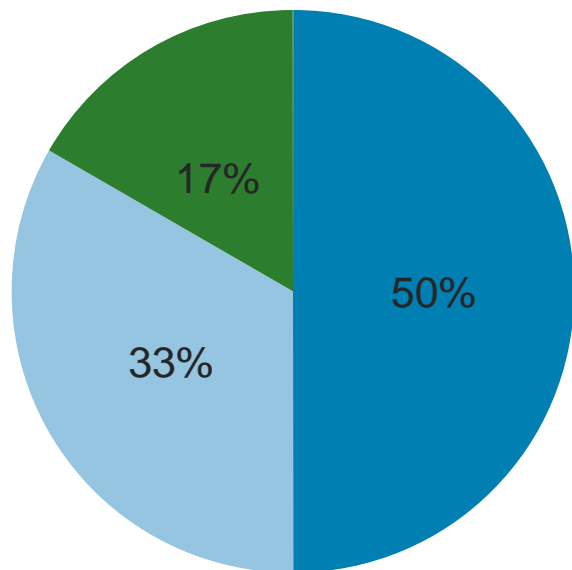
# The Results: Field vs Lab Use Time



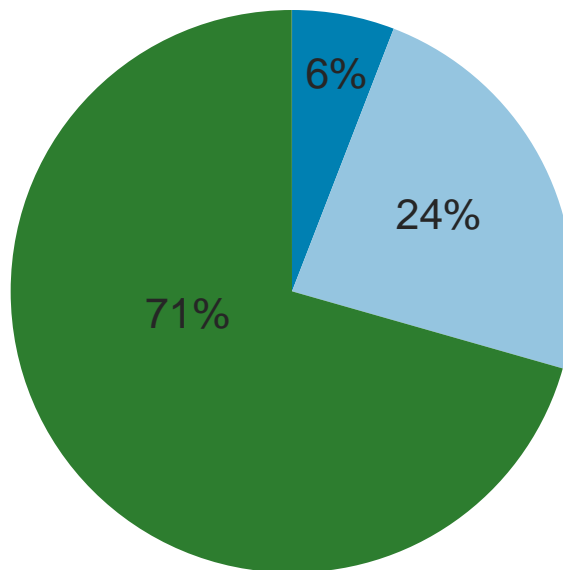


# The Results: User Satisfaction vs Flow Rate

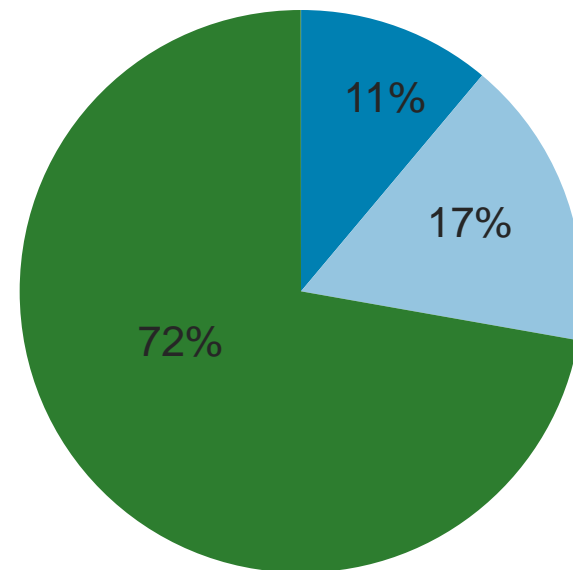
<1.0 gpm  
(12 user evaluations)



1.0 to 1.25 gpm  
(17 user evaluations)



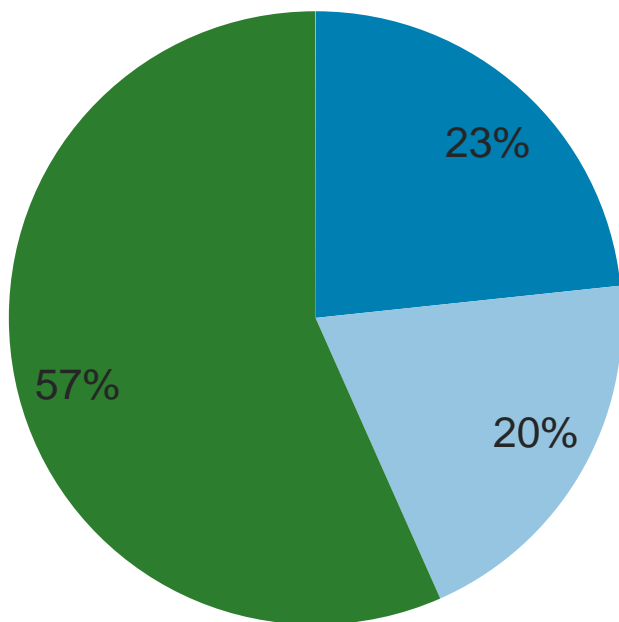
≥1.25 gpm  
(18 user evaluations)



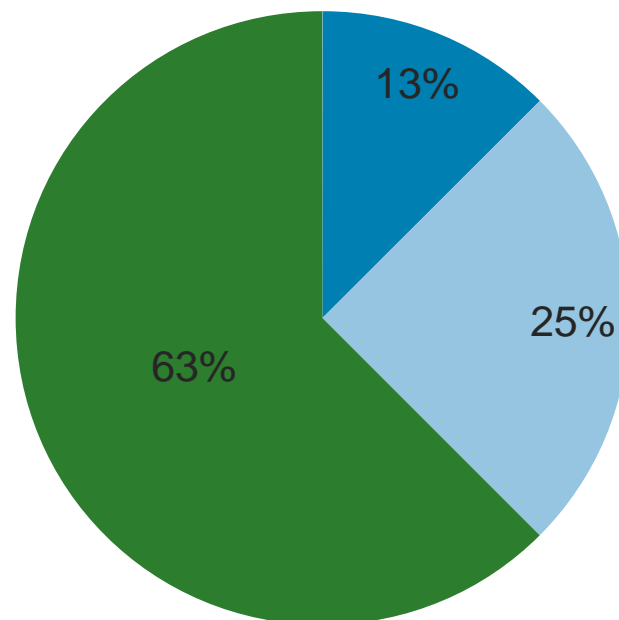
■ 1 - unsatisfied   ■ 2 – somewhat satisfied   ■ 3 – completely satisfied

# The Results: User Satisfaction vs Lab Use Time

Cleanability Between 17-21  
sec/plate



Cleanability Between 22-25  
sec/plate



■ 1 - unsatisfied   ■ 2 – somewhat satisfied   ■ 3 – completely satisfied



# The Results: User Feedback

- Qualitative analysis of the user satisfaction survey results showed:
  - Users were concerned with what they perceived to be increased use time with lower flowing valves
    - Perception not supported by the data; PRSV field use time remained relatively constant, regardless of flow rate
  - Several users indicated poor pressure (i.e., spray force) was a reason for dissatisfaction

# The Results: High-Efficiency PRSVs Save Water

Facility	Extrapolated PRSV Annual Water Use (gallons)		
	Category 1 (1.25 – 1.6 gpm)	Category 2 (1.0 – 1.25 gpm)	Category 3 (< 1.0 gpm)
<b>Educational Facilities</b>			
BC Stuart	9,800	6,100	4,800
BC McElroy	38,000	29,000	23,000
Harvard Mather	7,300–13,000	N/A	3,100–4,000
Harvard Currier	3,000–3,000	2,700	1,800
BB&N	N/A	17,000–18,000	20,000
<b>Restaurants</b>			
Farmers & Fishers	110,000	72,000–100,000	61,000
Mario's	30,000	26,000	12,000
Jimmy's	43,000	43,000	21,000
The Fireplace	29,000–30,000	30,000	24,000
Founding Farmers	69,000–71,000	84,000	99,000

# The Results: High-Efficiency PRSVs Save Water

Facility	Extrapolated PRSV Annual Water Use (gallons)		
	Non-EPA Act-Compliant (> 1.6 gpm)	Category 2 (1.0 – 1.25 gpm)	Category 3 (<1.0 gpm)
<b>Educational Facilities</b>			
BC Stuart	13,000	6,100	4,800
BC McElroy	77,000	29,000	23,000
BB&N	35,000	17,000–18,000	20,000
<b>Restaurants</b>			
Mario's	53,000	26,000	12,000
Jimmy's	90,000	43,000	21,000

# Study Observations

- In general, high-efficiency PRSVs saved water and energy
  - Did not require additional use time, thus not completely offsetting expected water savings
- Another lab test may be needed to differentiate performance
  - Laboratory use time (cleanability) test did provide an accurate indicator of user preference, nor did it correlate to actual use time in the field
- Users were less satisfied with PRSVs with operating flow rates lower than 1.0 gpm
  - May not only be due to flow rate
  - Several users indicated pressure (i.e., spray force) as a reason for dissatisfaction

# Collaboration is Key

- After analyzing the study results, EPA and the ASME/CSA project team decided to explore a new force test as an alternative to the existing lab use time test
  - Did not want to establish a minimum flow rate (e.g., 1 gpm) to differentiate performance
  - Want to make the requirements performance-based so that we are not stifling manufacturer innovation
- The project team developed a new force test method and through a series of round robin testing assessed its repeatability among labs
- The project team then compared the force results to the user satisfaction data to determine if there was a correlation



# Next Steps

ASTM and ASME/CSA are considering changes to their respective standards to incorporate this new force test

EPA plans to move forward with a draft PRSV specification specifying a maximum flow rate and force performance requirement sometime this Fall





look for



# Questions?



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