

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

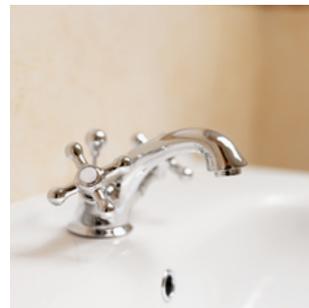


- WaterSense uses the following factors to determine which products to label. Products must:
 - Offer equivalent or superior performance
 - Be about 20 percent more water-efficient than conventional models
 - Realize water savings on a national level
 - Provide measurable results
 - Achieve water efficiency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



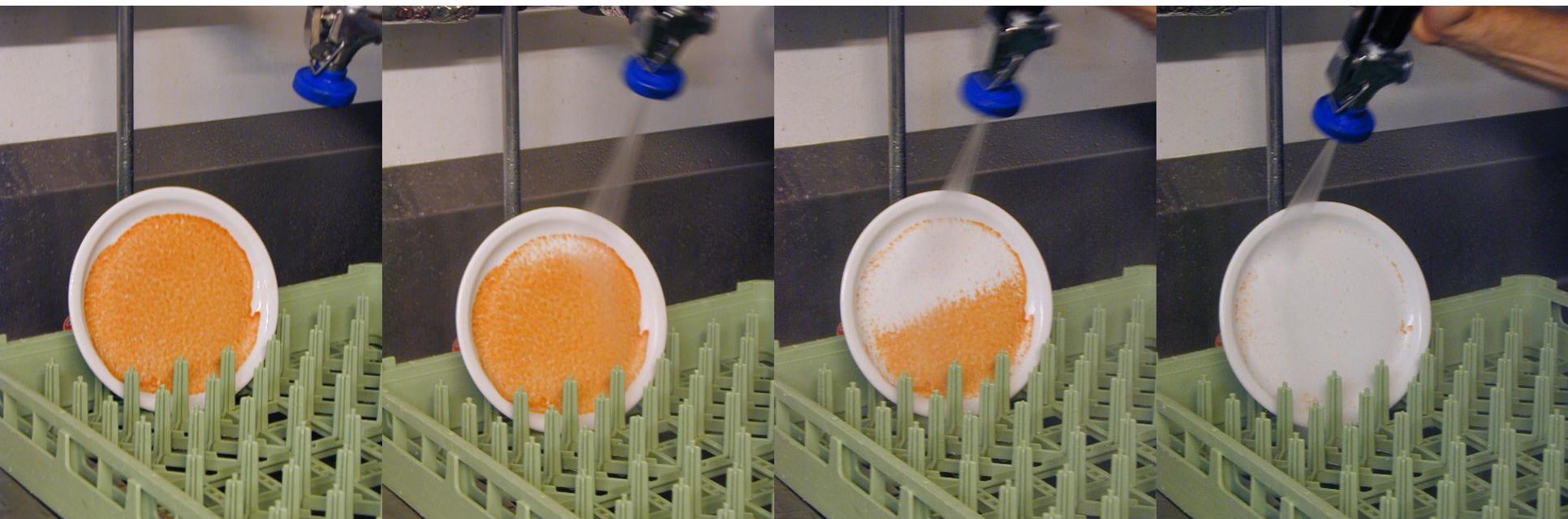
WaterSense is Considering Pre-Rinse Spray Valves

- 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

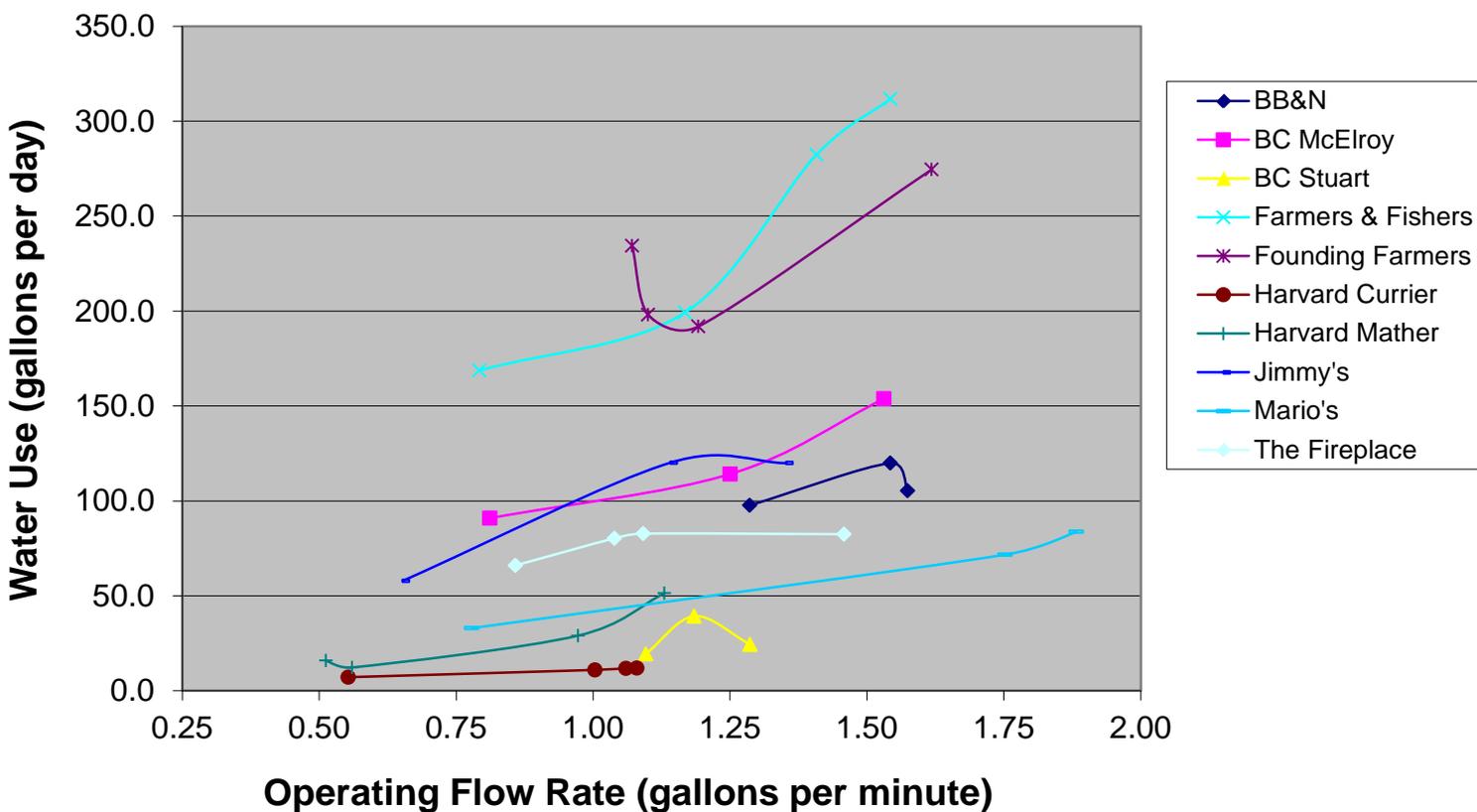
Category	Flow Rate Range	Number of Models
1	$\geq 1.25 - 1.6$ gpm	3
2	$\geq 1.0 - <1.25$ gpm	5
3	< 1.0 gpm	6

Study Scope

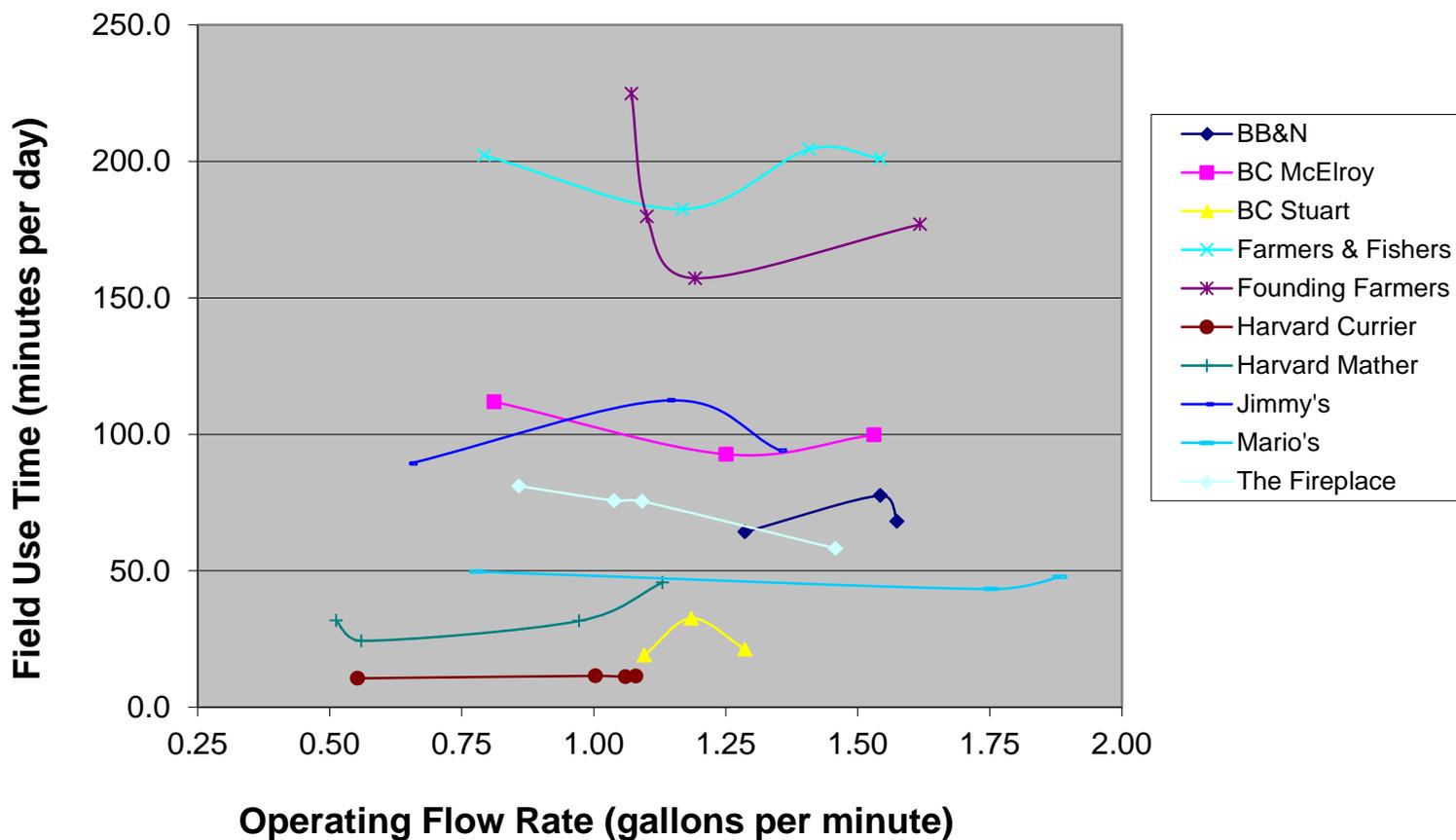
- Water meters and data loggers were installed at the 10 sites for data collection to measure and record average flow rate over time
- Temperature, flow rate, and water pressure were also tested weekly
- For each PRSV users were also asked to evaluate:
 - Pressure (spray force)
 - Ability to clean dishes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



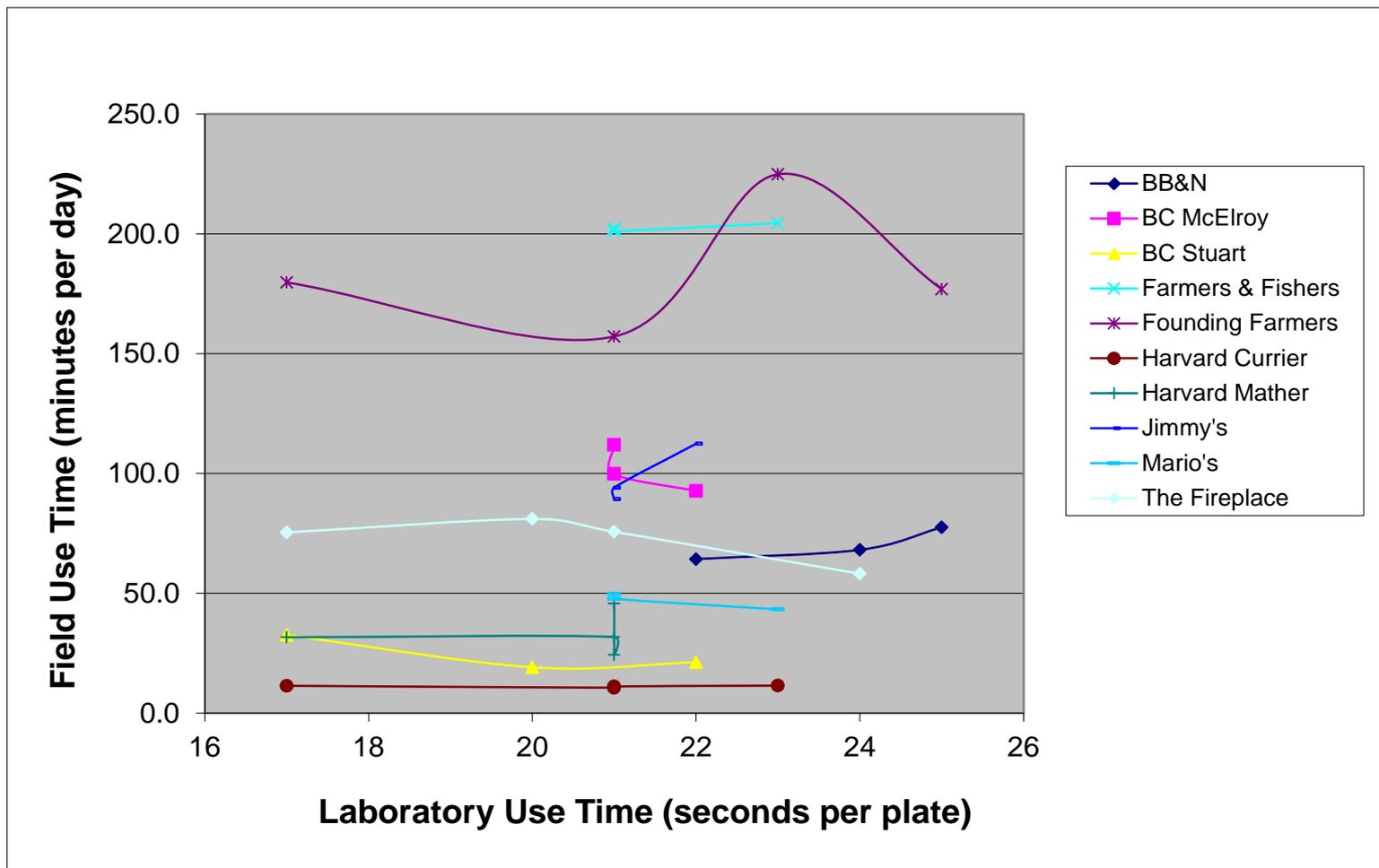
The Results: Water Use vs Flow Rate



The Results: Use Time vs Flow Rate

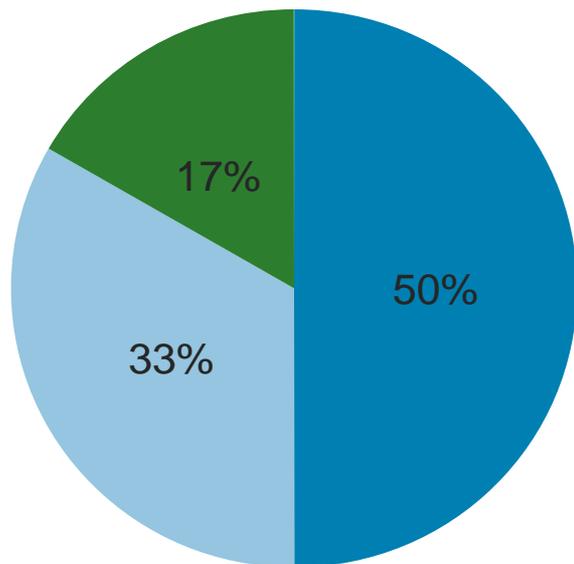


The Results: Field vs Lab Use Time

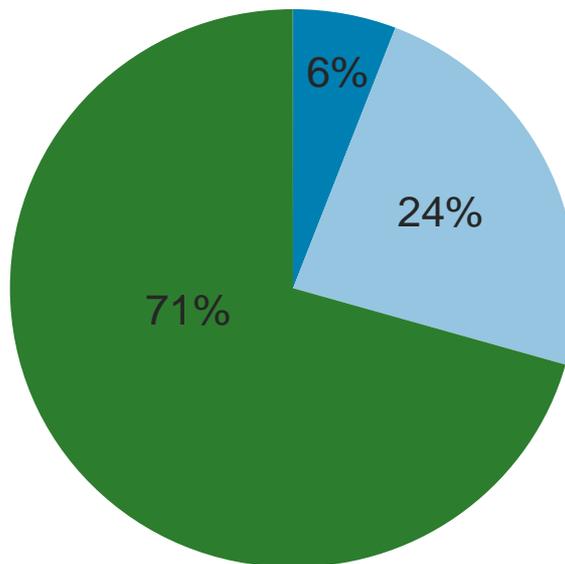


The Results: User Satisfaction vs Flow Rate

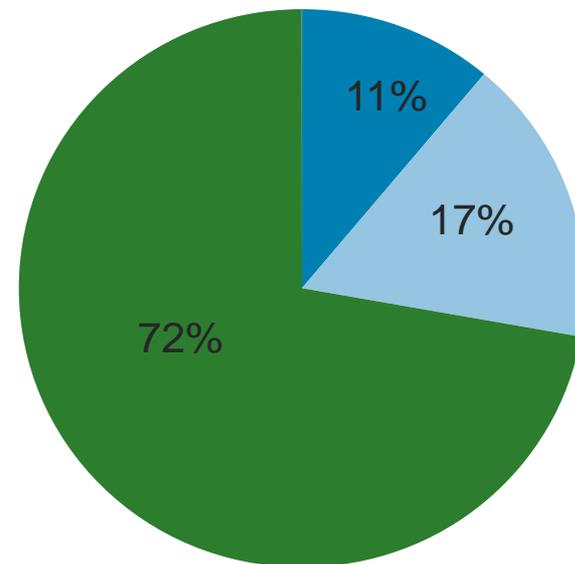
<1.0 gpm
(12 user evaluations)



1.0 to 1.25 gpm
(17 user evaluations)



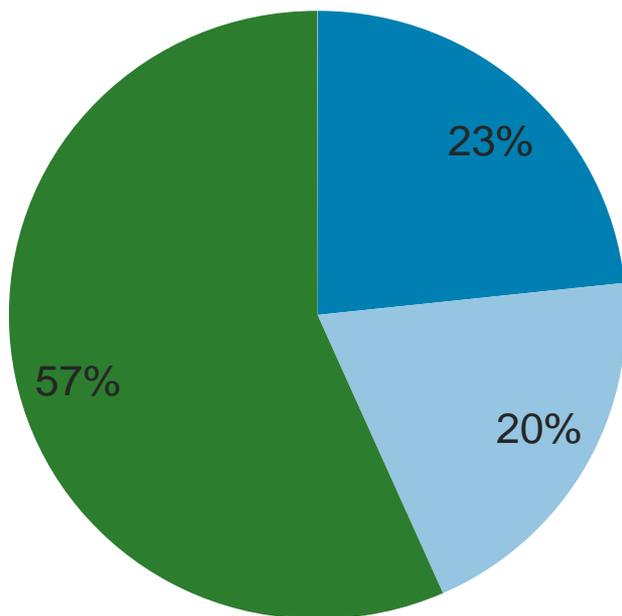
≥1.25 gpm
(18 user evaluations)



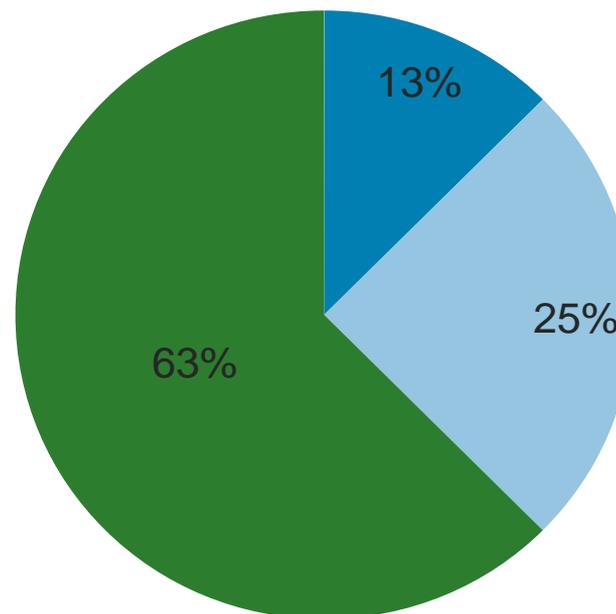
■ 1 - unsatisfied ■ 2 – somewhat satisfied ■ 3 – completely satisfied

The Results: User Satisfaction vs Lab Use Time

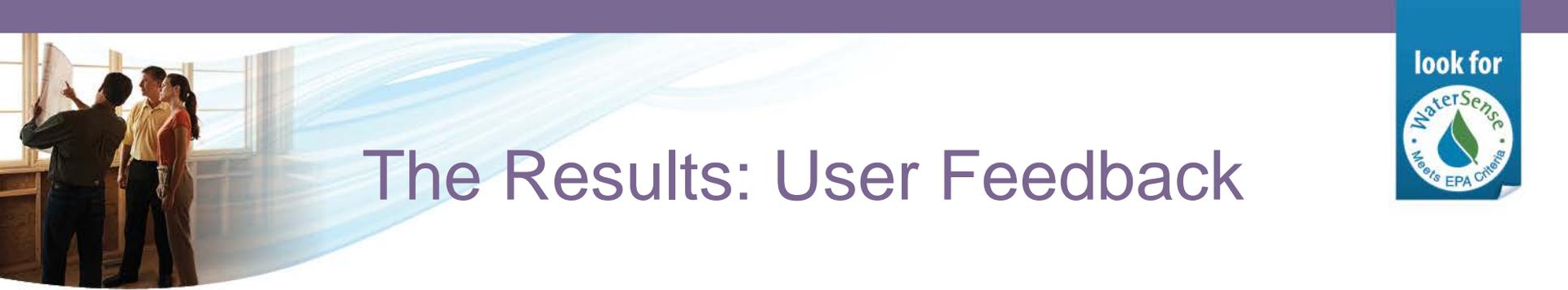
Cleanability Between 17-21
sec/plate



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)
Educational Facilities			
BC Stuart	9,800	6,100	4,800
BC McElroy	38,000	29,000	23,000
Harvard Mather	7,300–13,000	<i>N/A</i>	3,100–4,000
Harvard Currier	3,000–3,000	2,700	1,800
BB&N	<i>N/A</i>	17,000–18,000	20,000
Restaurants			
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)
Educational Facilities			
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
Restaurants			
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



Questions?



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