



## Overview of Notification of Intent & Technical Issues

April 19, 2007



# Notification of Intent

- Notification of Intent
  - Marks the **beginning** of the specification development process.
  - Identifies technical issues to be resolved as part of specification development.
    - Initial focus on resolving issues related to use of SWAT protocol for weather-based irrigation controllers.
    - Some key technical issues are the same for all “smart” controllers
  - Technical issues identified through conversations with manufacturers, utilities, and other irrigation stakeholders.
  
- WaterSense seeks stakeholder input on technical issues
  - Stakeholder input is critical for success of program.
  - Purpose for today:
    - Define the issues.
    - Collect stakeholder perspectives on the issues.
    - Resolve the issues, to the extent possible.
  - Follow-up discussions on specific issues are anticipated.



# Notification of Intent Technical Issues

- Technical Issues to be discussed during today's meeting include:
  - Potential Specification Performance Requirements
    - Irrigation Adequacy
    - Irrigation Scheduling Excess
  - User Interface Features
  - Product Testing Requirements
    - Testing in More Than One Geographically Distinct Climate Zone
    - Weather Station Standards
    - Ensuring Testing Protocol Mimics Real-World Relationships
    - Test Reproducibility
  - Product Certification Process



## Weather- or Sensor-Based Irrigation Control Technologies Testing Protocol

- WaterSense intends to incorporate performance requirements of SWAT™ Protocols into WaterSense specification.
  
- Why SWAT™?
  - Protocols are developed with manufacturer & water industry input.
  - Protocols are designed to accurately test the performance of products.
  - Build the WaterSense specification on the good work already put into the SWAT™ protocols.



# Potential Specification Performance Requirements

**Irrigation Adequacy** - How well the plant's or landscape's consumptive water needs are met.

- Studies have shown acceptable turfgrass appearance when plants receive between 80%-100% ET.
- WaterSense proposes a **performance requirement of 80-100%** irrigation adequacy, as defined by SWAT.

**Irrigation Scheduling Excess** - Water applied in excess of the plant's or landscape's consumptive needs.

- SWAT tested technologies - scored less than 5% irrigation scheduling excess.
- WaterSense proposes a **performance requirement of less than 5% irrigation scheduling excess**, as defined by SWAT.



# User Interface Features

- Performance of controllers is influenced by design of the user interface
- Many desirable water efficiency features have been identified, including:
  - Automatic grow-in schedule for new landscapes
  - Top of the line stand alone irrigation controller (when signal is not is use)
  - Rain data management
  - Zone by zone control to allow for each zone to operate in a different mode
  - User friendly data review
  - Percent up-down adjustment
  - Adjustable start times for peak daily demand management
  - Ability to comply with potential drought restrictions
  - Ability to see and change crop coefficients
  - Non volatile memory for program, not reliant on back-up battery
- We will discuss which features should be included in a WaterSense specification



# Product Testing Requirements

- **Technical Issues related to product testing:**
  - Testing in More Than One Distinct Climate Zone
  - Weather Station Standards
  - Ensuring Testing Mimics Real-World Vendor to End-User Relationships
  - Test Reproducibility



## Testing in More Than One Distinct Climate Zone

- Products must realize water savings on a national basis.
- Therefore, products should perform well under variable climates and prevailing weather conditions.
- WaterSense is considering requiring testing in at least two distinct climate zones.
- WaterSense recognizes that there are secondary issues to this requirement that need to be considered:
  - Availability & capacity of testing facilities
  - Cost
  - Products designed for one specific region





## Weather Station Standards

- Under the current SWAT™ protocol, products are evaluated at the Center for Irrigation Technology against California Irrigation Management Information System (CIMIS) weather stations.
- The weather station provides the reference ET and rain measurements used to calculate performance measures.
- Weather stations in the CIMIS program are maintained by the California Department of Water Resources, according to specific quality requirements.
- We need to consider weather station quality requirements if weather-based controller testing occurs at other locations.



## Real-World Interactions

- WaterSense seeks product testing that replicates typical installation, including:
  - Programming- same level & type of manufacturer or vendor support that a “typical” customer will experience
  - Signal processing & communication with controller- same as typical installation
- Discussion today will focus on these objectives



# Test Reproducibility

- Many technical issues identified are due to the inherent variability of weather between regions & over time.
  - Creates testing challenges
  - No two products are subject to the same test conditions
  
- Discuss today whether a standard set of weather conditions could be used to test the controller's response.
  - Pre-recorded weather data set for signal-based controllers
  - Simulated weather for sensor-based controllers



# Certification Process

- Current WaterSense product certification process:
  - Products are certified to conform to applicable WaterSense specifications by accredited third-party certification bodies
  - Certified products are authorized to carry the WaterSense label
  - Certification process is established in plumbing industry
  
- Might need different process for irrigation products; however, any process must meet some general criteria:
  - Provide independent, third-party testing
  - Provide ongoing surveillance of the manufacturing process
  - Not be overly burdensome for manufacturers to obtain or EPA to administer
  - Provide an appropriate level of assurance to customers that the product meets the WaterSense specifications



# Potential Specification Performance Requirements



# Potential Specification Performance Requirements

## **Irrigation Adequacy –**

How well the plant's or landscape's consumptive water needs are met.

- Studies have shown acceptable turfgrass appearance when plants receive between 80%-100% ET:
  - Turf grass studies across the United States have examined the effects of watering at less than 100% of plant needs (Beard 1993, Brauen 1989, Danielson et al. 1981, Feldhake et al. 1984, Gibeault et. al 1991, Gibeault et. al 1985, Meyer and Gibeault 1986, Minner 1984, University of California 2002, Zazueta et. al, 2000).
  - Although the exact percentage depends both on cool season vs. warm season turf grass, and on climactic conditions, the majority of the studies concluded that little, if any, decrease in turf grass quality resulted from watering at 80% of  $ET_c$ .



## Potential Specification Performance Requirements

### **Irrigation Scheduling Excess –**

Water applied in excess of the plant's or landscape's consumptive needs.

- Includes direct runoff, soak runoff, & irrigation surplus
- SWAT tested technologies - scored less than 5% irrigation scheduling excess



## Potential Specification Performance Requirements

- WaterSense suggests a **performance requirement of 80-100%** irrigation adequacy, as defined by SWAT™.
- WaterSense suggests a **performance requirement of less than 5% irrigation scheduling excess**, as defined by SWAT™.





# Potential Specification Performance Requirements Discussion Questions

1. Are these performance requirements appropriate?
  - Irrigation Adequacy: 80-100%
  - Irrigation Scheduling Excess: <5%
2. If proposing other performance requirements, please provide supporting rationale.
3. If proposing a different range, please provide supporting rationale.



## User Interface Features



## User Interface Features

- Many desirable water efficiency features have been identified, including:
  - Automatic grow-in schedule for new landscapes
  - Top of the line stand alone irrigation controller (when signal is not in use)
  - Rain data management
  - Zone by zone control to allow for each zone to operate in a different mode
  - User friendly data review
  - Percent up-down adjustment
  - Adjustable start times for peak daily demand management.
  - Ability to comply with potential drought restrictions
  - Ability to see and change crop coefficients
  - Non volatile memory for programs, not reliant on back-up battery



## User Interface Features Discussion Topic

WaterSense is seeking input on these features & other user interface issues that must be considered to ensure water savings are sufficient & reliable.



Product Testing Requirement:  
Testing in More Than One  
Distinct Climate Zone



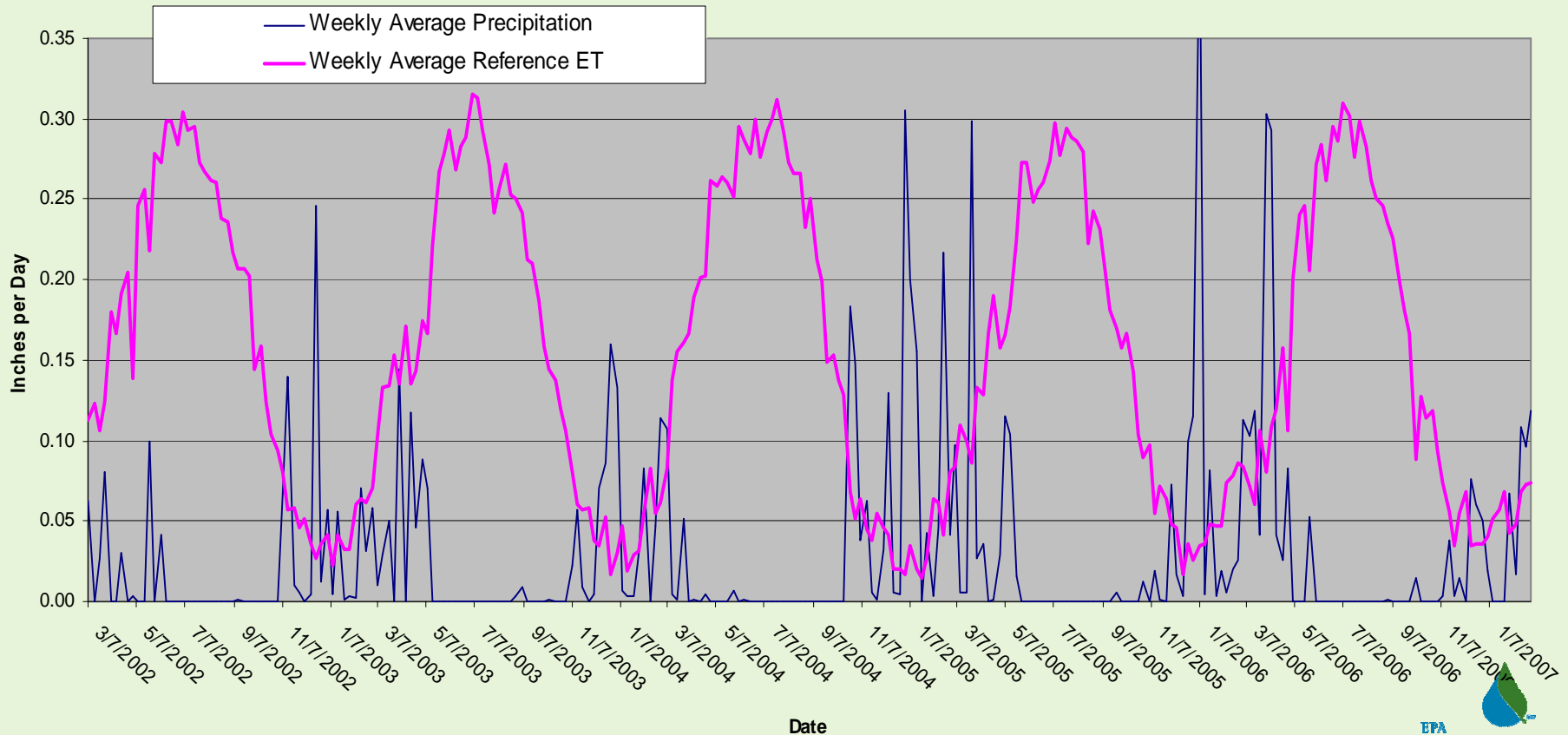
## Testing in More Than One Distinct Climate Zone

- Products must realize water savings on a national basis & perform well under variable climates & prevailing weather conditions.
- WaterSense is considering requiring testing in at least two distinct climate zones.
  - WaterSense has researched several climate zone maps & suggests using the International Energy Conservation Code (IECC) Climate Zone map.
    - Based on temperature and moisture
    - Three distinct zones (simplicity)
- IECC Climate Zone map
  - Divides the contiguous U.S. into 3 major climate-type zones based on temperature & precipitation: Marine, Dry, & Moist.



# ET and Precipitation Data for Two Distinct Regions

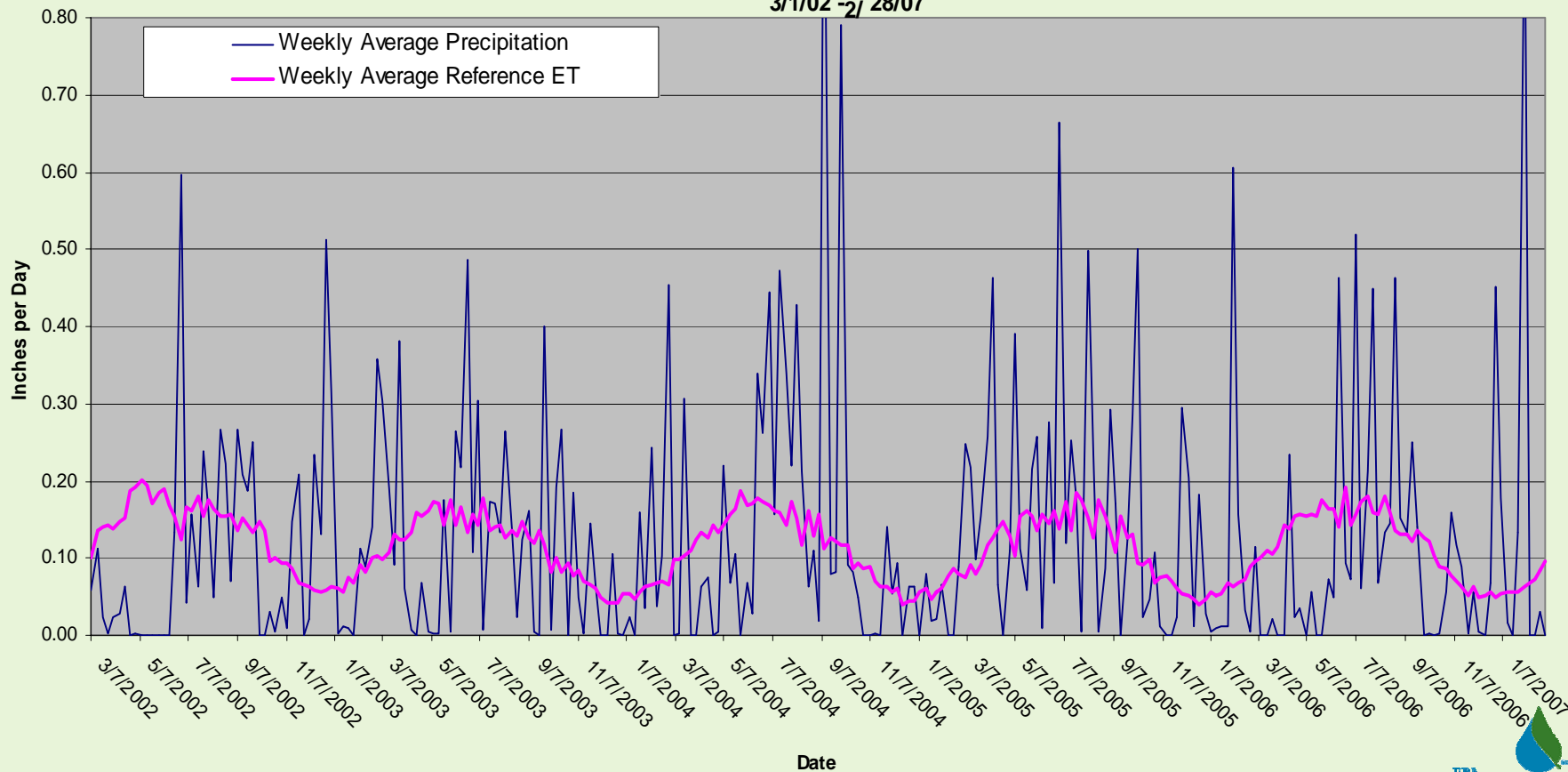
Five Year Precipitation & Reference ET Recorded at Fresno, CA  
Weekly Average  
3/1/02 - 2/28/07





# ET and Precipitation Data for Two Distinct Regions

Five Year Precipitation & Reference ET Recorded at Citra, Florida  
Weekly Average  
3/1/02 - 2/28/07

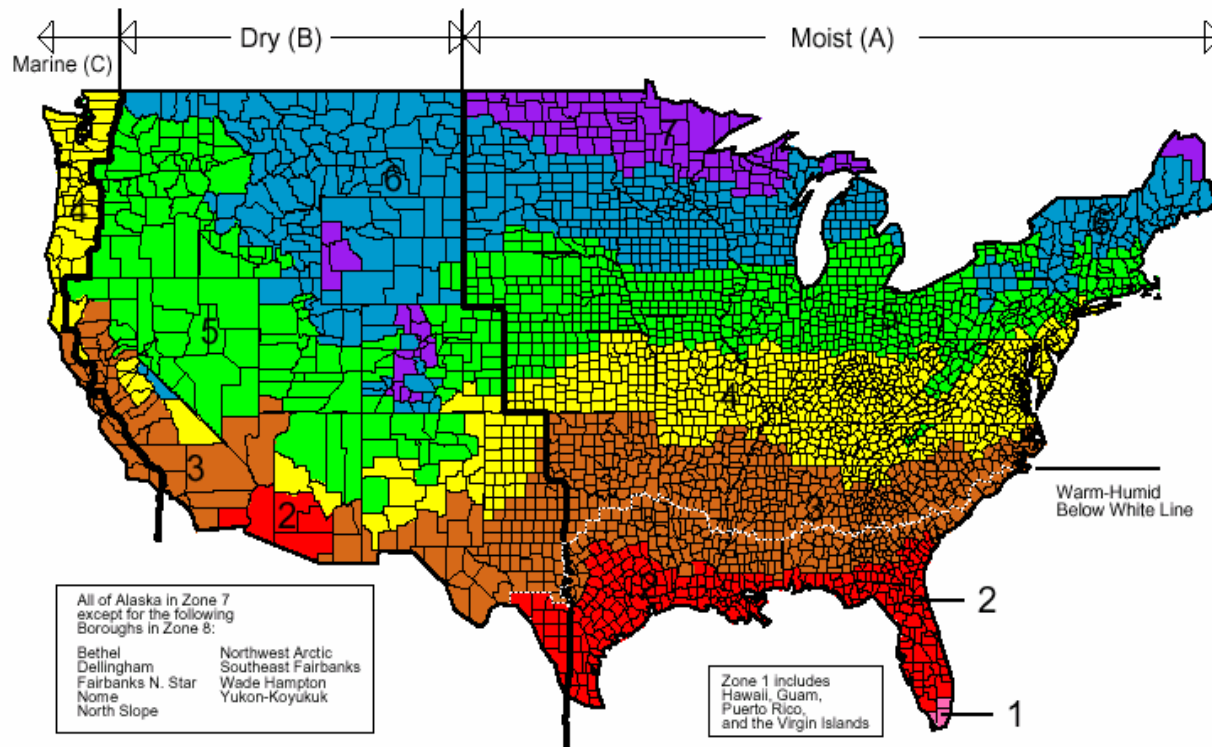






# IECC Climate Zone Map

Map of the Department of Energy's Proposed Climate Zones





## Testing in More Than One Distinct Climate Zone (cont.)

- WaterSense recognizes that there are secondary issues to this requirement that need to be considered:
  - Availability & capacity of testing facilities
  - Cost
  - Products designed for one specific region



## Testing in More Than One Distinct Climate Zone Discussion Questions

1. Will a requirement to demonstrate successful performance in more than one climate zone adequately address concerns?
2. Is testing in two distinct zones sufficient?
3. Some products might be designed to only operate in one specific region or type of climate. How should these products be addressed by WaterSense?
4. WaterSense is seeking feedback on how to best define distinct climate zones if testing in more than one distinct climate zone is required.



Product Testing  
Requirement:  
Weather Station Standards



## Weather Station Standards

- Under the current SWAT™ protocol, products are evaluated at the Center for Irrigation Technology against California Irrigation Management Information System (CIMIS) weather stations.
- The weather station provides the reference ET and rain measurements used to calculate performance measures.
- National & state run weather networks vary in their quality requirements (i.e. siting, maintenance, & sensor specifications).
- The reference weather station should experience the same weather as the testing facility and not be subjected to microclimate effects.



# Weather Station Standards Discussion Questions

1. If testing is conducted at locations other than CIT, how should the quality of the reference weather station data be defined?
  - Should weather station standards be established?
2. When testing products with onsite sensors, it is important that the test facility and reference weather station experience the same weather. Should there be a maximum allowable distance?
  - CIT and CIMIS Station #80 are ~0.5 miles apart



Product Testing  
Requirement:  
Real-World Interactions



## Real-World Interactions

- WaterSense seeks product testing that replicates typical installation, including:
  - Programming- same level & type of manufacturer or vendor support that a “typical” customer will experience
  - Signal processing & communication with controller- same as typical installation





## Real-World Interactions Discussion Topic

WaterSense is seeking input on how to best specify testing requirements so weather-based irrigation controllers are tested under conditions that will replicate real-world performance.

- Manufacturer declaration?
- Blind testing?



Product Testing  
Requirement:  
Test Reproducibility



## Test Reproducibility

- Many issues identified are due to the inherent variability of weather between regions & over time.
  - Creates testing challenges
  - No two products are subject to the same test conditions
- Can a standard set of weather conditions be used to test the controller's response?
  - Pre-recorded weather data set for signal-based controllers
  - Simulated weather for sensor-based controllers



## Test Reproducibility Discussion Questions

1. Does this idea have merit, and if so, how could it be implemented for signal-based irrigation controllers?
2. Could this approach be implemented for weather-based controllers equipped with onsite sensors?



# Certification and Labeling



# Product Certification and Labeling Indoor Plumbing Products

- All products must be certified by an accredited Product Certification Body (CB) or other organization approved by the WaterSense program.
- Manufacturers apply to an approved CB of choice
  - Approved list of CBs posted on WaterSense Web site, [www.epa.gov/watersense](http://www.epa.gov/watersense)
- CB certifies product in accordance with WaterSense specification
- CB authorizes manufacturer to use WaterSense label
  - Provides manufacturer with graphic artwork of label
- CB conducts periodic surveillance
  - Factory visits
  - Product retesting
  - Label policing



# Certification Body (CB) Accreditation Process

- CB's will be accredited to certify products to WaterSense specifications.
  - Accreditation process is under development
  - Draft process released for public input, Spring 2007
  - Anticipated implementation, Spring 2008
- In the interim, CB's are approved by EPA.
  - Currently ANSI accredited to certify plumbing products
  - Requirements outlined in the program guidelines
  - Approved for each WaterSense specification
    - 5 CB's have been approved for the HET specification
- Licensing Agreement
  - EPA licenses CBs to certify products and authorize use of WaterSense label



# Product Certification

## ■ Benefits

- Focus EPA resources on marketing and product development
- EPA is in compliance with National Technology Transfer and Advancement Act (NTTAA)
- Simplifies records management
- More rigorous, which is good from a marketing perspective
- Better policing of label and on-going surveillance of products
- Faster product approval times and no limit on business relationships
- Increases consistency in product testing





## Product Certification (Cont'd)

### ■ Issues

- Might need different process for irrigation products, but any process must meet some general criteria
  - Provide independent, third-party testing
  - Provide ongoing surveillance of the manufacturing process
  - Not be overly burdensome for manufacturers to obtain or EPA to administer
  - Provide an appropriate level of assurance to customers that the product meets the WaterSense specifications



# Certification Body WaterSense Accreditation

## ■ Benefits

- Ensure CB's have capability and competence to perform WaterSense certifications
- Ensure uniform minimum certification requirements among CB's
- Ensure open process for including CB's accredited by different organizations (ANSI, IAS, A2LA)
- Process open for public input

## ■ Issues

- Accreditation process cannot begin until final specification is issued



# Product Certification Process Discussion Topic

WaterSense welcomes input on how to implement the product certification process for irrigation products in the most efficient and effective manner possible.



## Wrap-Up

- Additional Comments
- Recap of the Meeting
- Discuss Next Steps