

DOCKETED

Docket Number:	17-AAER-05
Project Title:	Phase II Pre-Rulemaking
TN #:	220259
Document Title:	Results of Invitation to Participate Spray Sprinkler Bodies
Description:	N/A
Filer:	Sean Steffensen
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	7/19/2017 9:11:57 AM
Docketed Date:	7/19/2017



CALIFORNIA ENERGY COMMISSION

Results of Invitation to Participate: Spray Sprinkler Bodies



Phase II: Appliance Efficiency Pre-Rulemaking
Appliances & Outreach & Education Office
Efficiency Division

Sean Steffensen, P.E.
Mechanical Engineer

California Energy Commission: Rosenfeld Hearing Room

July 20, 2017



Agenda



- Purpose
- Spray Sprinkler Bodies
 - Review information requested
 - Review information received
 - Discuss responses with stakeholder participation
- General comments
- Next steps



Purpose

- On March 14, 2012, the Commission issued an Order Instituting Rulemaking to consider standards, test procedures, and labeling requirements for appliances.
- Staff held the Invitation to Participate (ITP) workshop on May 11, 2017 to request information that will shape the Commission's phase 2 standards.
- Staff will discuss responses submitted during the comment period that closed June 16, 2017.



Purpose

- The ITP requested information and data on the following phase 2 appliances:
 - Commercial and Industrial Fans & Blowers
 - General Service Lamps
 - ➔ Spray Sprinkler Bodies
 - Tub Spout Diverters
 - Irrigation Controllers
 - Set-Top Boxes
 - Low Power Modes & Power Factor
 - Solar Inverters



Respondents to Invitation to Participate

- California Investor Owned Utilities (CA IOU)
- Center for Irrigation Technology (CIT)
- Hunter Industries
- Irrigation Association
- Irrigreen, Inc.
- Natural Resources Defense Council (NRDC)
- U.S. Environmental Protection Agency (U.S. EPA)



Information Requested

- Product Definition & Scope
- Existing Test Procedures and Test Procedures Under Development
- Sources of Test Data
- Existing Standards & Standards under Development
- Product Lifetime
- Product Development Trends
- Operations and Duty Cycle
- Water-saving Features & Technologies
- Market Characteristics
- Installed Base Characteristics



Product Definition and Scope

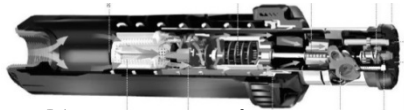
- Input to define products and set scope of standards
 - Irrigation Association Smart Water Application Technologies ANSI/ASABE/ICCC 802-2014
 - US EPA WaterSense Draft Spray Sprinkler Body Specification



Spray Sprinkler



Multi-stream
Multi-trajectory



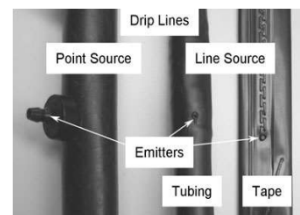
Gear Driven



Bubbler



Impact



Micro Emission



Gun



Hose End



Product Definition and Scope

Commenter	Product Definition Authority	In Scope	Out of Scope
U.S. EPA WaterSense	ASABE/ICC 802-2014	spray sprinkler bodies for spray and multistream multi trajectory nozzles	Nozzles, rotor sprinkler bodies, bubblers, microirrigation emission, agricultural products, hose-end, or valve-in-head
CA IOU	ASABE/ICC 802-2014	spray sprinkler bodies, replacements, shrub adapters	rotor sprinklers (or rotors), bubblers, drip irrigation emitters, and microspray
Irrigation Association	ASABE/ICC 802-2014 EPA WaterSense Irrigation Association SWAT	sprinklers with a pressure regulating device	Nozzles
Irrigreen	No comment	digitally controlled spray heads	No comment
Hunter Industries	ASABE/ICC 802-2014 EPA WaterSense Irrigation Association SWAT	No comment	No comment
NRDC	No comment	pressure regulating sprinkler bodies	No comment



Product Definition and Scope

- Discussion
 - What thoughts are there on the product definitions?
 - Should the Commission consider other definitions?
 - What comments are there on the scope?
 - Should any devices not shown be identified? If so should they be in or out of scope?



Test Procedures

- Input on available test procedures to measure performance.
 - Indicate test burden, industry acceptance, accuracy and repeatability, and ability to rank order performance
- Areas of interest
 - Pressure regulation
 - Application efficiency
 - Drain check valve



Test Procedures

Commenter	Test Procedures	Comments	Measurement
CA IOU	ASABE/ICC 802-2014	Test per procedure	Anti-Burst
CA IOU	SWAT Pop-up Sprinkler Head Check Valves Equipment Functionality Test Protocol Version 2.3	Modify for 60 minute hold time	Drain Check Valves
CA IOU	ASABE/ICC 802-2014 EPA WaterSense IA Stability Test	Modify to improve test accuracy and perceptiveness	Pressure Regulation
U.S. EPA WaterSense	ASABE/ICC 802-2014	Modify to improve test accuracy and perceptiveness	Pressure Regulation
Irrigation Association	IA SWAT Pressure Regulating Sprinklers, V 4.1	test similar to how installed in field, with nozzles	Pressure Regulation
Center for Irrigation Technology	CIT procedure for sprinkler operation efficiency	Evaluate sprinklers with conditions that duplicate field use	Sprinkler Operation Efficiency

- Staff research:
 - SSB manufacturers’ internal product development tests



Test Procedures

- Discussion
 - Pressure regulation
 - Discuss the various test methods and reasons to offer modifications.
 - Drain check valve
 - Discuss the various test methods and reasons to offer modifications.
 - Manufacturer internal product development tests^{1 2}
 - Tests for durability, burst, cyclic pressure, wind drift, coverage and cap leak.
 - Comment on test methods and applicability to water efficiency.



Sources of Test Data

- Studies showing performance of spray sprinkler bodies
 - Identify performance differences among different models with various water saving features
 - Identify case studies that demonstrate water savings through implementation of water saving features — before and after



Sources of Test Data

Commenter	Test Data	Results
CA IOU	Zoldoske, Mecham. "A New Way to Measure, Calculate and Use Irrigation Efficiency."	Recent research has also shown that interference between different sprinklers may occur, which is not captured by DU testing of individual nozzles
CA IOU	California Urban Water Conservation Council. "Evaluation of Potential Best Management Practices – Rotating Nozzles"	varying results in terms of actual water savings from improved Distribution Uniformity
CA IOU	University of Arizona. "Project PRS"	Water savings found from SSB with pressure regulation
U.S. EPA WaterSense	University of Florida Pressure Regulation Study	Pressure regulated SSB have lower flow rates over non pressure regulated SSB
CIT	CIT study on percolation and overspray losses for testing in a square and round target shape	Study to explore how overlapping spray patterns affect uniformity of water delivery
Irrigreen	CIT study on Irrigreen Sprinkler head	Testing showed 40 percent less water to achieve similar soil moisture content

- What are other sources of SSB performance or water efficiency test data?



Sources of Test Data

- Staff research on case studies:
 - Rainbird, Cobb County School District, Atlanta, Georgia³
 - Rainbird, Legoland, Carlsbad, California⁴
 - Rainbird, Parkhurst, Fullerton, California⁵
 - Hunter, Water Pollution Control Lab, Portland, Oregon⁶
 - American Society of Golf Course Architects, Golf and Water Case Studies⁷
 - Willows Water District, Water Programs Final Reports^{8 9}
 - UC Riverside, Trends in Golf Course Water Use¹⁰
 - Abbotsford/Mission, Water Efficiency Retrofits Case Study^{11 15}



Existing and Developing Standards

- What standards address water savings of spray sprinkler bodies?
 - Examples:
 - Draft US EPA WaterSense Spray Sprinkler Body Specification
 - ANSI/ASABE 802-2014 Landscape Irrigation Sprinkler and Emitter Standard
 - Irrigation Association Smart Water Application Technologies (SWAT)



Existing and Developing Standards

Commenter	Standard Name	Description
U.S. EPA WaterSense CA IOU	Draft Specification for Spray Sprinkler Bodies	WaterSense: compiled public comments on the draft specification developing the final specification and supporting materials. publish a final specification in mid-2017. working with ICC/ASABE to update 802 standard to revise test method. Labeled SSBs may start to appear on the market by the end of this year
CA IOU	California Model Water Efficiency Landscape Ordinance	The MWELO requires irrigation emission devices: comply with ANSI ASABE/ICC 802-2014 check valves to prevent drainage through sprinklers The MWELO does not contain performance requirements for pressure regulation or check valves.
CA IOU	IAPMO Green Code	Sprinkler heads shall be low precipitation rate, matched rates, pressure regulation within system, minimum 4" pop up height
CA IOU	International Green Construction Code	Sprinkler heads shall be matched precipitation rates, minimum 4" pop up height, with system designed to achieve DU 0.65 minimum

- Additional standards to consider?



Product Lifetime

- What is the range of product lifetimes?
- Are product lifetimes changing?
- How do lifetimes vary by product lines or sprinkler type?
- What data or testing supports product lifetime information?

➔ No comments received

- Staff estimates lifetime at 10 years^{12 13}



Product Development Trends

- What new products have been introduced to the market recently?
- What new products provide increased water savings?

Commenter	Product
Irrigreen	Digitally Controlled Spray Heads with Embedded Software

- Staff research:
 - Sprinkler head wiper seal advancements
 - In-stem Flow Regulators
 - Durability enhancements and extended product lifetimes
 - High efficiency nozzles – larger droplets, even distribution



Product Operation and Duty Cycle

- How much water do spray sprinkler bodies use?
 - How are spray sprinkler bodies used in California?
 - How are spray sprinkler bodies installed?
 - Head to head spacing
 - Design guides
 - Actual practice
- Under what conditions are spray sprinkler bodies installed?
- How often is watering performed and what contributes to variations in irrigation time?



Product Operation and Duty Cycle Continued

- Does irrigation practice vary by commercial or residential installation?
- What sources of data are available that address irrigation cycle time in California?

Commenter	Comment
Irrigreen	Head to head spacing of sprinkler heads is typical
Irrigreen	U.S. has more than 40 million acres of grass
Irrigreen	Irrigation is the largest use of residential water in the United States — more than all others combined
CA IOU	the single largest use of potable water in the residential sector and accounts for approximately half of total urban water usage in California
CA IOU	City of Santa Cruz study showing irrigation practice among single family, multi family and commercial properties

- Staff requests additional sources of information



Water-Saving Features & Technologies

- Identify water-saving technologies, components and features
 - Estimate the savings performance at a device and statewide level

Commenter	Technology	Savings Estimate
U.S. EPA WaterSense	Pressure Regulation	The average household using 50,500 gallons per year for outdoor water use with an irrigation system operating at 60 psi could save nearly 5,600 gallons of water per year by installing WaterSense labeled sprinkler bodies.
CA IOUs	Pressure Regulation	The Metropolitan Water District of Southern California (MWD) awarded Rain Bird with a grant for the “Project PRS” study conducted by the University of Arizona, College of Agriculture and Life Sciences. The study found that spray sprinklers with integral pressure regulation result in significant water savings compared to non-regulated spray sprinklers when inlet pressure exceeds 30 psi.



Incremental Costs

- Identify water-saving technologies, components and features
 - Identify the retail cost difference between products with and without the water-saving feature
- ➔ No Comments received
- Staff estimates incremental cost for pressure regulation and/or check valve within a SSB at \$2-\$6.



Market Share

- Identify water-saving technologies, components and features
 - Identify the market share of devices installed with the water-saving feature
 - Identify the market share of devices sold with the water-saving feature

Commenter	Technology	Market Share
U.S. EPA WaterSense	Pressure Regulation	Industry estimates less than 10 percent of irrigation systems include pressure regulating SSB

- Staff requests additional estimates of market penetration of water saving features



Market Characteristics

- Identify manufacturers of spray sprinkler bodies
- How do offerings differ among manufacturers?
 - Do some manufacturers provide broad product offerings while others focus on specialty products?

Commenter	Spray Sprinkler Body Manufacturers
Hunter	Hunter Industries
IrriGreen	IrriGreen, Inc.
CA IOU	Three largest manufacturers of landscape irrigation equipment in the California Rain Bird, Hunter, and Toro. Other manufacturers include: Orbit, Hydro-Rain, K-Rain, Irritrol, Weathermatic, and Signature.
CA IOU	Toro markets a line of drip irrigation equipment as well as a pressure compensating spray nozzles Hunter offers a large variety of pressure compensating bubblers Rain Bird developed a pressure regulating rotor body.



Market Characteristics

- Identify aspects of supply chain
 - Does one manufacturer make all components or are there multiple suppliers involved?
 - What is the length of time between an order and a delivery to retailer?
 - Are there sales seasons or product years to consider when setting regulation effective dates?

Commenter	Market Characteristics
CA IOUs	Most major manufacturers indicated that scaling up the production of pressure regulated spray bodies to comply with a potential standard would take only a few months.
CA IOUs	Landscape irrigation emission devices are distributed through several outlets, including direct sales from manufacturers to homebuilders, sales from large irrigation product distributors, such as Ewing Irrigation and SiteOne Landscape Supply and retail sales, Many irrigation contractors use irrigation product distributors.



Market Characteristics Continued

- Identify small businesses involved in spray sprinkler body market

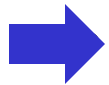
Commenter	Market Characteristics
CA IOUs	Small businesses play a role in the spray sprinkler body market. Many irrigation contractors that buy wholesale spray sprinklers and provide them to end use consumers are price-conscious small businesses.

- Irrigation equipment retailers and distributors
- Small businesses that purchase irrigation equipment
- Staff seeks comments as to:
 - Additional small business types
 - Representative trade organizations



Market Characteristics Continued

- California sales of spray sprinkler bodies
 - Identify how many spray sprinkler bodies are installed in California
 - What percentage of landscape is irrigated by spray sprinkler bodies?



No Comments

- Staff assumes 21 million SSB sold per year based upon 10 year lifetime and 210 million installed base
- Staff estimates 72% of landscape irrigated by SSB



Staff Estimate of SSB in California

- Staff assumptions
 - 72% of homes with SSBs
 - 8.1 million homes in California
 - 36 SSBs per home
 - 10 year design life

Value	Units	Description	Source
72%	Percentage	Automatic Irrigation (single family)	CALMAC
3,809	Sq. Feet	Avg Irrigated Area Single Family Home	CALMAC
8,094,422	Homes	California Single Family Detached Homes (2016)	California Department of Finance
10	Years	Sprinkler Design Life	Commission Staff



General Comments

- Additional discussion topics?
 - Limit comments to 3 minutes



Next Steps

- Notice of Invitation to Submit Proposals on SSB posted, July 18, 2017
- ITSP Webinar to explain proposal process and template on August 1, 2017.
- Proposals may be submitted until September 1, 2017.
- Address questions to Sean Steffensen.
- Additional comments on this topic may be submitted to Commission [Docket 17-AAER-08](#)



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Public Participation

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1/27/17





Contact Information

Sean Steffensen

Sean.steffensen@energy.ca.gov

916 651 2908

Docket #17-AAER-08

docket@energy.ca.gov





End Notes

- ¹ Rainbird 1800 Series Sprayanalysis, <http://www.rainbird.com/sprayanalysis/index.htm>
- ² Hunter Pro-Spray PRS30, <https://www.hunterindustries.com/irrigation-product/spray-bodies/pro-spray-prs30>
- ³ Rainbird, Cobb County School District, Atlanta Georgia, https://www.rainbird.com/documents/turf/site_CobbCounty_D40613EO.pdf
- ⁴ Rainbird, Legoland, Carlsbad California, https://www.rainbird.com/documents/turf/site_Legoland-RD-short.pdf
- ⁵ Rainbird, Parkhurst, Fullerton, California, https://www.rainbird.com/documents/turf/site_Parkhurst_SQ.pdf
- ⁶ Hunter, Water Pollution Control Lab, Portland, Oregon, <https://www.hunterindustries.com/site-study/mp-rotator-efficiency-goes-unmatched-usage-test>



End Notes

- ⁷ American Society of Golf Course Architects, Golf and Water Case Studies, https://www.mgcsa.org/resources/Documents/ASGCA_Water_and_Golf_Spreads_lores.pdf
- ⁸ Willows Water District, Water Programs 2013 Final Report, <http://www.willowswater.org/repository/docs/2013%20Willows%20Water%20Final%20Report.pdf>
- ⁹ Willows Water District, Water Programs 2014 Final Report, <http://www.willowswater.org/repository/docs/2014%20Willows%20Water%20Final%20Report.pdf>
- ¹⁰ UC Riverside, Trends in Golf Course Water Use, http://turfgrass.ucr.edu/reports/topics/trends_in_golf_course_water_use.pdf
- ¹¹ Abbotsford/Mission, Water Efficiency Retrofits Case Study, <https://abbotsford.civicweb.net/document/25835>



End Notes

¹² Rain Bird's Professional Customer Satisfaction Policy and Trade Warranty,
<http://www.rainbird.com/corporate/CustomersatisfactionPolicy.htm>

¹³ Hunter Statement of Warranty,
https://www.hunterindustries.com/sites/default/files/Hunter_Warranty.pdf



Staff Estimate of SSB in California

Stock Calculation:

Single Family Homes x % Homes with Automatic Irrigation = Homes with Automatic Irrigation

8,094,422 Homes * 72% = 5,827,984 Homes with Automatic Irrigation

Homes with automatic irrigation * 36 devices/home = Stock Sprinklers

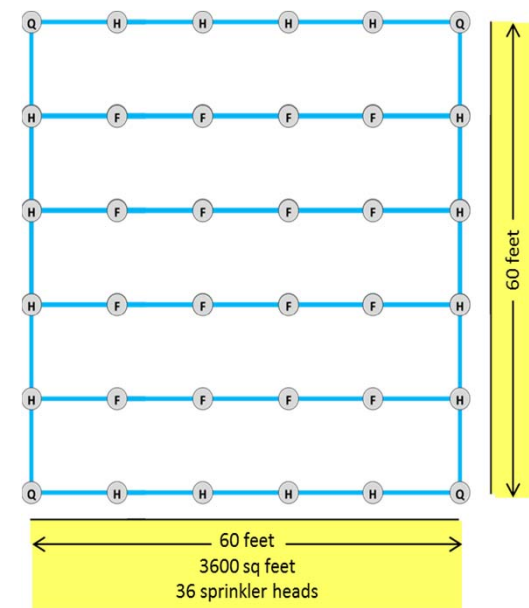
5,827,984 homes * 36 devices/home = 209,807,424 Stock Sprinklers

Annual Sales Calculation:

Stock Sprinklers / Design Life = Yearly Sales

209,807,424 Sprinklers / 10 years = 20,980,742 Sprinklers per year

Value	Units	Description	Source
72%	Percentage	Automatic Irrigation (single family)	CALMAC
3,809	Sq. Feet	Avg Irrigated Area Single Family Home	CALMAC
8,094,422	Homes	California Single Family Detached Homes (2016)	California Department of Finance
10	Years	Sprinkler Design Life	Commission Staff



CALMAC: Andrew Funk and William DeOreo, Embedded Energy in Water Studies Study 3: End-use Water Demand Profiles, 2011

CAL DOF: California Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2016 with 2010 Census Benchmark, May 2016, <http://www.dof.ca.gov/Forecasting/Demographics/Estimates/E-5/>