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Alliance
for Water
Efficiency

June 5, 2014

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 14-AAER-1
1516 Ninth Street
Sacramento, CA 95814-5512

California Energy Commission

DOCKETED

14-AAER-1

TN 73116

JUN 06 2014

RE: CEC DOCKET NO. 14-AAER-1, APPLIANCE EFFICIENCY PRE-RULEMAKING

The Alliance for Water Efficiency (AWE) is a nonprofit organization dedicated to the efficient and sustainable use of water in North America. We represent a broad coalition of stakeholders that include water suppliers, business and industry, government agencies, energy and environmental advocates, and academia.

We have reviewed both the CEC draft staff report and the CASE team recommendations from the California Investor Owned Utilities (IOU's) related to the subject docket. We support the CEC staff recommendation for the proposed faucet, toilet and urinal rulemaking. Our detailed comments begin on the next page.

Thank you for this opportunity to comment on the CEC's Water Appliance Efficiency program. We are very cognizant of the need to aggressively address California's current serious drought, and we support careful examination of all options to make California more water efficient. However, in this proceeding we believe that the CEC should adopt plumbing standards that are supported by: (1) adequate field research and investigation; (2) examination of the full effects on the entire plumbing system; (3) documentation of true impacts and costs of the proposals; (4) consideration of potential public health issues; and (5) recognition of available resources and expertise.

Sincerely,

A handwritten signature in dark ink that reads "Mary Ann Dickinson". The signature is fluid and cursive, with the first name "Mary Ann" and the last name "Dickinson" clearly legible.

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Summary Recommendation:

The Alliance for Water Efficiency (AWE) supports the CEC staff report, and recommends that the maximum water consumption thresholds specified in AB715, SB 407 and CalGreen be incorporated into the CEC Title 20 requirements. These levels have been developed, comprehensively analyzed, scrutinized, and vetted by standards organizations, water utilities, regulators, efficiency advocates, and the plumbing industry during the last several years. In addition, after much study and deliberation among all stakeholders¹, they have been incorporated into the two key national standards (both ANSI approved standards) and the three WaterSense specifications:

- ASME A112.18.1-2012/CSA B125.1-12: Plumbing Supply Fittings (Faucets)
- ASME A112.19.2-2013/CSA B45.1-13: Ceramic Plumbing Fixtures (Toilets and Urinals)
- WaterSense Specification for Tank-Type Toilets, version 1.1, May 20, 2011
- WaterSense Specification for Flushing Urinals, version 1.0, August 14, 2009
- WaterSense High-Efficiency Lavatory Faucet Specification, version 1.0, October 1, 2007

Those maximum consumption thresholds are as follows:

- Water Closets: 1.28 gpf
- Urinals: 0.5 gpf
- Lavatory Faucets (residential): 1.5 gpm (minimum of 0.8 gpm)

AWE also supports the CEC Staff recommendations for the following products:

- Kitchen faucets: 1.8 gpm maximum @ 60 psi with an allowable 2.2 gpm maximum override for pot filling, consistent with CalGreen
- Commercial lavatory faucets: 0.5 gpm maximum @ 60 psi, consistent with CalGreen and the model plumbing codes

Comments on the Recommendation by the CASE Team for a Maximum Urinal Consumption Level of 0.125 gpf:

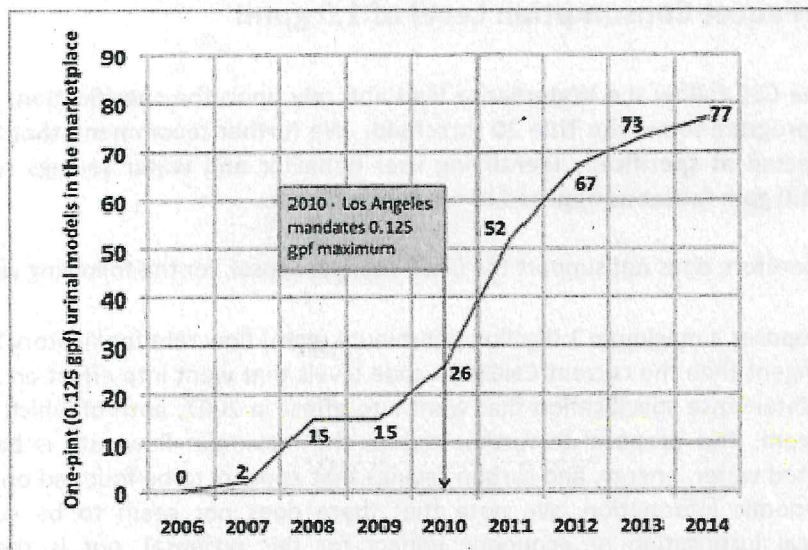
As an initial step, AWE recommends that CEC adopt the specification thresholds in CalGreen and AB715, both of which have one urinal category at 0.5 gpf. The U.S. EPA WaterSense labeling program for urinals sets the maximum consumption threshold at 0.5 gpf for this voluntary, performance-based, third-party certification program. The 0.5 gpf level is the benchmark for today's high-efficiency urinals and many models are available in a variety of design choices in wall- and floor-mount configurations.

AWE recommends that further regulatory consideration of 0.125 gpf urinals be tabled for at least 3 years until field experience and drain line research can provide insight regarding the efficacy of that consumption level. To our knowledge, a study of this kind is not yet underway, and AWE recommends that the CEC investigate using EPIC funds for this needed research. When sufficient and satisfactory data and field experience become available, AWE recommends that the CEC then reconsider the 0.125 gpf threshold in its future rulemaking.

¹ Stakeholders include plumbing manufacturers, water efficiency advocates and consultants, testing laboratories, certification bodies, government representatives, and the public.

AWE's recommendation is supported by the following comments:

- The Federal standard for flushing urinal fixtures sets the maximum flush volume at 1.0 gallons, a flush volume that has existed in the U.S. for about 20 years. California began lowering that maximum to 0.5 gallons per flush (gpf) in 2010 by requiring progressive proportions of market share product at that threshold, and it permanently eliminated the availability of new 1.0 gpf urinals on January 1, 2014 (AB715). Other jurisdictions (Texas, Colorado, Georgia, Miami-Dade and New York City) have done likewise. In response, the plumbing industry has aggressively developed new product and implemented new production processes to meet this obvious trend to 0.5 gpf urinals. California's current 0.5 gpf threshold maximum has been in place for less than six months.
- Urinals flushing at 0.125 gpf were introduced to the marketplace in 2006. Response was initially very slow and the marketplace had limited product availability. It was only in 2010 that product selection was sufficient to gain attention, and in October, 2010 these pint urinals were required for new installations by the City of Los Angeles. (Their experience to date with these fixtures remains undocumented.) Today, only 77 (about a third of all high-efficiency urinal models) certified to the WaterSense specification are at the 0.125 gpf threshold. See the chart below for information on the growth of these models².



- Drain line blockages (due to a buildup of struvite) and installation problems related to odors have been associated with some non-water consuming urinal installations. The model plumbing and green codes addressed these two significant issues by requiring that water supply lines be installed behind the walls in washrooms to facilitate replacement of non-water consuming urinals in the event building owners chose to replace them with flushing urinals. For 0.125 gpf urinals there is insufficient experience to date to correctly assess the magnitude of concerns that may or may not result similar to the odor and drain line issues experienced with non-water consuming urinals. It remains to be determined, and more data and time are needed, to be more certain if 0.125 gpf is adequate to remove or mitigate such concerns.

² Source: John Koeller

- While 0.125 gpf urinals may be suited to new construction where new drainline systems are designed specifically for extremely low water flows from fixtures and other equipment, their feasibility in retrofit situations in existing buildings is questionable. Whereas a 1.0 gpf urinal can usually be successfully retrofitted to 0.5 gpf by installing a new flushometer valve or by changing valve components, without requiring replacement of the urinal fixture itself, this is not the case for a retrofit from 1.0 gpf to 0.125 gpf because of the physical limitations with the urinal fixture. In such an instance, both the valve and the urinal fixture would require replacement, which is costly due to labor for installation and possible wall repair, and the purchase of the urinal system components themselves. If the standard is further reduced to 0.125 gpf, retrofits could therefore be discouraged by the cost and the downtime associated with such a major change-out.
- A further concern is that a very significant change in California to the urinal standard at this time will seriously disrupt urinal product development and production planning, which has just successfully moved to the 0.5 gpf product threshold. This is of special concern because California represents at least 10 percent of the national market.

Comments on the Recommendation by the CASE Team for a Maximum Residential Lavatory Faucet Consumption Level of 1.0 gpm:

AWE recommends that the CEC follow the WaterSense lead and rely upon the specification, testing, and certifications of that program to set the Title 20 threshold. We further recommend that the CEC sponsor a field study directed at specifically identifying user behavior and water savings resulting from the installation of a 1.0 gpm faucet as opposed to a 1.5 gpm faucet.

AWE's recommendation therefore does not support the CASE Team proposal, for the following reasons:

- The CASE Team proposes a maximum 1.0 gallon per minute (gpm) flow rate for lavatory faucets, which is more stringent than the current CalGreen code levels that went into effect on January 1, 2011 and the WaterSense specification that went into effect in 2007, both of which set the maximum at 1.5 gpm. This proposal to further reduce the maximum flow rate is based on anticipated estimated water, energy, and carbon savings that appears to be founded on limited technical and economic information. We note that there does not seem to be sufficient supporting technical justification or economic impact for this proposal, nor is there any supporting research on the potential unintended consequences and impact on health, safety, or sanitation.
- By virtue of the reduction in flow rate as proposed, an associated 33 percent increase in hot water wait times for users could result, exacerbating already existing concerns over wait times for hot water at the bathroom sink. This is also an issue that needs further examination.
- As of May 2014, there are 7,437 residential lavatory faucet models certified to the WaterSense specification. Under the current ISO/IEC 17065 requirements within Version 2.0 of the WaterSense Product Certification System, AWE believes that all of these faucets would be required to undergo re-testing and recertification in order to be sold in California. At an estimated cost of \$800 per model for testing, and re-certification and listing costs ranging up to

\$1,800 of additional costs³, the total obligation could exceed many millions of dollars. This cost, together with the associated new product development costs, would be borne by manufacturers and, ultimately, by consumers. This seems a high cost for the small savings anticipated.

- WaterSense faucets, in addition to a maximum allowable flow rate, are also equipped with a pressure-compensating feature. The WaterSense specification provides for a minimum flow rate of 0.8 gpm at 20 psi flowing to assure user satisfaction. What is unknown is whether currently certified and available WaterSense faucets re-equipped to flow at no greater than 1.0 gpm (at 60 psi flowing) are also capable of delivering no less than 0.8 gpm at 20 psi. All WaterSense faucets that cannot meet the requirements at both the maximum and minimum flow rates would need to be removed from the California marketplace and new product designs (without the user satisfaction feature) would be required.
- The WaterSense specification was developed in consultation with a wide variety of stakeholders, including manufacturers, water efficiency advocates, hot water distribution specialists, and water utilities. The CASE Team proposal to reduce the lavatory faucet maximum by 33 percent from the WaterSense threshold did not include the full involvement of those same stakeholders.
- There is an emerging issue with respect to residence time for water in plumbing systems. Reduced demand and higher efficiencies in building plumbing systems are now resulting in longer residence times for water within the building piping, resulting in storage of water for such a long period of time within the pipes that the disinfection residual is no longer present to protect public health. Thus, legionella and pathogen growth is occurring, and cases of user illness and death are being documented by the Center for Disease Control and other research institutions⁴. Definitive conclusions on the necessary remedies to this problem have not yet been determined. Reduced flows in building potable water pipes must be carefully investigated and decisions with respect to end use fixtures must consider the overall impact to the plumbing system.

Comments on the recommendation by the CASE Team Supplemental Report to Increase the Minimum MaP Score for Toilets to 600 grams:

AWE does not support the recommendation to increase the minimum MaP performance threshold for toilets to 600 grams (approx. 21 ounces) from the current WaterSense and national standard of 350 grams (approx. 12 ounces). This recommendation is unsubstantiated, inconsistent with current industry standards, severely restricts product availability, thwarts innovation, fails to save energy, and is not cost-effective.

AWE's position is based on the following reasons:

- Maximum Performance (MaP) testing of toilet fixtures was developed in 2003 as a fully voluntary program with the funding support of 22 interested water utilities (including utilities in California) and related organizations in the U.S. and Canada. In addition to encouraging the production of more efficient products, its purpose was also to provide water utilities,

³ Source: John Koeller and IAPMO R&T Certification

⁴ Source: Presentation by Dr. Marc Edwards, Professor of Civil and Environmental Engineering, Virginia Tech

consumers, and design professionals with the information necessary to make the purchase and specification decisions based upon flush performance data for bulk waste. The MaP protocol is a 'test to failure' using specific test media chosen to represent and replicate bulk waste. Subsequent to MaP introduction in 2003, the test protocol and the minimum performance threshold of 350 grams was adopted by the U.S. EPA's WaterSense program for their tank-type toilet specification. In 2013, the same protocol and threshold was added to the ANSI standard for toilets, ASME A112.19.2-2013/CSA B45.1-13.

- The 350 gram minimum performance threshold was initially based upon a 1977 medical study⁵ conducted in the United Kingdom on 20 individuals, 10 male and 10 female. The 350 grams represents approximately the 99.5 percentile of bowel movements for male subjects. The study findings and the 350 gram threshold were later validated by two subsequent studies⁶.
- The Supplemental CASE Team document offers two assertions that form the basis for their analysis: (a) users are dissatisfied with toilet flushing performance because of the need for double flushing; and (b) double flushing can be reduced by increasing the minimum MaP score to 600 grams.
 - (a) No evidence has been provided in the Supplemental CASE Team report (or elsewhere) that shows that double flushing of toilets currently meeting the 350 gram minimum bulk media removal requirement is a 'real world' problem. Quite to the contrary, consumer feedback to manufacturers, water utilities, and water efficiency professionals on WaterSense-listed toilets has demonstrated overwhelming user satisfaction.
 - (b) The presumption that a toilet that meets a 600 gram minimum requirement will require less double flushing than a toilet that meets a 350 gram requirement is a flawed presumption.

There are four primary causes of user double flushing:

1. Remove bulk (solid) waste remaining in the bowl;
2. Remove waste marks left on the bowl;
3. Remove toilet paper adhered to the walls of the bowl above the water level; and
4. Remove "slurry" of waste left behind because of inadequate water exchange.

Based upon the findings of a 1999 customer satisfaction study undertaken by the Metropolitan Water District of Southern California⁷, we can also identify the occurrence of each of these causes of double flushing (the study was conducted before the development of MaP). The current national standard (ASME A112.19.2-2013/CSA B45.1-13) contains specific test protocols for all four potential causes of double flushing, and establishes minimum performance requirements for each. MaP tests for bulk waste removal only. Table 1 displays the distribution of the causes and the applicable test elements of the standard.

⁵ Wyman-Variability of Colonic Function in Healthy Subjects, 1977 (available at <http://www.map-testing.com/performance-toilets-testing/background.html>)

⁶ Wignarajah, et. al., 2006, "Simulated Human Feces for Testing Human Waste Processing Technologies in Space Systems" and Feachem, undated, "Part One - Health Hazards of Excreta: Theory and Control" (both available at <http://www.map-testing.com/performance-toilets-testing/background.html>)

⁷ Metropolitan Water District of Southern California, 1999. "Ultra-Low-Flush Toilets, Customer Satisfaction Survey"

Table 1. Double Flushing and Testing

| Causes of user double flushing | Percentage occurrence (1999) | ANSI National Standard tests (ASME A112.19.2-2013/CSA B45.1-13) | | MaP tests for? |
|--|------------------------------|---|--|----------------|
| | | Sections | Title | |
| 1. Bulk waste remaining (sinking) | 21% | 7.7 & 7.10 | Mixed media test. Waste extraction test (350g). | Yes |
| 2. Waste marks on side of bowl | 47% | 7.6 | Surface wash test | No |
| 3. Paper adhered to side of bowl | | | | No |
| 4. 'Slurry' waste remaining (floating & sinking) | 32% | 7.5 | Granule and ball test | No |

Not only will increasing the minimum requirement to 600 grams not address the double flushing issues associated with items 2, 3, and 4 above, it could actually make those issues worse as manufacturers could be driven to divert more water away from rim punchings (which help clean the sides of the bowl) to ensure increased bulk removal capability. As the maximum toilet flush volume for toilets sold and installed in California decreased from 1.6 gpf to 1.28 gpf on January 1, 2014, the effect of such a diversion is magnified. As a result, not only would double flushing not be reduced, it is possible, perhaps even likely, that it would increase.

- As of May 2014 a total of 2,087 individual toilet models were certified to the WaterSense specification. Of these 2,087 models, 886 (42 percent) had not been shown to achieve a 600 gram MaP threshold. Most of these 886 models rely solely upon the minimum 350 gram WaterSense requirement for a marketplace presence. Yet, these same products compete in the marketplace and meet consumer expectations. If implemented today, the 600 gram threshold would unfairly remove 886 qualified products from the California marketplace, significantly and adversely impacting consumer choice and likely cost.
- Unlike self-certification as in Energy Star, the WaterSense program requires independent third-party testing and certification of toilets (and other products) to the applicable specification. If the 600 gram threshold was implemented, manufacturers would be required to retest all 2,087 toilet models to the new threshold at great cost in order to be sold in California. Under the current ISO/IEC 17065 requirements within Version 2.0 of the WaterSense Product Certification System, every such model must be re-certified through a WaterSense-approved certifying body, and re-listed in accordance with the System provisions. Based upon the current costs of testing, certification, and listing (conservatively estimated at \$800 per model for testing and \$1890 per model for certification and listing)⁸, the total obligation could result in millions of dollars expended, without assurance of any water or energy savings. We consider this to be a significant and unnecessary cost of money and resources.
- Setting an arbitrarily high minimum performance level could significantly harm the industry's chances of moving to even lower flush volumes, i.e., lower than 1.28 gpf. While it may be possible for manufacturers to develop hundreds of models that flush with only 1.0 gallon or less

⁸ Source: John Koeller and IAPMO R&T Certification

while clearing 350g, it may be very difficult to achieve greater water efficiency if the minimum is set at 600g. This would be a step back in the advancement of water efficiency.

Comments on Relationship to the National WaterSense Program:

AWE is also concerned about the unintended negative impact that may result to the U.S. EPA's WaterSense program if the CEC adopts the CASE Team's recommendations. This could send a signal that the WaterSense specifications are inadequate and outdated, and do not provide for the highest levels of consumer satisfaction. This would be a very unfortunate outcome in light of the rigorous third party testing protocols and certification and the excellent consumer feedback associated with all WaterSense labeled products. The WaterSense program specifications for plumbing are developed through a thorough process that seeks input from all stakeholders. The results of this approach are evident in the success of the program among consumers, manufacturers, and utilities.

Conclusion:

- AWE recommends that the CEC process for water closets (toilets), urinals, and lavatory faucets rely upon the WaterSense certification and listing process for all three of the products discussed here. This action would result in substantial water savings and save significant funds for various parties by removing the requirement for manufacturers to submit different 'paperwork' to the CEC that is duplicative of what they already submit to WaterSense and certifying bodies in the normal course of business. Furthermore, the CEC would benefit financially by no longer needing to maintain a very large database of toilets, urinals, and faucets and the associated documentation. Finally, consumers and design professionals would benefit because ready and easy access to the WaterSense database is available to all through its online presence.
- Recognizing the dire situation that California is in because of the current mega-drought, AWE suggests that CEC and the California state agencies consider where significant long-term savings can be had immediately. AWE calculates that there are likely up to 4 million existing 3.5 gpf and 5.0 gpf toilets remaining in residences throughout the State of California. **A retrofit program to replace those 4 million toilets could yield 90,000 acre-feet per year for 20 years, equivalent to a total of 1,800,000 acre-feet of water at a cost as low as \$333 per acre-foot of water saved.**