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June 5, 2014

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

Subject: MaP® Issues – CEC Docket No. 14-AAER-1, Appliance Efficiency Pre-Rulemaking

Dear Mr. Singh and Commission staff,

Thank you for this opportunity to participate in the CEC pre-rulemaking process related to plumbing products. Our comments today relate exclusively to one item under consideration by your organization, the CASE proposal from the Investor-Owned Utilities suggesting a minimum 600 gram MaP® flush performance threshold for toilets sold in California.

Maximum Performance (MaP®) testing is a private program that reports results of independent toilet performance testing to the public free-of-charge. The program is owned and administered by the undersigned. The MaP® logo (including the term 'MaP') is trademarked and the testing protocol and listings posted on the MaP® website are copyrighted.

### **Background**

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 delivery of more efficient products to the marketplace, its purpose was to provide water utilities, consumers, and design professionals with the information necessary to make their purchase and specification decisions based upon flush performance data for bulk waste. The MaP® protocol<sup>1</sup> is a 'test to failure' using specific test media chosen to represent and replicate bulk waste.

The 350 gram (12.3 ounce) minimum bulk waste removal performance threshold identified by MaP® was based upon a 1977 medical study<sup>2</sup> 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

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<sup>1</sup> The full MaP® toilet test protocol may be found at: <http://www.map-testing.com/content/info/menu/map-testing-protocol.html>

<sup>2</sup> Wyman-Variability of Colonic Function in Healthy Subjects, 1977 (available at <http://www.map-testing.com/performance-toilets-testing/background.html> )

subjects. The study findings and the 350 gram threshold were later validated by two subsequent studies<sup>3</sup>.

MaP<sup>®</sup> began working with the U.S. EPA's WaterSense<sup>®</sup> Program staff in 2006 to adopt the MaP<sup>®</sup> protocol as an integral part of their specification for High-Efficiency Toilets<sup>4</sup> (HETs). That was successfully completed with the release by WaterSense<sup>®</sup> of version 1.0 of the HET specification in January 2007. The WaterSense<sup>®</sup> specification requires a pass-fail test at 350 grams to achieve compliance.

In 2013, the MaP<sup>®</sup> test protocol contained within the WaterSense<sup>®</sup> specification was adopted into the ANSI standard<sup>5</sup> for all water closets (toilets). This national standard covers both HETs and 1.6 gallons per flush toilets, such that all toilets sold in the U.S. must undergo the same pass-fail test at 350 grams to comply and be qualified for installation.

Today, approximately 3,000 different tank-type toilet models are listed on the MaP<sup>®</sup> website ([www.map-testing.com](http://www.map-testing.com)) with performance information and key physical characteristics. Similarly, about 460 different flushometer valve/bowl combinations for commercial use are listed as well. These models are produced by about 80 different manufacturers under more than 100 different brand names. Each of the MaP<sup>®</sup>-listed toilet models is available in North America (although not in every location).

With the establishment of a universally accepted North American minimum performance threshold for bulk waste removal (350 grams), manufacturers and others began to develop very efficient products for the marketplace. Many of the manufacturers participating today in MaP<sup>®</sup> would not have found it feasible to develop new products without the established benchmarks provided by MaP<sup>®</sup> and WaterSense<sup>®</sup>. Some entities have developed or are currently developing products that flush at less than 1.28 gallons (4.8 L) while still able to evacuate 350 grams and meet all other requirements of WaterSense<sup>®</sup>. This ancillary benefit (i.e., increased water savings) of MaP<sup>®</sup> and WaterSense<sup>®</sup> is significant.

### **Response to IOU's CASE proposal**

The CASE Team Addendum 1 document<sup>6</sup> offers two assertions that form the basis for their analysis: (a) users are dissatisfied with toilet flushing performance (page 1) because of the need for double flushing; and (b) double flushing can be reduced (page 9) by increasing the minimum MaP<sup>®</sup> score from 350 grams (12 ounces) to 600 grams (21 ounces). Both of these assertions are entirely without merit.

#### **(a) User Satisfaction**

No evidence has been provided in the CASE Team document (or elsewhere) that shows 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<sup>®</sup>-listed toilets has demonstrated overwhelming user satisfaction.

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<sup>3</sup> 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> )

<sup>4</sup> High-Efficiency Toilets (HETs) are subject to a maximum effective flush volume of 1.28 gallons per flush (4.8 Liters per flush).

<sup>5</sup> ANSI Standard ASME A112.19.2-2013/CSA B45.1-13: Ceramic Plumbing Fixtures

<sup>6</sup> 2014, Energy Solutions. "Codes and Standards Enhancement (CASE) Initiative For PY2014: Title 20 Standards Development, Addendum 1 to Toilets and Urinals CASE Report, Recommend Establishing a Maximum Performance (MaP) Threshold of 600 grams for all Toilets." February 20.

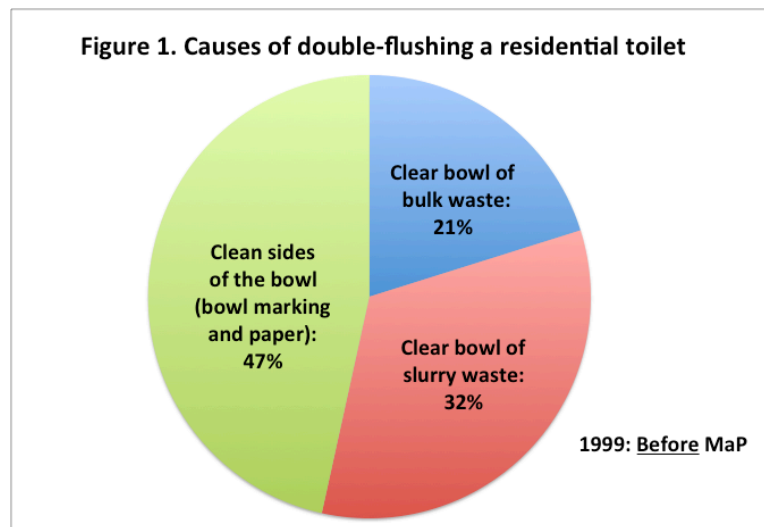
## (b) Double Flushing

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 California<sup>7</sup>, the frequency of each of these causes of double flushing can be identified as shown in Figure 1.



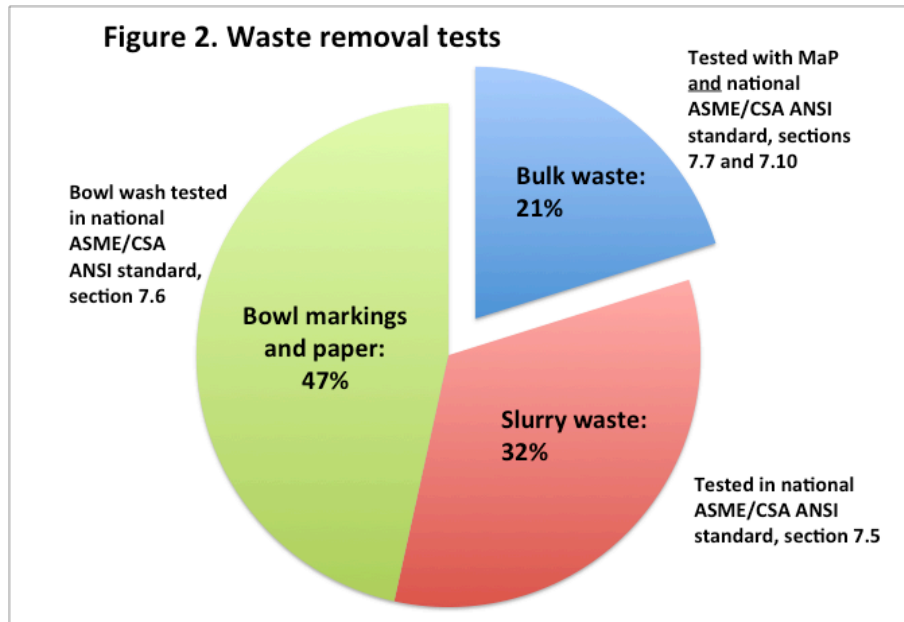
It should be noted that the 1999 study was conducted before the development of MaP® and the resulting improvements in bulk waste removal.

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 and Figure 2 display the distribution of the four causes and the applicable test elements of the national standard.

**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

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

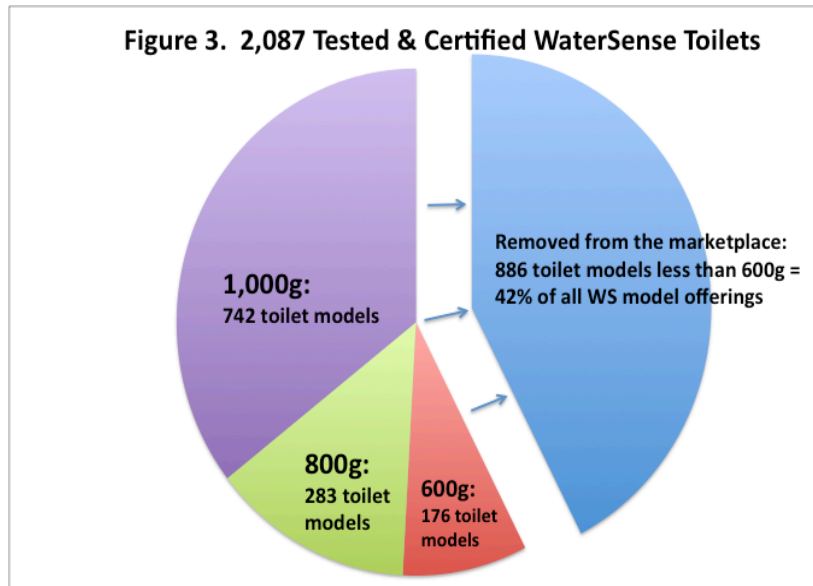


Not only will increasing the minimum requirement to 600 grams not address the double flushing issues associated with items 2, 3, and 4 in Table 1, but it could actually make those issues worse as manufacturers could be driven to divert more water away from rim punchings (which direct water to help clean the sides of the bowl) to ensure increased bulk removal capability. As a result, not only would double flushing not be reduced, it is possible, perhaps even likely, that it would increase as less water is made available to clean the sides of the bowl.

### (c) Fractured Marketplace

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. Many (but not all) of these 886 models rely solely upon the minimum 350 gram WaterSense® requirement for a marketplace presence. Yet, these very same WaterSense® products compete successfully 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<sup>8</sup>. See Figure 3.

<sup>8</sup> This assumes the CEC 'accepts' the current results of the voluntary MaP testing program as displayed on [www.map-testing.com](http://www.map-testing.com). However, it is more likely that the separate WaterSense® testing and certification process would be the recommended process for determining fixture compliance with a 600 gram threshold. As a result, even those fixtures already found by MaP® testing to meet the 600 gram requirement would require re-testing in accordance with that process.



#### (d) Product Re-testing and Re-certification

Unlike self-certification (as has been the history of Energy Star), the WaterSense® program has, from its inception, instead required independent third-party testing and certification of toilets (and other products) to the applicable specification. The formalized WaterSense® Product Certification System meets current ISO/IEC 17065 requirements. If the 600 gram threshold was implemented, manufacturers would be required to retest all 2,087 WaterSense®-certified toilet models to the new threshold in order for those models to be sold in California<sup>9</sup>. 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 up to \$1890 per model for certification and listing)<sup>10</sup>, the average cost per fixture is estimated at \$1,000 each (\$800 for testing and \$200 average for recertification). As such, the total obligation could amount to over \$2 million, without assurance of any water or energy savings. We consider this to be a significant and unnecessary expenditure of money and other resources.

#### (e) Effect upon Efficiency Innovation

Setting an arbitrarily high minimum performance level could significantly harm the industry's chances of moving to even lower flush volumes, i.e., 1.0 gpf and less. While it may be possible for manufacturers to develop hundreds of models that flush with only 1.0 gallon or less while clearing 350 grams, it may be very difficult to achieve significantly greater levels of water efficiency if the minimum is set at 600 grams. We believe this would be a serious step back in the advancement of water efficiency.

<sup>9</sup> Including those already tested and results displayed at [www.map-testing.com](http://www.map-testing.com)

<sup>10</sup> Source: IAPMO R&T Product Certification

In summary, MaP® rejects the CASE recommendation to increase the minimum MaP® performance threshold for toilets to 600 grams from the widely accepted WaterSense® and national standard of 350 grams. The CASE recommendation is inconsistent with current industry standards, severely restricts product availability, thwarts innovation, fails to save energy or water, does little, if anything, to improve upon user satisfaction, and is not cost-effective.

Thank you for considering these comments. We are available to answer questions regarding MaP® testing as well as regarding the information we have provided in this letter.

Regards,



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