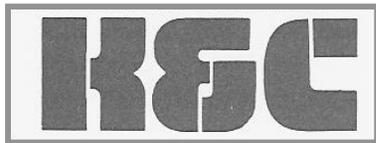


MaP Testing's 6-year Anniversary:

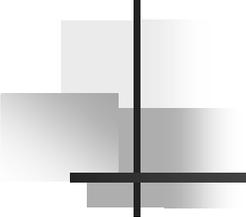
A proven process for development & implementation
of meaningful product performance standards

John Koeller, P.E.
Koeller and Company
Technical Advisor for the
U.S.-Canadian
Alliance for Water Efficiency

*AWWA PNWS Annual Conference
Salem OR
May 7, 2009*



A historical perspective & update on MaP Testing



Origin of a problem...and a solution!

- Fed Govt mandates 1.6-gal maximum flush - 1994
- Early U.S. 1.6-gal siphonic toilets did not flush well
- Why? Because many mfrs simply converted a 3.5-gallon toilet to flush with 1.6 gallons
 - No engineering - no hydraulic redesign - same tank size
 - Same tank, but use an “early closing” flapper
 - No rigorous performance requirements
- PLUS, many models could be adjusted to increase the flush volume back to 3 - 4 gals!

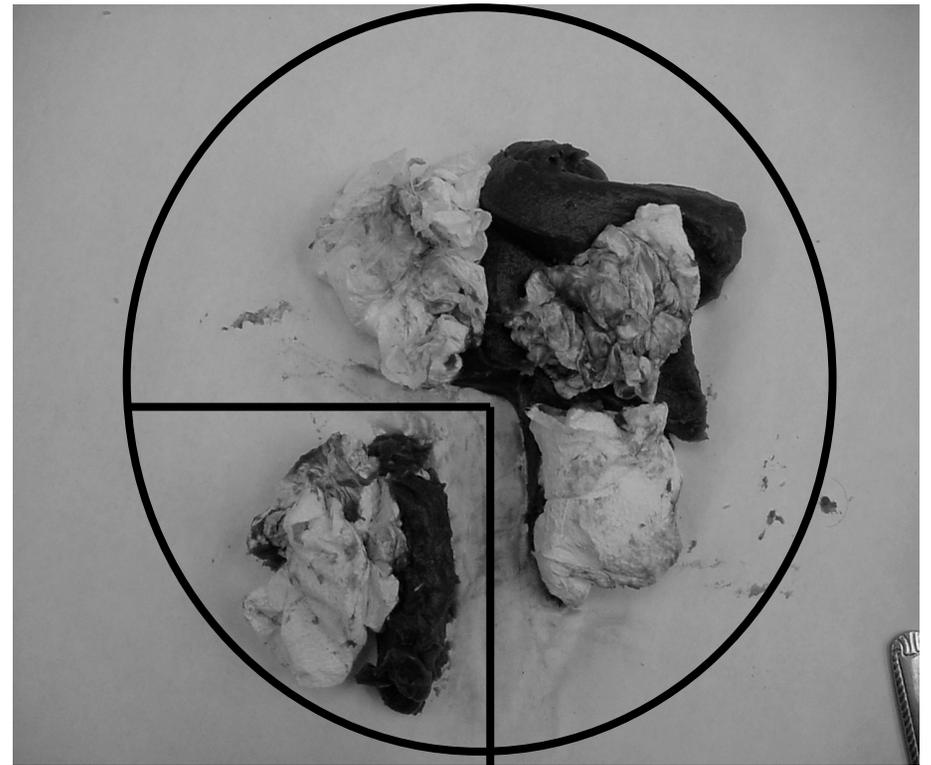
U.S.-Canadian Certification Process - 3 major problems remain today!!

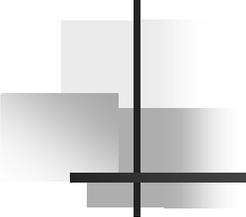
1. Testing fails to replicate “real world” conditions
 - Sponges?
 - Paper wads....maybe!
 - Granules?
 - Plastic balls?
2. 100% removal of waste
not required!!
3. Pass/fail only - no rating
or ranking of performance
for consumers



Certification in North America

- Only 22 of 28 media required to clear fixture - 75+%!!
- Question: Would a consumer be satisfied with a toilet that cleared only 75% of waste?





Like saying....

✓ Pilot to passengers:

“Folks, this aircraft will only be using 3 of its 4 engines on this trip!
But, we’ll be OK...”

✓ Car salesman to customer:

“Sir, the brakes on this new vehicle will stop the car at least 75%
of the time!”

✓ Plumber to homeowner:

“This toilet will regularly remove 75% of the waste!”

Result...

- ✓ Early ULFTs (1.6 gallon) = performance problems
 - ✓ Water utility complaints about sustainability of savings
 - ✓ Customer complaints about flush performance
 - ✓ Outcome: Manufacturers got the “message” and developed improved product (led to the 2nd generation of toilets in the late 1990s)
- ✓ ALSO..... water utility industry steps up to address:
 - ✓ Sustainability of water savings (flappers & adjustability)
 - ✓ Flush performance (customer satisfaction)

Three Water utility “responses” ...

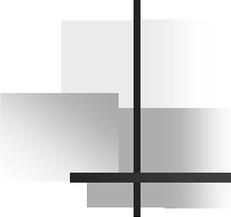
- ✓ 2000 - Los Angeles Supplementary Purchase Specification (SPS) for tank-type toilets
 - Mandates durable flappers
 - Limits flush volume adjustability
 - Requires marking with flapper part no.

- ✓ 2003 - Maximum Performance (MaP) testing
 - Addresses flush performance issues

- ✓ 2005 - UNAR developed for WE programs

UNAR is developed





Maximum Performance Testing of Popular Toilet Models (MaP Testing)

- Cooperative Canadian & U.S. project - 2003
- Development sponsored by 22 water utilities and interested parties in U.S and Canada
- Purposes:
 - Give consumers information they needed on toilet flush performance
 - Provide water conservation programs with info for their approved “lists”

Maximum Performance Testing of Popular Toilet Models (MaP Testing)

- Cooperative U.S. and Canadian project - 2003
 - East Bay Municipal Utility District
 - Los Angeles Dept of Water & Power
 - Tampa Bay Water
 - Seattle Public Utilities
 - Calif Urban Water Conservation Council
 - Toronto, Ontario
 - Winnipeg, Manitoba
 - Greater Vancouver Regional District
 - Canada Mortgage & Housing Corp.
 - B.C. Buildings Corp. Victoria B.C.
 - Capital Regional District, Victoria B.C.
 - Canadian Water & Wastewater Association (Lead)
 - Region Durham, Ontario
 - Region Halton, Ontario
 - Region Waterloo, Ontario
 - Hamilton, Ontario
 - Region Peel, Ontario
 - Calgary, Alberta
 - Edmonton, Alberta
 - Montreal, Quebec
 - Ottawa, Ontario
 - Halifax, Nova Scotia

Maximum Performance Testing of Popular Toilet Models (MaP Testing)

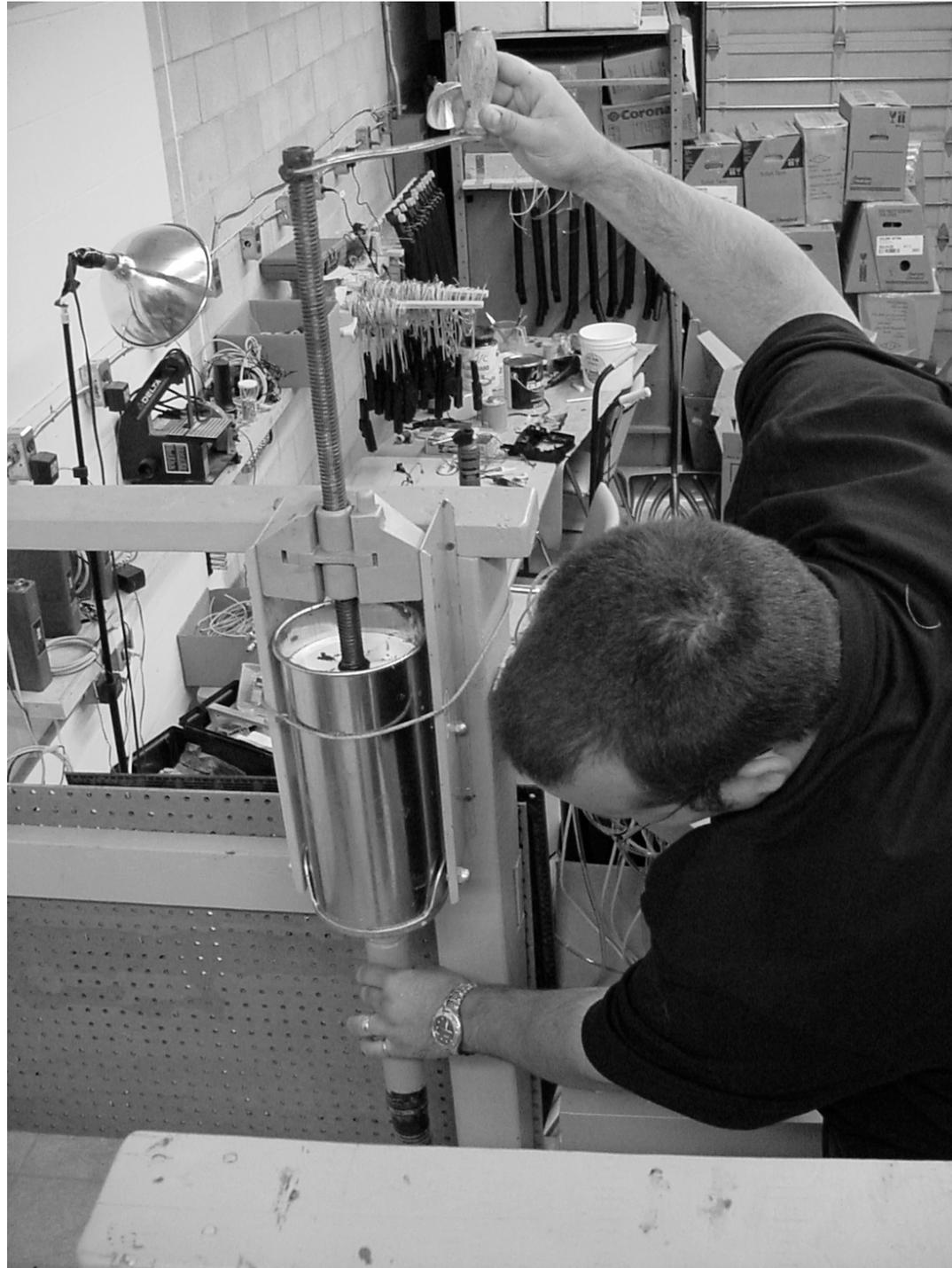
- Why MaP?because certification testing is a very poor measure of “real world” performance of toilet fixtures.... and consumers want to compare!
- MaP Features -
 - ✓ Replicates “real world” with special test media
 - ✓ An independent measure of toilet performance
 - ✓ Scientifically based minimum performance threshold for waste removal (250g = 95th percentile for men)
 - ✓ User-friendly basis for toilet selection



Test Media: Soy Bean Paste









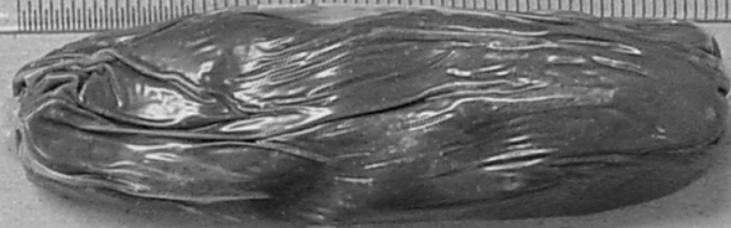
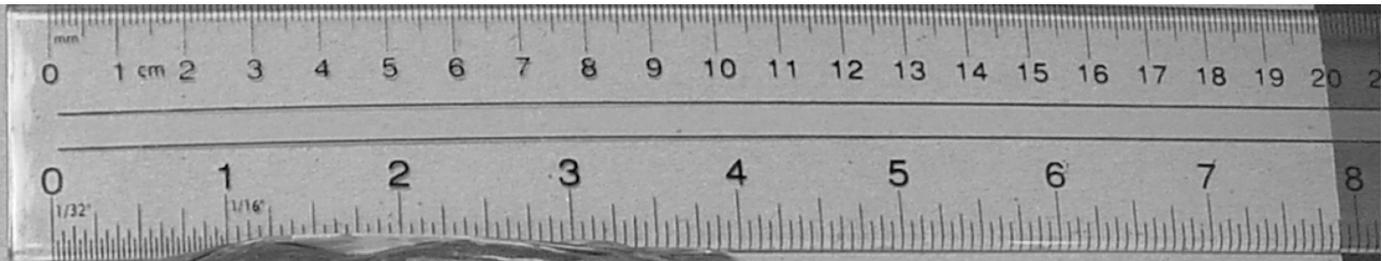






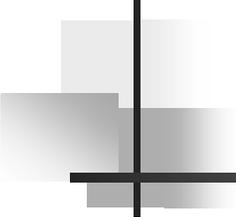
Maximum Performance Testing of Popular Toilet Models (MaP Testing)

- ✓ Uncased soy bean paste: primary test media
- ✓ BUT, costs escalate
 - ✓ One-time use
 - ✓ Worldwide distribution
- ✓ Seek out a “re-usable” alternative =
encased soy bean paste



Maximum Performance Testing of Popular Toilet Models (MaP Testing)

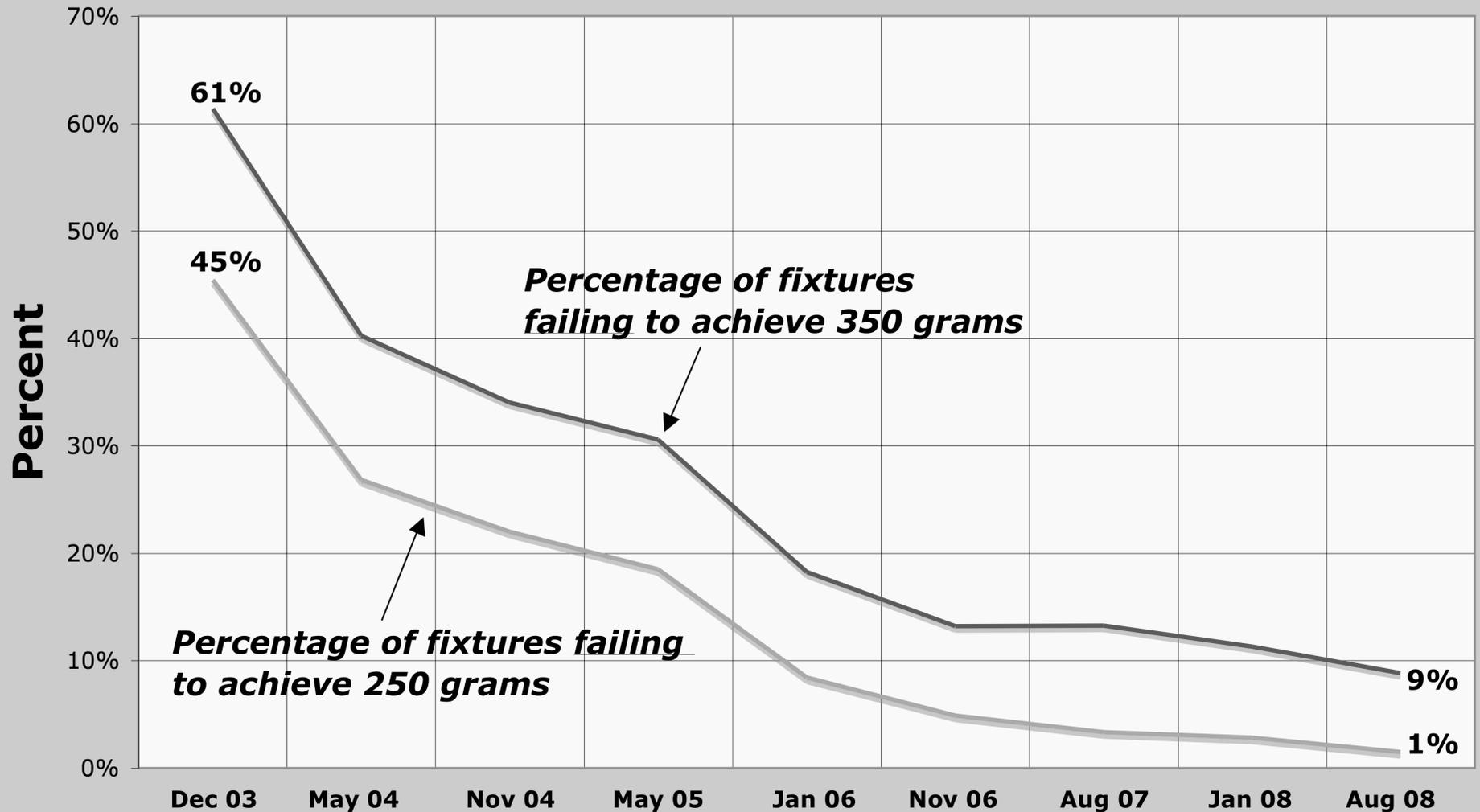
- ✓ 13th Edition report now posted (January 2009)
 - ✓ 840+ different toilet fixture models tested for flush performance and rated!!
 - ✓ Tank-type AND flushometer valve fixtures
- ✓ Used or adopted by various large production builders, designers, specifiers, retailers, water utilities, plumbers, consumers, & others for product selection
- ✓ Used by U.S. EPA WaterSense® Program as basis for measuring toilet performance...
 - All WaterSense®-certified HETs MUST meet a 350g threshold
 - All WaterSense®-certified HETs are INDEPENDENTLY tested
- ✓ Manufacturers worldwide now testing to MaP
- ✓ Manufacturers submit products for **independent testing**
- ✓ Future MaP initiatives -
 - ✓ Flushometer valve toilet fixtures
 - ✓ Urinals



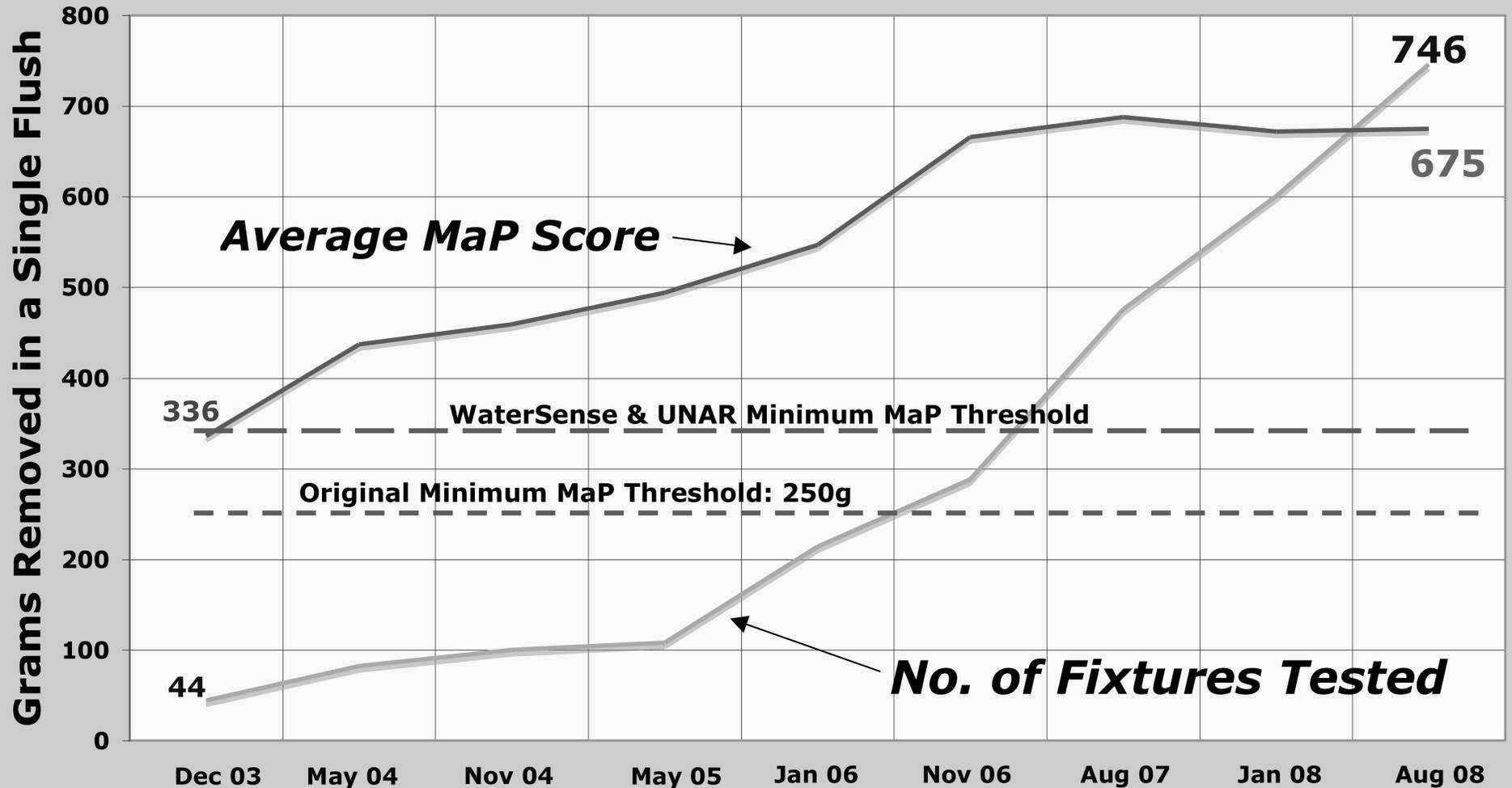
Performance Progress through MaP Testing

- Early ULFTs (1.6gal) - minimal testing, poor performance
- Today's ULFTs - MaP testing leads to improved performance
- New HETs (1.0 to 1.28gal) - MaP testing is leading to outstanding performance
- WaterSense[®]-certified HETs outperform older toilets

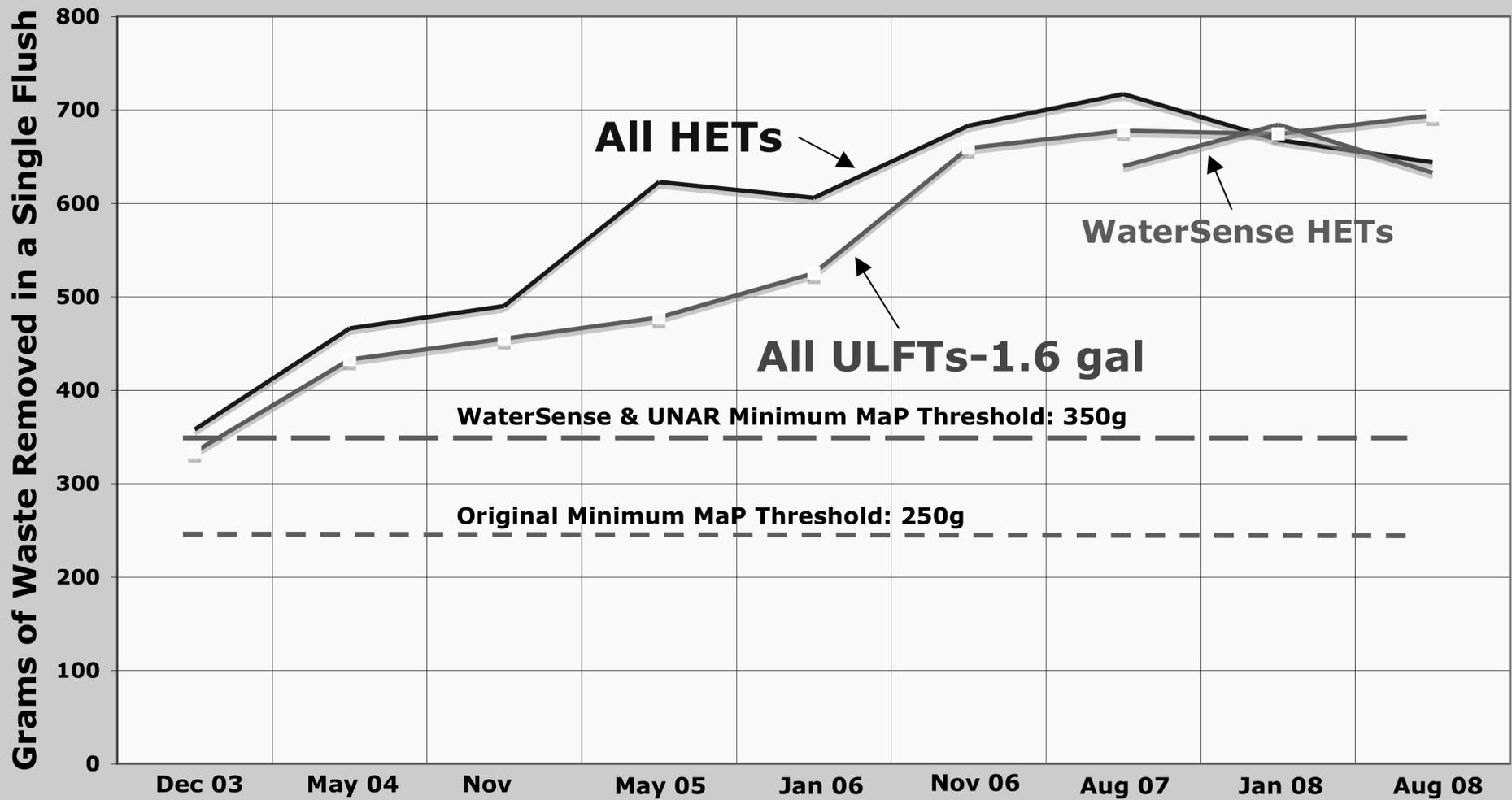
Percentage of MaP-tested fixtures failing to meet minimum performance



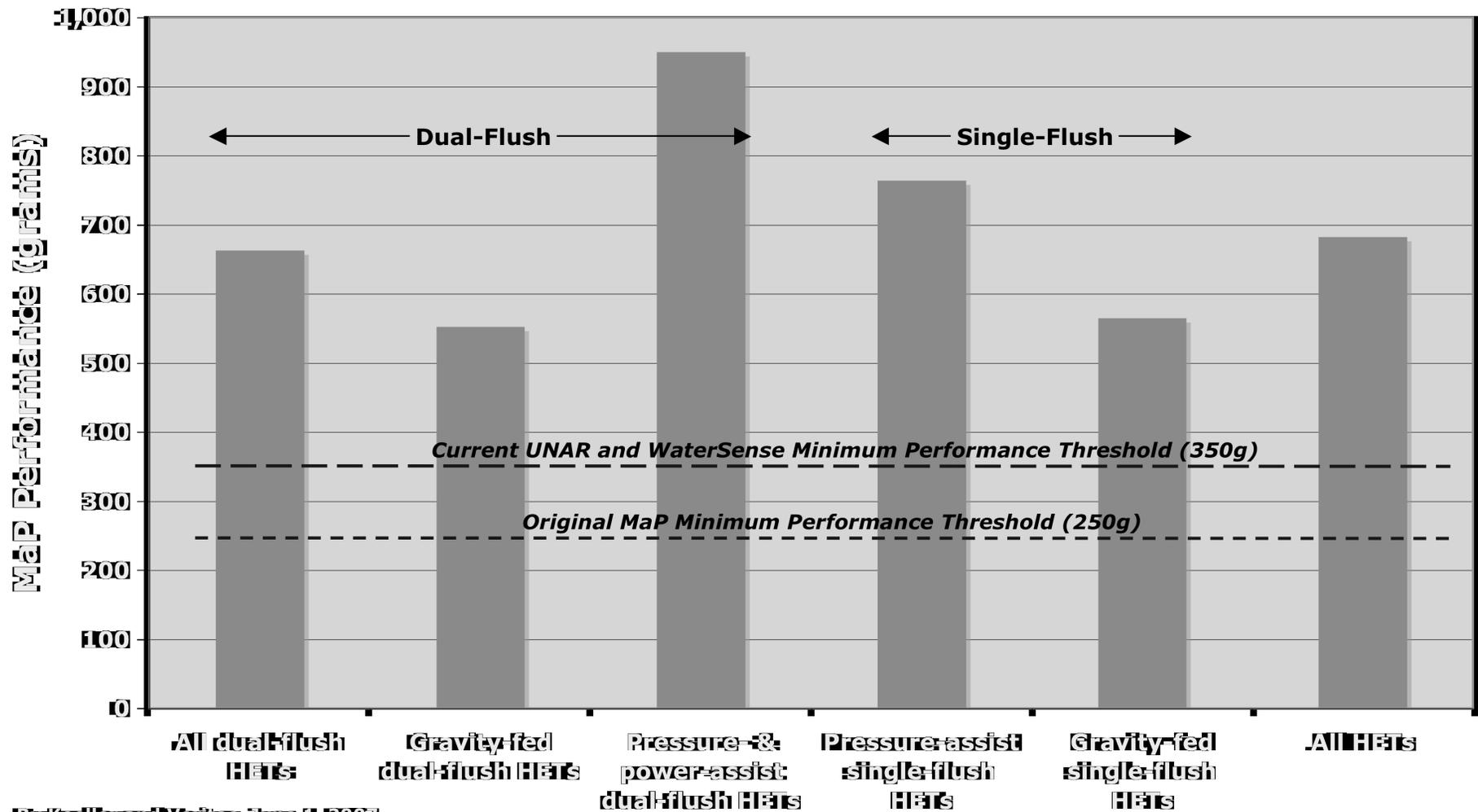
Toilet Fixtures Tested - Average MaP Score

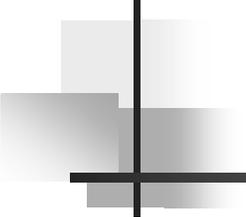


Average MaP Scores - 2003 to 2008



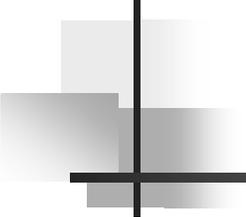
MaP Scores for HETs (1.28 gpf - 4.8 lpf and less)





High-Efficiency Toilet (HET) Specifics

- TODAY: Over 400 different HET models available
(375+ WaterSense certified!)
 - ✓ 30 mfrs of dual-flush HETs with 183 different models
 - ✓ 12 mfrs of 1-gal single-flush pressure-assist HETs - 44 models
 - ✓ 26 mfrs of 1.28-gal single-flush gravity HETs - 105 models
 - ✓ 7 mfrs of 1.28 flushometer valve toilets for commercial - 24 models
- 2009 is seeing dozens more!



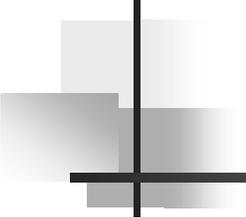
What's Next?

- New MaP test for flushometer bowl-valve HET combinations (1.28 gal)
 - “Super log”
 - Toilet seat covers & paper towels
 - More floating media
- U.S. EPA WaterSense Program - test protocol for flushometer bowl-valve combinations
- More “matched” flushometer bowl-valve combinations from single manufacturers

Conclusions...



- ✓ WaterSense[®]-certified HETs perform equal to or better than 1.6-gallon ULFTs
- ✓ Today's high-efficiency toilets perform better than the 3.5-g fixtures of the 1980s
- ✓ Customers are satisfied!
- ✓ Marketplace contains wide selection of WaterSense[®]-certified HETs....with many more to come in 2009
- ✓ MaP started it all!



10 good reasons for you to join AWE!

1. Single voice with Federal lawmakers
2. Backed by credible national authority
3. Extensive technical support & resources
4. Codes & standards advocacy
5. Clearinghouse of programmatic information
6. Testing, evaluation, monitoring of products/technologies
7. Green building support
8. National messaging about water conservation
9. Outreach methods & marketing approaches
10. “Mingle” with your peers....networking contacts with professionals

Thank you...



**John Koeller, P.E.
Koeller & Company
Yorba Linda, California**

for the

Alliance for Water Efficiency

**Tel. (714) 777-2744
koeller@earthlink.net**