



July, 2012

Contributor Update on the PERC Drainline Transport Research Program

Dear PERC Contributor,

We have passed the half-way point of the testing phase on our drainline transport research program and the PERC Technical Committee is pleased to provide you with this status report detailing our progress to date and our next steps.

Brief review:

Actual testing commenced on March 12, 2012 at the American Standard Brands Product Development Center located in Piscataway, NJ.

As you know from the PERC research test plan proposal (attached to the accompanying e-mail for convenience), this research is intended to evaluate the following variables and how they interact to impact drainline transport in long horizontal drains:

Study Variablesⁱ:

| | | | |
|----------------------------|-------------|----------|---------|
| Diameter (inches) and Type | 4" PVC Pipe | | |
| Pitch (%) | 1% | 2% | |
| Flush Volume (Lpf/gpf) | 6.0/1.6 | 4.8/1.28 | 3.0/0.8 |
| Flush Rate (ml/s) | 3500 | 2500 | |
| % Trailing Water | 75% | 25% | |

Additionally, the research entails two explicit deliverables, characterized in the proposal as follows:

1. Prior international studies and some field failures reported recently in Australia, indicate that flush volumes consistent with High Efficiency toilets may result in systemic drainline transport-related failures in building drains. This study will evaluate the viability of a low-cost building drain clearing solution. It will seek to determine if a clog can be cleared on a 200 ftⁱⁱ, 4" diameter plastic pipe by means of a flushometer valve or other device set to deliver higher volume discharges at intermittent intervals (1% or 2% of flushes).

2. Prior international studies have concluded that toilet hydraulics are a significant factor in drainline transport, specifically pointing to the amount of trailing water as a key factor. This study will determine the role that toilet discharge curves play in drainline transport efficacy in a multi flush sequence and will rank the hydraulic characteristics (percent trailing water and flow rate) of the toilet relative to other variables beyond the control of the toilet design (flush volume and drainline slope).

Status:

We have completed all of the testing with the drainline test apparatus set at 1% slope. We have achieved this milestone ahead of schedule. The apparatus has been re-set at 2% slope and testing is ongoing. We will complete the testing phase, as scheduled, in mid-July.

Because we were ahead of schedule and found that we could accomplish more with the existing funds on hand, the PERC Technical Committee determined that we could add another test variable to the work plan. The decision was therefore made to add toilet paper properties to the test variables shown above.

We made this decision based on a research report from AS-Flow in Australia conducted in 2010 that clearly indicated that toilet paper properties have an impact on drainline transport distances. Testing conducted by PERC in 2011, using the Australian toilet paper brands used in the AS-Flow research, showed a strong correlation between wet tensile strength of the toilet papers and the resulting transport distances. Hence, we determined that by selecting two (2) US toilet paper brands, one with very high tensile strength and one with very low wet tensile strength, we would provide valuable insight to our contributors by measuring the potential impact of toilet paper properties on drainline transport relative to the other test variables.

It is important to note that we will not be identifying the two specific brands of toilet paper used for this work in our final report; however we will provide the method we used to determine wet tensile strength. Keep in mind that the purpose of adding this to our work plan is to characterize the potential impact that toilet paper properties can have on drainline transport, not to recommend a particular brand.

While it is too soon to discuss any results from our work at this time (the testing at the 2% slope is still in progress) we are indeed confident that we will be able to meet our deliverables. We look forward to issuing our full report early in the 4th quarter of this year.

In closing, we are happy to inform you that we will actually be providing more information than what was detailed in our work plan. We thank you for your financial support and we look forward to the issuance of our report later this year.

Sincerely,
The PERC Technical Committee

Milt Burgess - representing ASPE
Pete DeMarco - representing IAPMO
John Koeller - representing AWE
Shawn Martin - representing ICC
Len Swatkowski - representing PMI
Charles White - representing PHCC

ⁱ You may notice some minor discrepancies to the values for flush rate and % trailing water shown here and in the work plan. These values, which represent characteristics of a toilet flush, were intentionally revised to better reflect the performance of toilets currently in the marketplace.

ⁱⁱ The length of the apparatus being used to conduct this work is 135 feet. While the Work Proposal sought to conduct this testing on a 200 foot long apparatus, the longest length that could be accommodated in the American Standard Brands test facility was 135 linear feet.