



**ENERGY STAR® Discussion Document:
Flight Type Commercial Dishwashers
June 27, 2011**

During the ENERGY STAR Flight Type Dishwashers Stakeholder Meeting on May 23, 2011, the U.S. Environmental Protection Agency (EPA) presented its analysis of flight type final rinse water data compiled from the NSF Certified Directory. Several metrics were evaluated in an attempt to identify apparent trends or relationships. For purposes of discussion, a flat gallons/hour (GPH) line was applied to the data set to determine whether top performers could be identified using this simple metric. To view EPA's flight type analysis and presentation, visit the ENERGY STAR website at www.energystar.gov/revisedspecs (click on Commercial Dishwashers).

Several stakeholders shared concerns regarding the use of a simple GPH metric. The purpose of this interim document is to present a new metric proposed during the meeting, as well as identify additional outstanding questions/issues, and continue the flight type discussion. EPA intends to use feedback and data received on this document to propose flight type requirements in the Draft 3 Version 2.0 specification, scheduled for release in August 2011.

It's important to note that if an approach for evaluating flight type performance cannot be determined in time for the Draft 3 release, EPA may decide to exclude these products and address them under a subsequent version (e.g. Version 3.0) once a total energy and water consumption test method is made available by ASTM.

Interested stakeholders are encouraged to send comments and any supporting data to commercialdishwashers@icfi.com by **July 29, 2011**. Questions can be directed to Christopher Kent, EPA, at kent.christopher@epa.gov or Rebecca Duff, ICF International, at rduff@icfi.com.

Area/Minute Approach

EPA revisited the data set to determine whether there is a relationship between conveyor belt area, speed, and water consumption, as suggested during the May stakeholder meeting. Data plots are provided at the end of this document for review.

This analysis suggests a relationship between GPH, conveyor area, and speed for both single- and multi-tank machines. The scatter plots also appear to confirm the following:

- Movement within the industry over the last several years to reduce final rinse water usage.
- Inherent design differences between single- and multi-tank machines suggesting separate levels, similar to the existing rack conveyor binned requirements.
- Water efficient designs, such as dual rinse, rank favorably using this metric and might benefit from ENERGY STAR recognition.

Potential performance levels representing approximately the top 25% of the single- and multi-tank data sets are also presented in the scatter plots, derived from the overall trend lines. Several

manufacturers offer models that would currently meet these potential levels. EPA's intent is to collect information on this approach and propose flight type requirements in the next Draft 3 Version 2.0 specification, if this feedback and additional research support ENERGY STAR guiding principles.

EPA is also interested in receiving comments on the following:

- Impacts of a metric that ties water consumption to area and speed on product design and whether reducing water consumption during the final rinse using this approach would have unintended consequences in regards to increased water and/or energy consumption during other modes within the cycle.
- ENERGY STAR qualification based on the lowest speed, in addition to the highest speed which is currently certified to NSF/ANSI 3. Another option may be to use the maximum speed for purposes of qualification but educate end users on the impacts of adjustments on water consumption. This is in response to concerns that the speeds by which flight type machines are certified may not be representative of actual operation.
- Opportunities for recognizing efficient technologies that are outside the scope of the current specification, such as heat recovery.

Cost Effectiveness

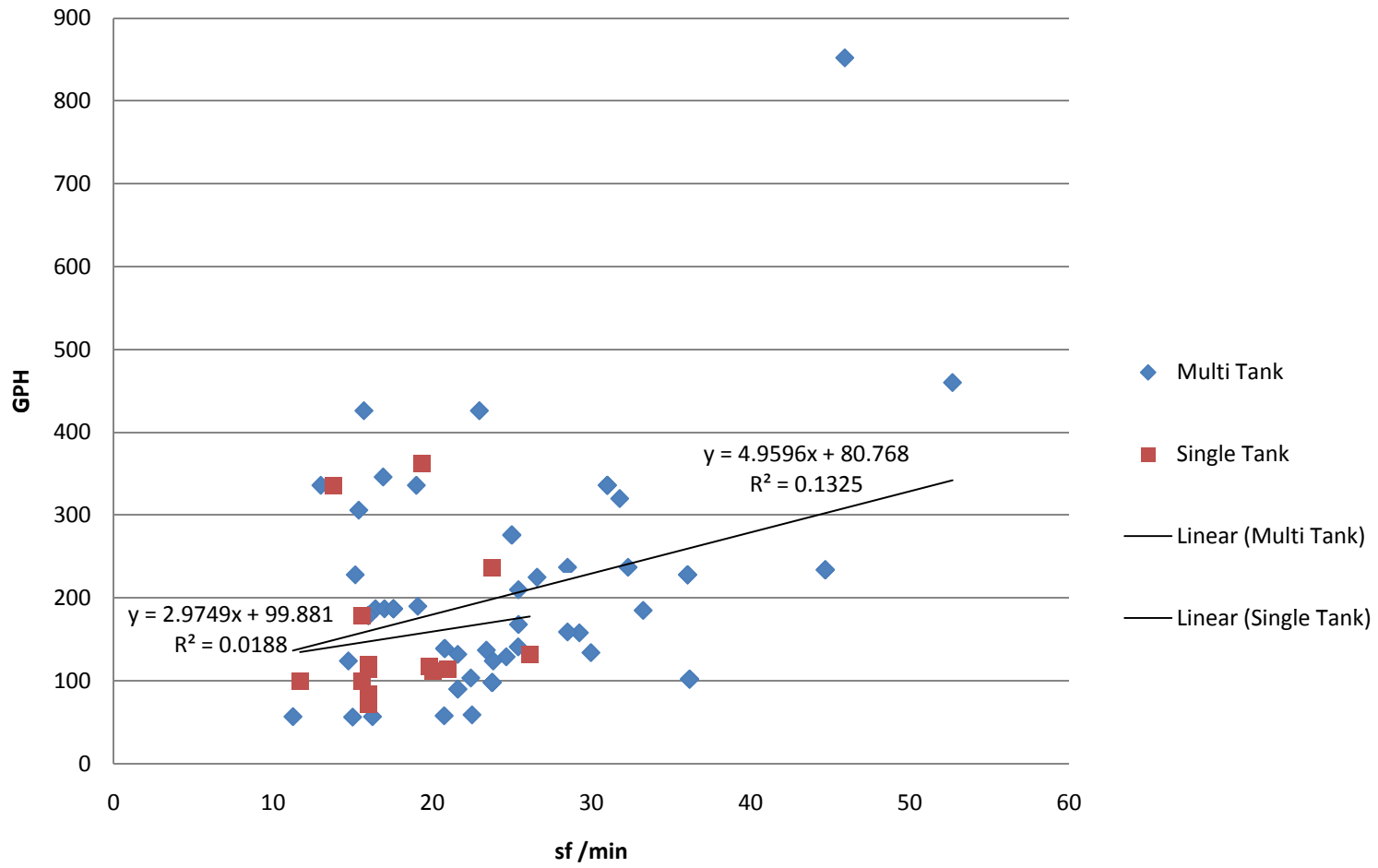
Over the next several weeks, EPA will conduct research on flight type pricing to evaluate the cost effectiveness of a potential ENERGY STAR specification using this approach. To determine the potential payback, EPA is requesting information on the following assumptions:

- Operating Hours – to the extent that this will vary based on facility type, what are the different usage patterns and/or is there a typical usage scenario that can be applied to represent several facility types for purposes of simple payback analysis.
- Building hot water fuel type – electric vs. natural gas.
- Booster water heater type – electric vs. natural gas.
- Base model prices and/or price differential – standard vs. high efficiency.

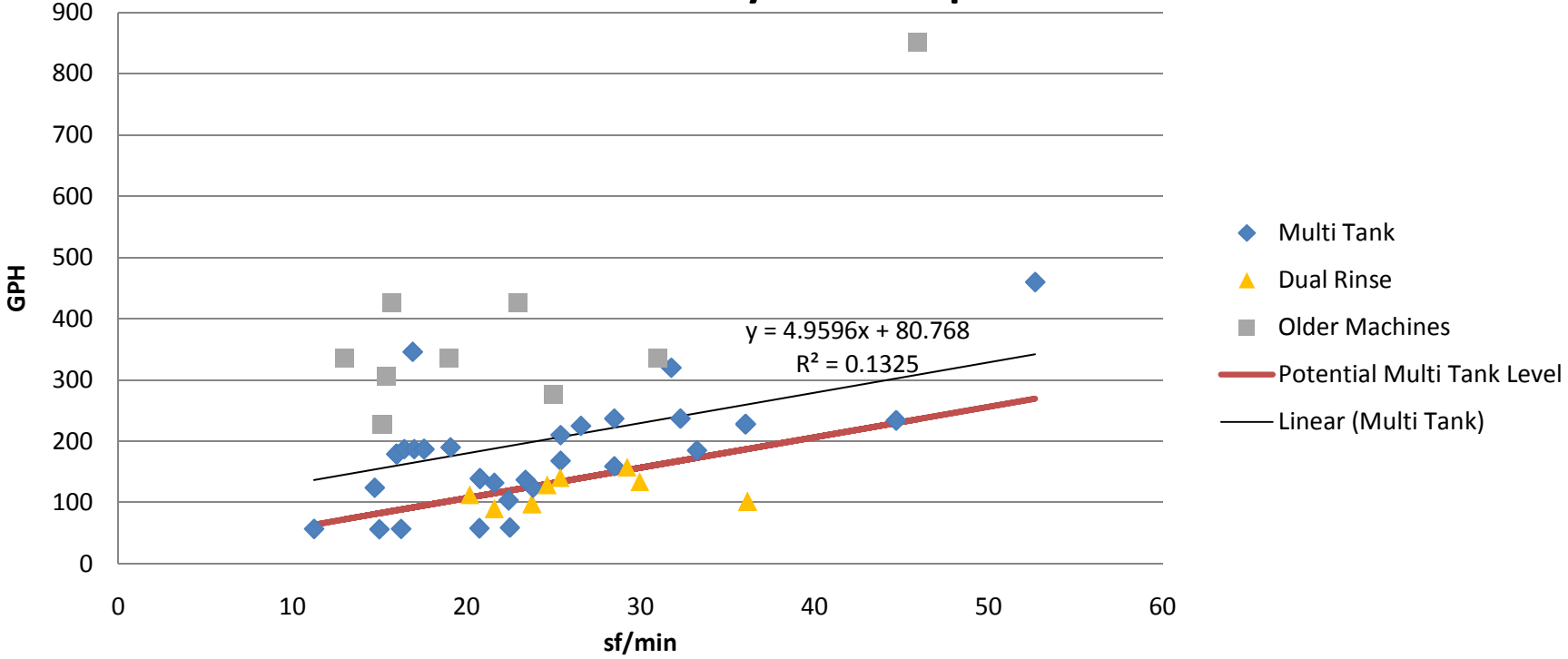
Idle Energy Mode

EPA continues to be interested in evaluating idle energy consumption for flight type machines. Manufacturers are encouraged to apply the ASTM F1920–11 Idle Test Method for Conveyor Machines to representative models and share test results with EPA **by July 29, 2011**. To obtain a copy of the ASTM test method, which was finalized earlier this month, please contact Christine DeJong, ASTM International, at cdejong@astm.org. EPA is interested in confirming whether the test method can be applied to flight type machines as written and reviewing performance results.

GPH vs Conveyor Area Speed



Multi Tank GPH vs. Conveyor Area Speed



Single Tank GPH vs. Conveyor Area Speed

