



ENERGY STAR® Draft 3 Version 2.0 Commercial Dishwasher Specification

Stakeholder Webinar

October 18, 2011



Learn more at energystar.gov

Agenda



- Overview of Key Draft 3 Revisions
- Review of stakeholder comments received
- Test Procedure Status Update
- Next Steps and Timeline

Section 1: Machine Type Definitions



- Single Tank Conveyor
 - Clarification regarding the presence of an auxiliary rinse tank
 - “....may include a prewashing section ahead of the washing section *and an auxiliary rinse section, **for purposes of reusing the final rinse water, between the power rinse and final rinse sections***”
- Flight Type
 - Removal of “permanently installed, vertical pegs” to allow for flat belt designs

Comments Received



- Clarify that machines with air gap, pumped final rinse are single tank if all other criteria is met
 - Interested in getting feedback on need to provide this clarification
- Address under counter rack size similar to door type definition (i.e., “standard rack”)
 - As written, models that accept a 16x16 rack can meet even if substantially less efficient
 - Interested in getting feedback on need to provide specific rack dimensions

Section 1: Mode and Metric Definitions



- Wash Mode: Machine is actively running a cycle and is spraying wash water (i.e., water that is neither part of the final rinse nor the prewashing unit).
- Rinse Mode: Machine is at the end of the actively running cycle and is spraying final hot water or chemical sanitizing rinse water.
- Dwell Mode: For stationary rack type, machine is actively running a cycle but is not in wash or rinse modes.
- Idle Mode: Machine is not actively running a cycle but is still powered on.
- Idle Energy Rate: The rate of energy consumed by the dishwasher tank heater while “holding” or maintaining wash tank water at the thermostat(s) set point during the time period specified in ASTM Standards F1920-11 and F1696-07.

Comments Received



- Rinse mode definition should clarify that it is the sanitizing rinse rather than pumped rinse from a multiple tank machine
 - Use NSF/ANSI 170 definition
- DOE is in the process of updating definitions

Section 1: Product Family Definition



- Current definition does not address fuel type options offered (steam, gas, electric)
 - Existing definition: “variations of one model offered within a single product line with design differences limited to: finish/color; length of pre-wash section, voltage, and orientation (e.g., corner, straight through models). Individual models represented by a product family must have the same final rinse water and idle energy consumption”
- There will be different test methods proposed by DOE for fuel types other than electric

Comments Received



- Each machine should be tested and qualified individually
- EPA should continue to allow representative model (worst case) testing
 - Worst case may not track between GPR and idle
- Options under consideration:
 - Test/certify each individual model, as currently written
 - Allow for worst case GPR and idle (two tests total)
 - Interested in stakeholder feedback on an appropriate approach

Energy and Water Efficiency Requirements – Draft 3



	High Temp		Low Temp	
	Tank heater Idle Energy	Water Consumption	Tank heater Idle Energy	Water Consumption
Undercounter	≤ 0.50 kW	≤ 0.86 GPR	≤ 0.50 kW	≤ 1.19 GPR
Single Tank Door	≤ 0.64 kW	≤ 0.89 GPR	≤ 0.60 kW	≤ 1.18 GPR
Pot and Pan	≤ 0.70 kW	≤ 0.58 GPSF	≤ 0.60 kW	≤ 0.58 GPSF
Single Tank Conveyer	≤ 1.50 kW	≤ 0.700 GPR	≤ 1.50 kW	≤ 0.790 GPR
Multi-tank Conveyer	≤ 2.25 kW	≤ 0.540 GPR	≤ 2.0 kW	≤ 0.540 GPR
Single tank Flight	Reported	GPH=2.975x + 55.00	Reported	GPH=2.975x + 55.00
Multi-tank Flight	Reported	GPH=4.96x + 17.00	Reported	GPH=4.96x + 17.00



Green – Draft 3 changed levels
Red – Draft 1 proposed levels

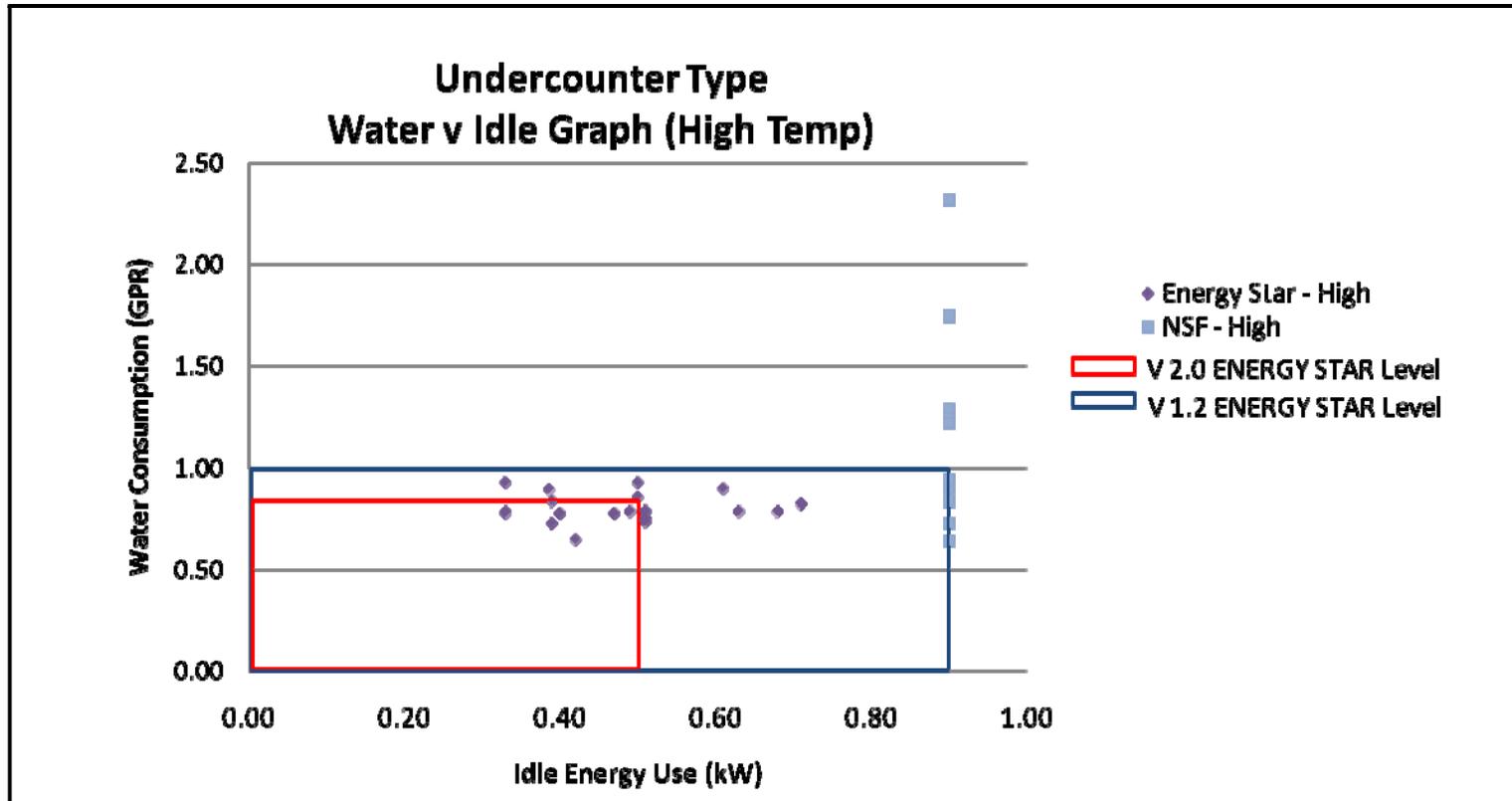
Purple – Draft 2 proposed levels
Black – Levels from V1.2 specification

Section 3: Revised Performance Levels

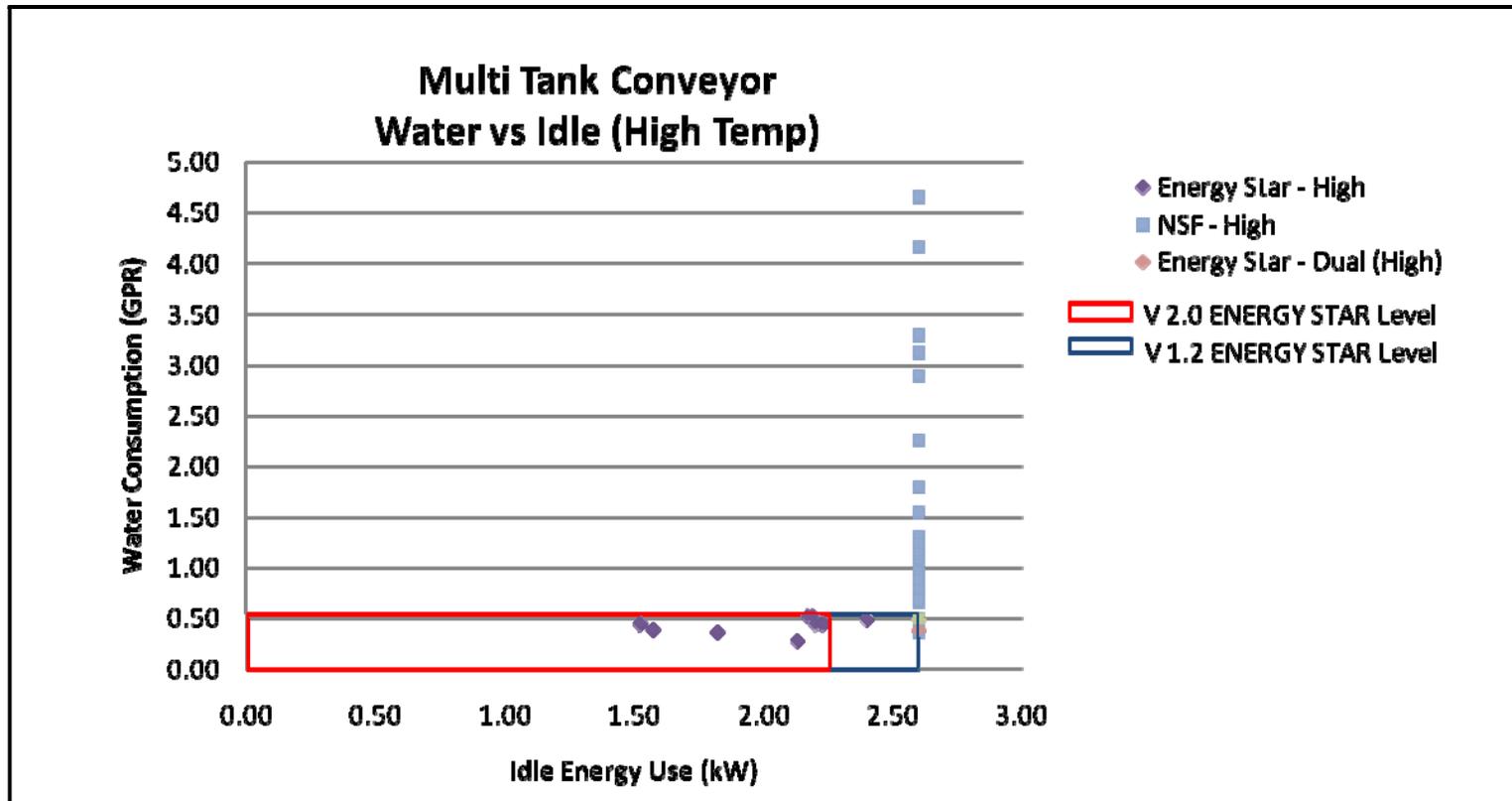


- New GPR level for HT under counter machines
 - 0.86 to 0.84, qualification rate = 26%
- New idle energy rate for HT multiple tank rack conveyors
 - 2.00 to 2.25 kW, qualification rate = 21%

HT Under Counter Graph



HT MT Conveyor Graph



Comments Received

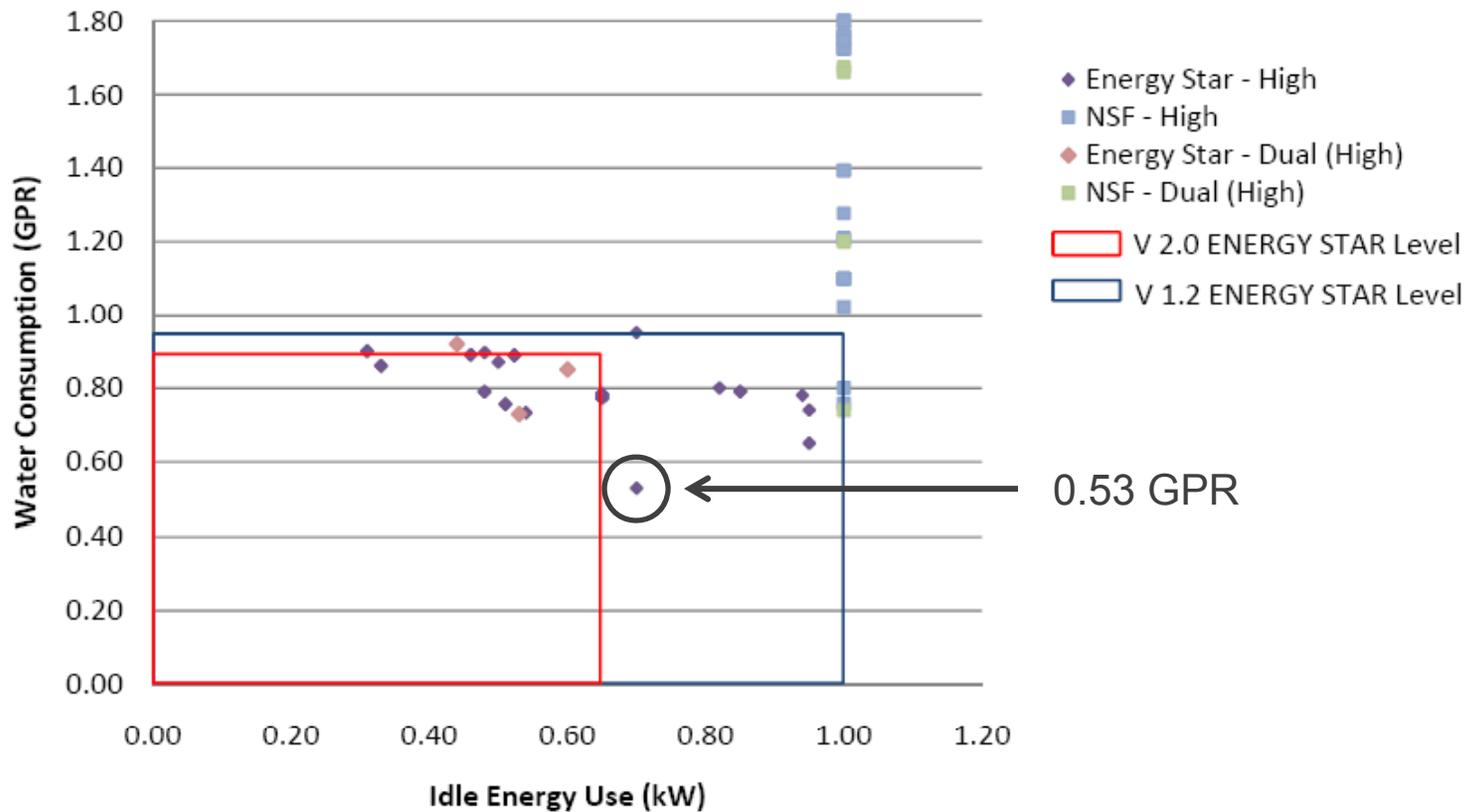


- Reducing idle for door type machines from 1.0 to 0.64 kW would exclude the most water efficient designs
 - Increase idle to 0.7 kW to include this model
 - EPA considering this change, recognizing that greater energy savings will be garnered through reduction of rinse water consumption

HT Door Type Graph



Single Tank Door Type
Water v Idle Graph (High Temp)



Comments Received



- Idle energy rate does not capture energy consumed by on-board booster heater
 - Test method will provide guidance on separate monitoring of booster
 - ASTM method intended to measure total idle (all tanks and controls) but not booster
 - For V2.0, EPA will continue to define idle energy rate without internal booster idle energy

Comments Received



- Apply a consistent “useable rack space” for all rack machines
- LT dump type machines *should not* be tested for idle energy
- LT dump type *should* be tested for idle energy
 - These machine types are run through several cycles to get tank wash water up to temp for operation
 - More efficient to maintain tank water during idle
 - EPA should not encourage removal of tank heaters to avoid idle testing
 - EPA is interested in stakeholder input on this issue

Section 3: GPH/GPR Calculations



- New, more detailed GPH, GPR, and GPSF calculations proposed in Draft 3
- **Comment Received:**
 - Formula for stationary rack GPR may be more complicated than necessary
 - Simplify as the weight of water for x number of cycles divided by 8.34 lbs/gal divided by x cycles
- DOE is continuing to revise calculations, which will be provided along with the draft test method

Comments Received



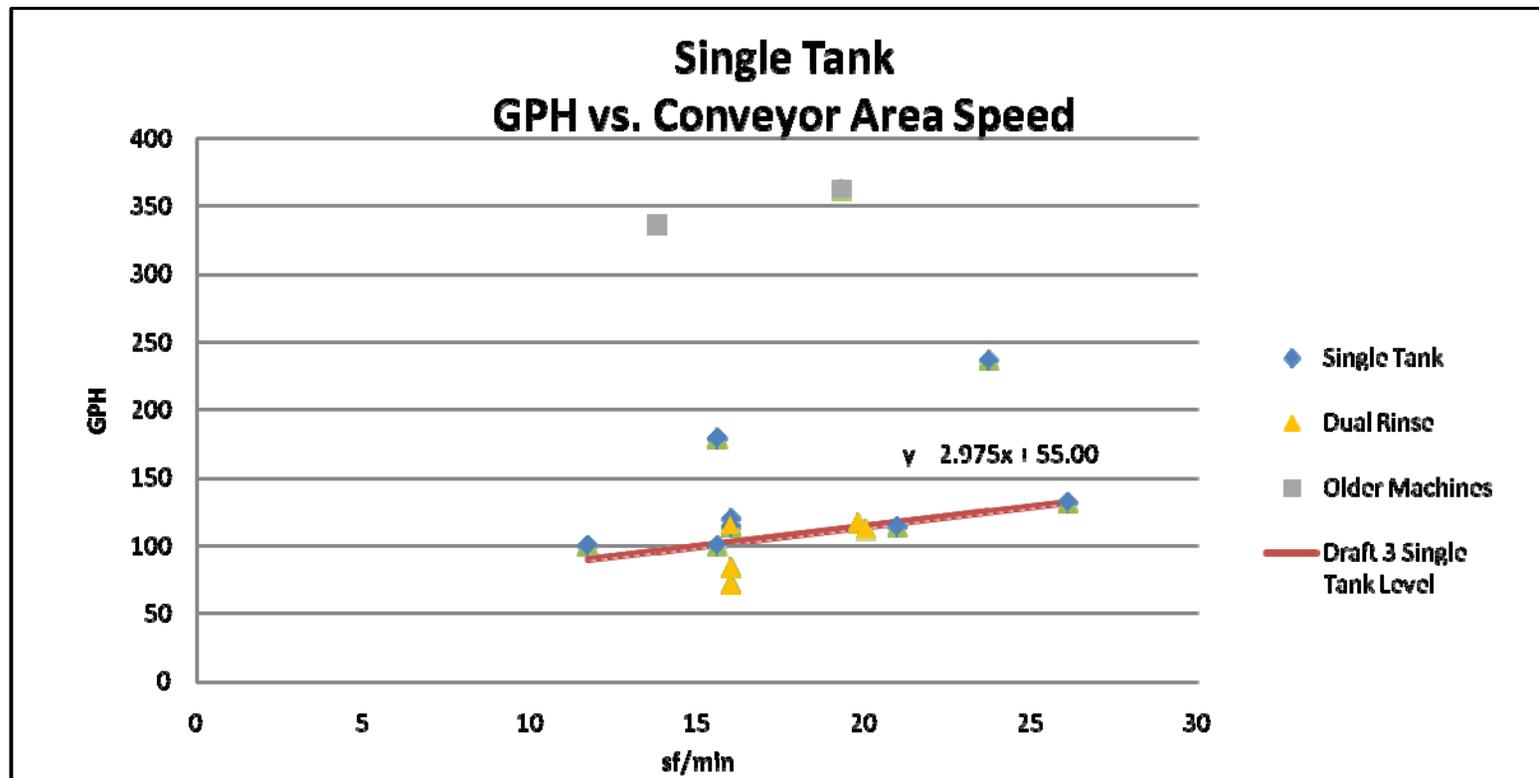
- Calculating GPR at max speed fails to capture worst case scenario for water consumption
 - Suggestion: require max speed for qualification but also require reporting GPR at slowest speed
 - Suggestion: Calculate GPR based on slowest speed based on manufacturer recommended range OR choose a midpoint between the two
- EPA inclined to take the first suggestion
- How would manufacturers choose speed for variable speed machines?

Section 3: Flight Type Machines

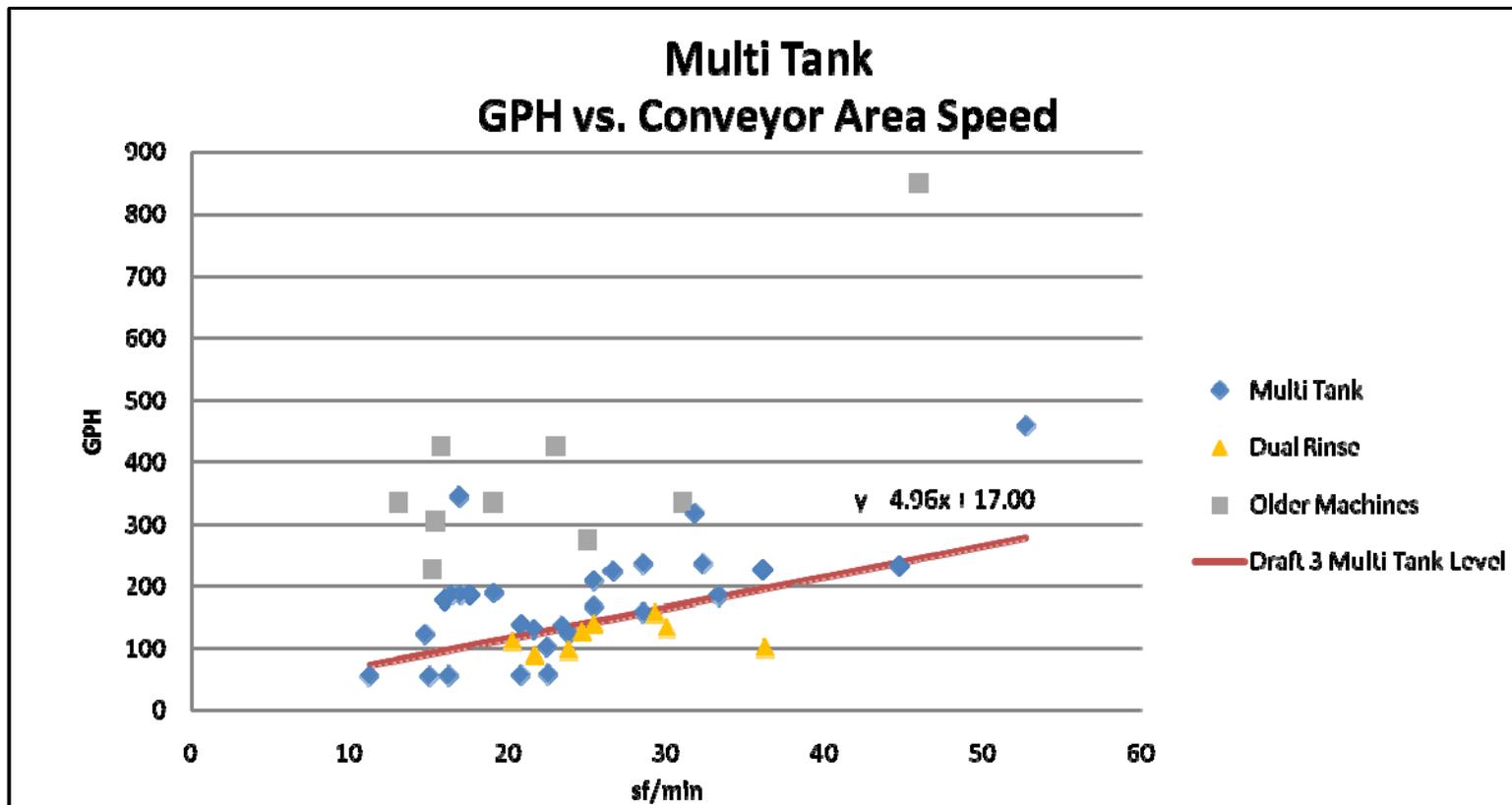


- Flight type levels proposed based on conveyor type, belt area, and speed ($W \cdot L/\text{min}$)
- Testing based on max speed, which is used for certification to NSF/ANSI 3
- Idle energy rate to be tested using ASTM F1920-11 method and *reported* to EPA

FT Single Tank Graph



FT Multiple Tank Graph



Comments Received



- Support for including flight types as proposed
 - Opportunity for significant savings in short term
 - Continue to pursue total energy metric longer term
- Do not include prescriptive requirements, such as heat recovery
- Lingering concerns regarding dual rinse machines using more total energy than single rinse designs
 - Recommendation to create two categories
 - EPA not inclined to do as these machines compete in marketplace and data sets would be too small

FT Dual Rinse Discussion



- Reached out to several manufacturers of dual rinse machines
 - One instance where auxiliary tank heater rating was significantly higher than other designs
 - Led to slightly greater energy consumption
 - Additional testing suggests that its possible to design a dual rinse machine that uses the same or less total energy than single rinse models
 - Reduction in booster heater significant, savings garnered at equipment and building levels
- Draft 3 levels were relaxed to allow more single rinse to meet, offering end user choices

Section 3: Certification to NSF 3



- Reference to NSF/ANSI 3-2010 has been removed from test procedure reference table
- Cleaning and sanitation performance is not measured for ENERGY STAR qualification
 - However, it's important that final rinse water GPH is tied to cleaning and sanitation performance
- Therefore, new Section 3.E requires certification to NSF/ANSI 3 for ENERGY STAR qualification

Other Outstanding Issues



- EPA received limited idle data for pot, pan, utensil (PPU) machines
 - EPA may consider requiring idle energy reporting
- Comments on supplemental devices
 - OEM has no control, do not address in specification
 - Include water consumed for drain water tempering in GPH measurement (adjust test method)
 - If prewash temp control or drain water tempering device is shipped with machine then unable to use ENERGY STAR mark
 - Educate end users that use may impact performance
 - EPA inclined to take the education approach

Test Method Validation Background



- DOE is responsible for validating and developing test methods for ENERGY STAR.
- ENERGY STAR Commercial Dishwasher Version 2.0 Draft 3 specification references two ASTM standards^{1,2} for the idle energy test.
- Used ASTM F1920-11 published in July 2011.
- No method had been published for the final rinse water consumption test, so ENERGY STAR released a draft test method with Draft 2 of the Version 2.0 specification.

1. ASTM F1920-11: Standard Test Method for Performance of Rack Conveyor, Commercial Dishwashing Machines.

2. ASTM F1696-07: Standard Test Method for Energy Performance of Single-Rack, Door-Type Commercial Dishwashing Machines.

Test Method Validation Preliminary Testing Summary



- DOE conducted validation testing on 8 dishwashers.
 - Dishwashers chosen to represent a wide range of product types and features.
 - Initial testing has been completed.
 - Repeatability testing to determine consistency of results is underway.
- Testing allowed DOE to identify areas in each referenced test procedure that may need clarification.
- When published, the draft test method will provide a step-by-step, stand-alone test procedure.
 - Clearly identifies which steps of the referenced test procedures are needed and provides additional detail and clarifications, when necessary.
 - Scheduled for release in November 2011.
 - Stakeholder feedback will be solicited and the test method will be revised after all comments and data received are considered.

Test Method Validation

ASTM Test Procedures



- Overview of DOE's proposed changes to the draft test method:
 - DOE plans to use the latest version of the ASTM test procedures.
 - Updates to idle energy test in the preliminary draft include:
 - Max energy input rate test
 - Test based on specific power ratings of machine;
 - No water temperature specified to allow for variations in machine operation;
 - Instantaneous power measurement for electric heaters once heaters cycle on; and
 - Average power consumption for the last 3 minutes of 5 minute testing period for gas heaters.
 - More details for steam and gas procedures
 - Once the detailed method is available, DOE strongly encourages feedback, especially for the steam test procedure.
 - Internal booster heaters separately monitored and subtracted out for idle energy test

Test Method Validation

Water Consumption Draft Test Procedure



- Overview of DOE's proposed changes to the draft test method:
 - Same basic procedure as originally published with more details added for clarity.
 - Catch and weigh method that was originally published is easier than using a flow meter. DOE plans to specify method that should be used to improve repeatability.
- Calculations in the preliminary draft have been revised since they were published in the Version 2.0 Draft 3 specification.
 - Listed in detail so there is no ambiguity.

Test Method Validation

Preliminary Issues and Proposed Solutions



Preliminary Issue	Preliminary Proposed Solution
Some dishwashers include an energy saver mode that converts the machine to a setting that uses less energy after idling for a certain period of time.	Disable the energy saver mode during testing to provide a fair comparison of idle energy.
If a prewash maintenance heater is included, it may provide a different idle energy rate than units without a prewash heater.	Separate testing of machines that include prewash maintenance heaters.
There is no existing test method for measuring water consumption from a post-sanitizing rinse; machines with a post-sanitizing rinse were not included in validation testing.	Solicit stakeholder feedback on a test method for measuring water consumption for post-sanitizing rinse machines.

Test Method Validation

Preliminary Issues and Proposed Solutions



Preliminary Issue	Preliminary Proposed Solution
Some machines include variable settings.	Require that the dishwashers be tested at the same specified settings (water levels, cycle times, sanitizing modes, etc.) for both the water consumption and idle energy tests.

Section 5: Effective Date



- EPA plans to finalize V2.0 requirements by end of 2011
 - Proposed new effective date of September 1, 2012
- Once released, all dishwashers meeting Version 2.0 requirements can be immediately begin getting certified to the new requirements.
 - Including equipment previously excluded under V1.1

Comments Received



- Concern about requirement that all models be third party tested to remain qualified under V2.0
 - Models qualifying under V1.1 are eligible for V2.0 certification without additional testing if:
 - Model was tested by an EPA recognized 3rd party lab or 1st party lab in supervised/witness program
 - Changes in test method do not impact performance results as compared to previous version
 - Data acceptance decision up to the EPA recognized Certification Body

Next Steps/Timeline



- ENERGY STAR Draft Test Procedure scheduled for release by November
- Final Draft V2.0 released in December
 - Specification levels will be finalized
- Specification becomes effective Sept 1, 2012
 - Products can immediately be certified to V2.0 once final
 - Summer 2012, EPA will cease to accept products certified to V1.1
 - Once effective, only those products that are certified to V2.0 will remain on the QP list

ENERGY STAR Contacts



- Christopher Kent, EPA
(202) 343-9046
kent.christopher@epa.gov

Rebecca Duff, ICF
(434) 202-7875
rduff@icfi.com

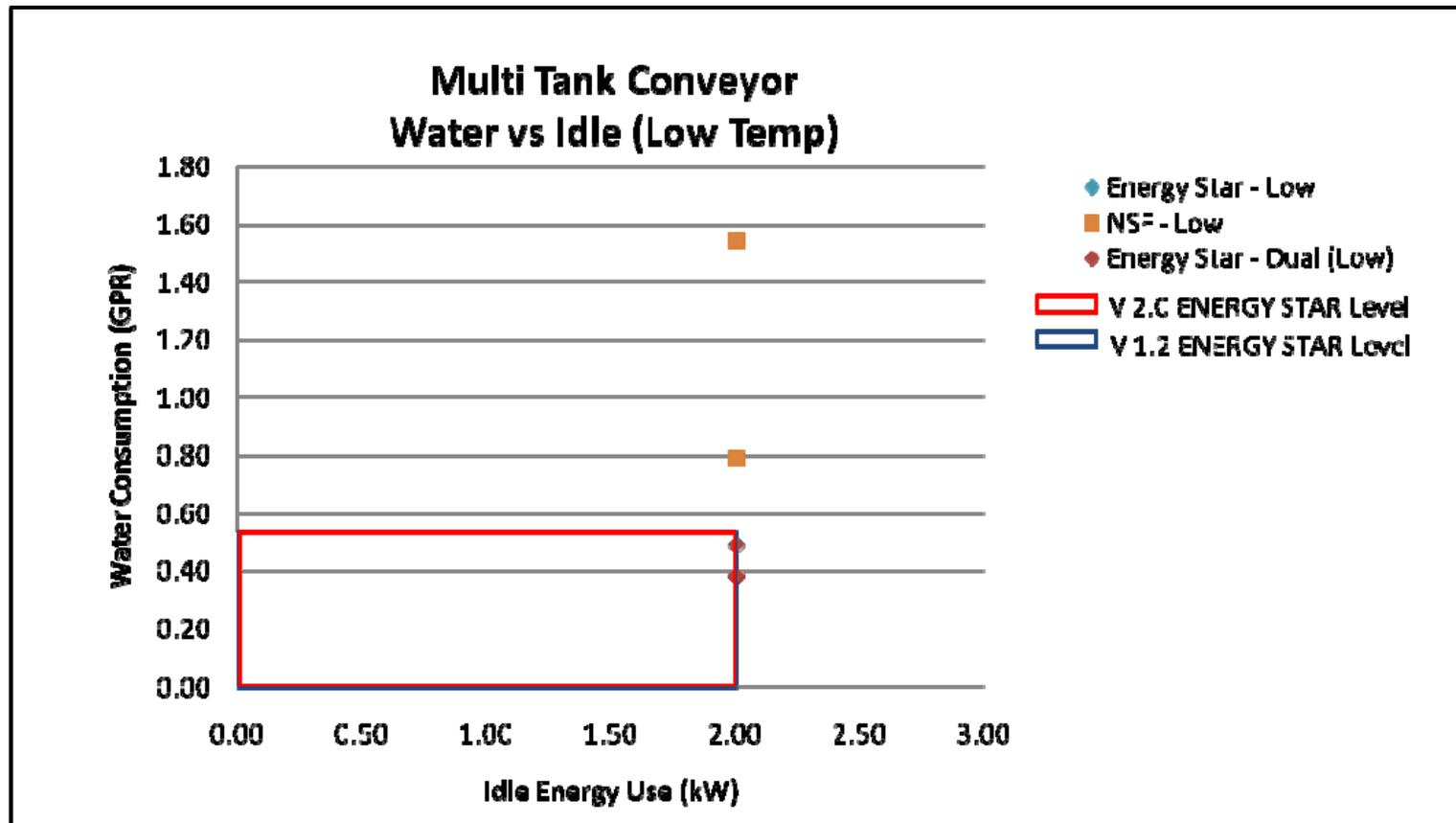
Test Procedure Questions:

- Bryan Berringer, DOE
 - (202) 586-0371
 - bryan.berringer@ee.doe.gov

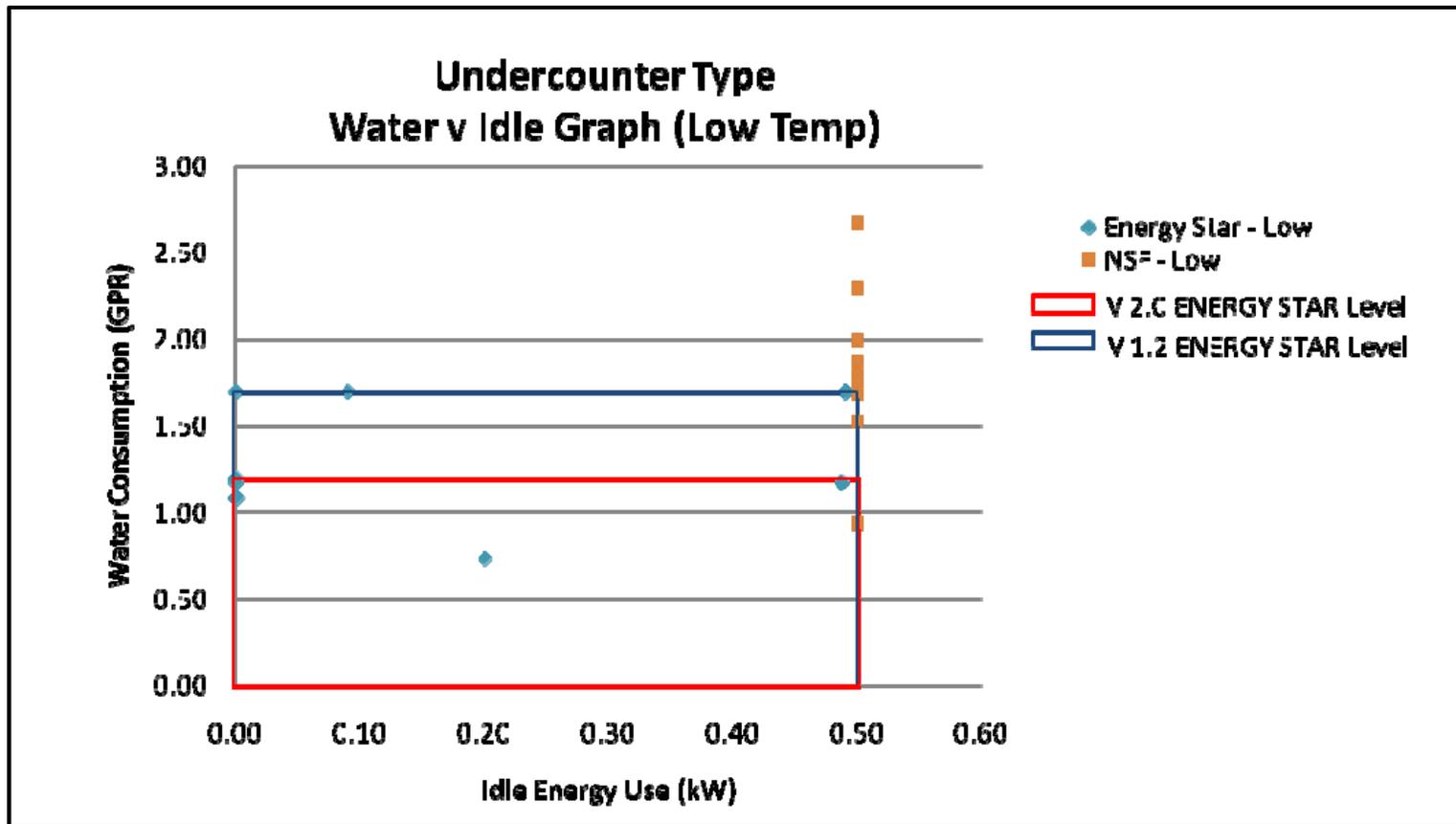


Backup Slides

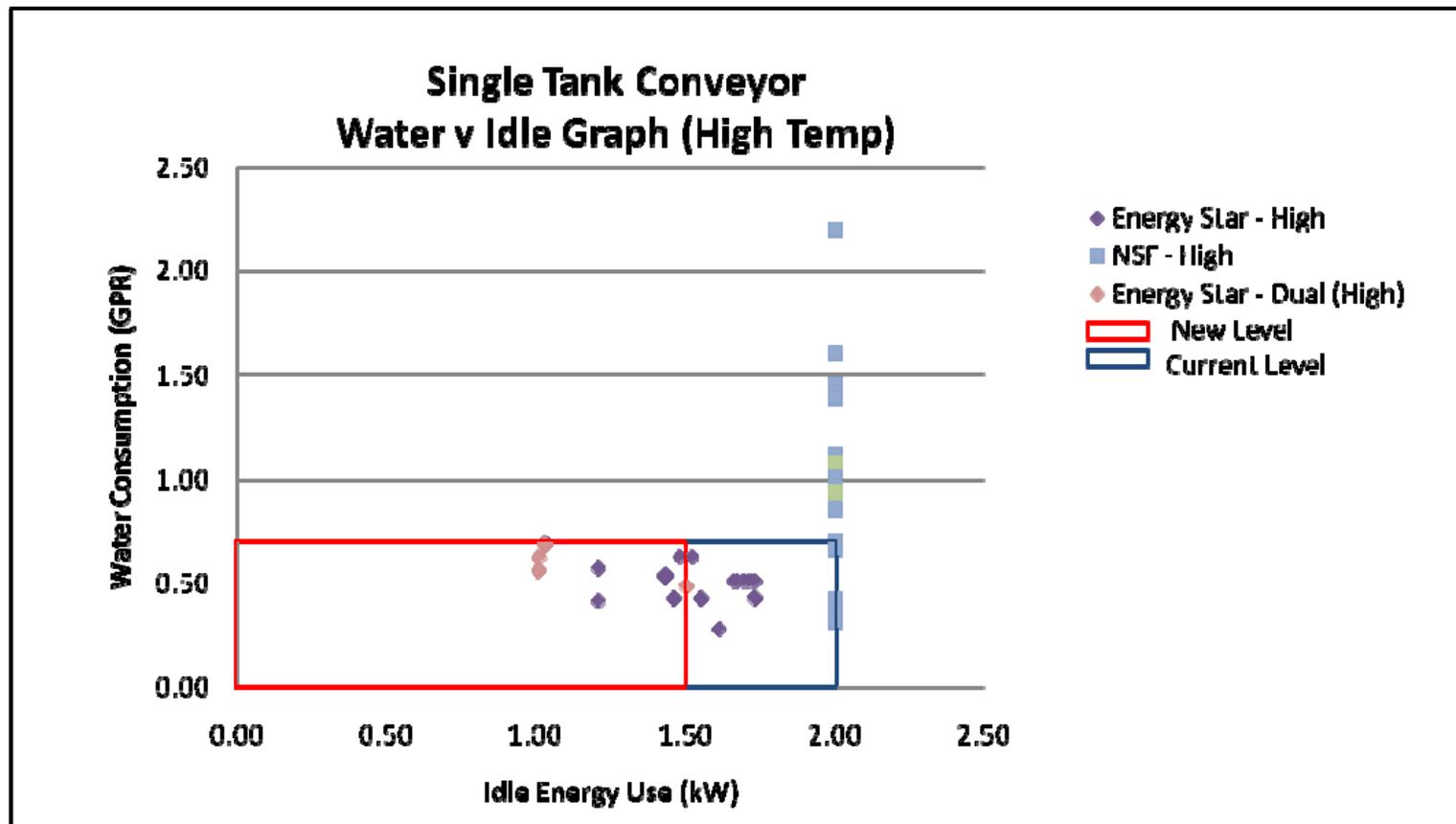
LT MT Conveyor Graph



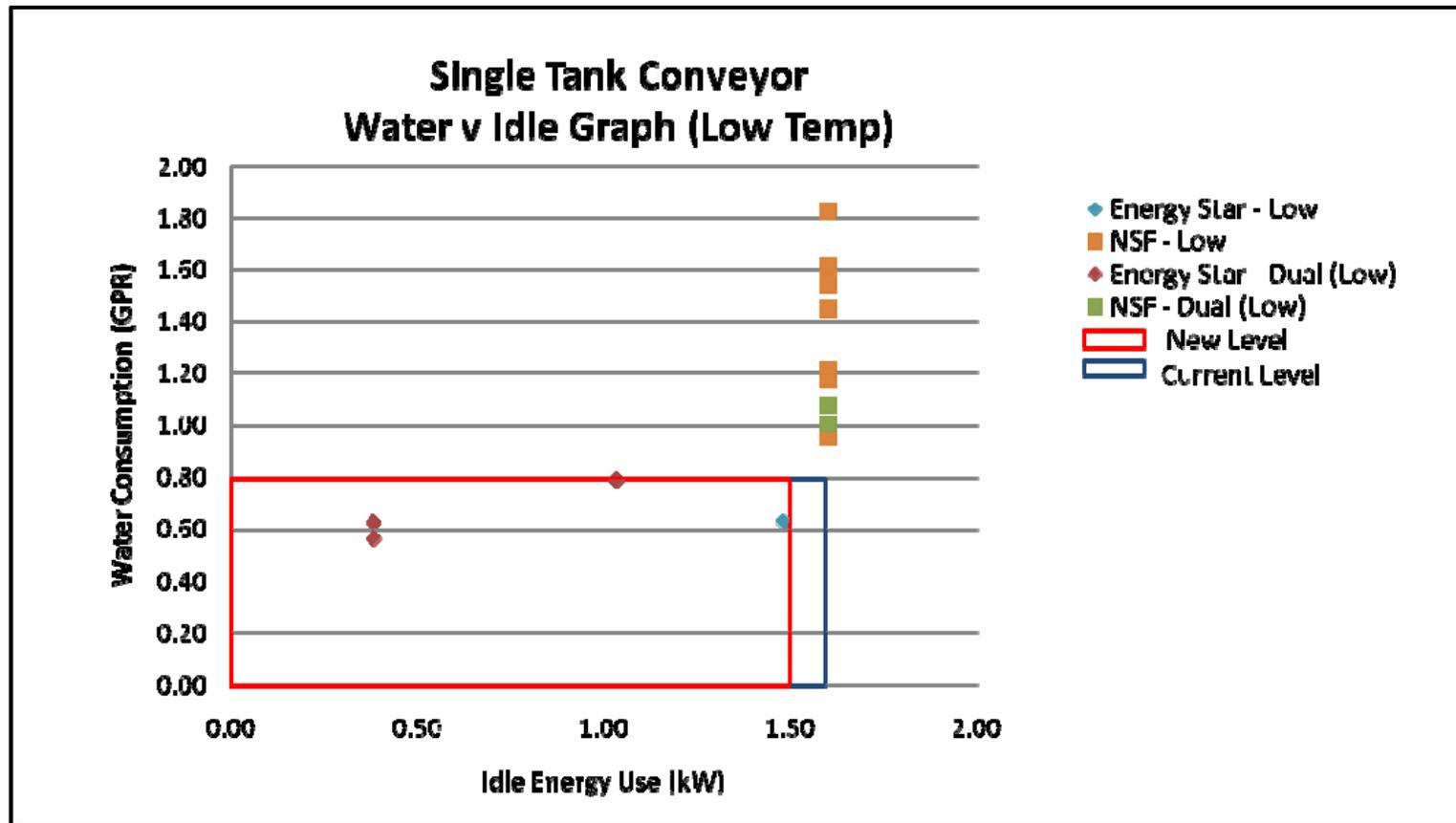
LT Undercounter Graph



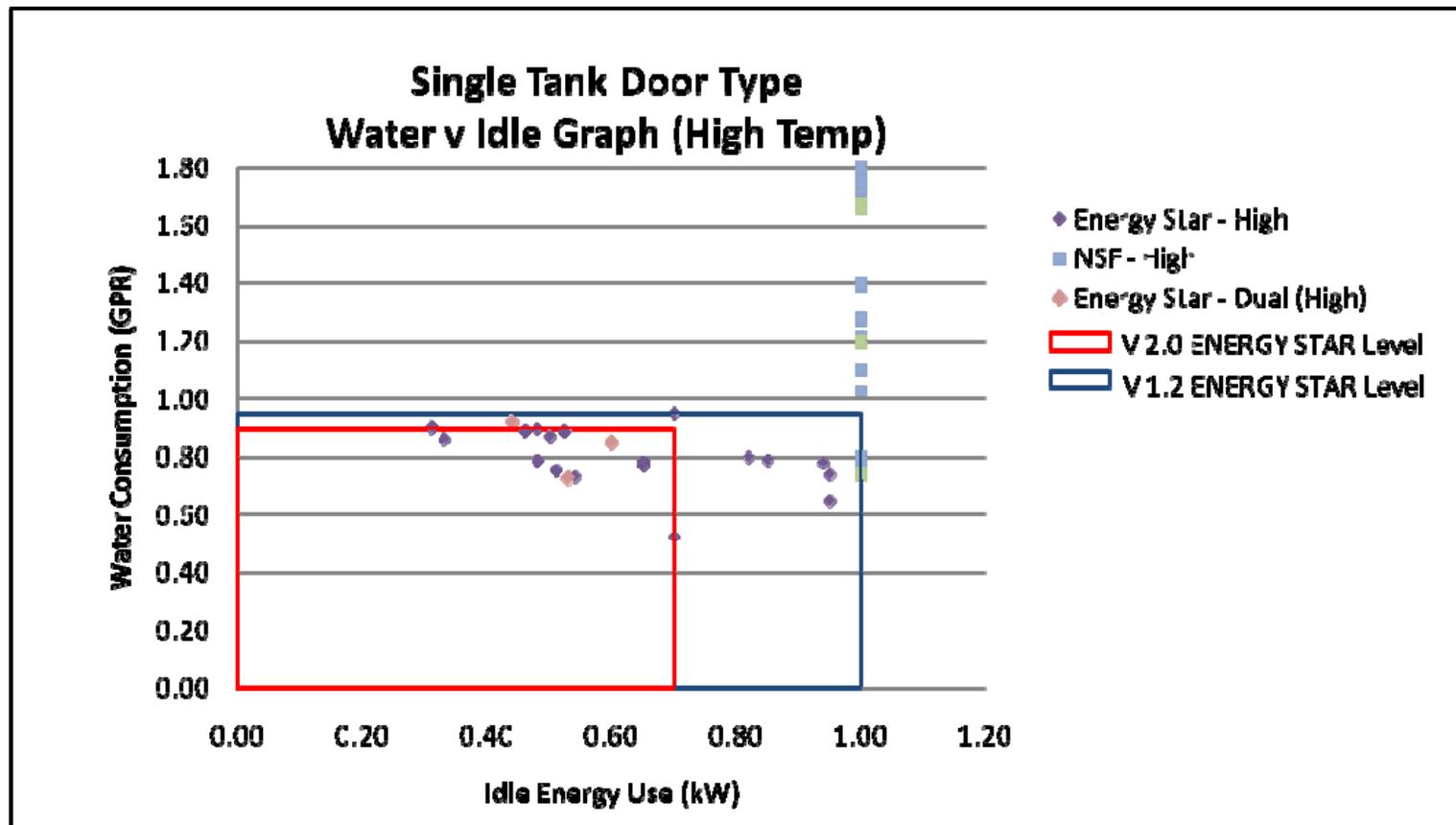
HT ST Conveyor Graph



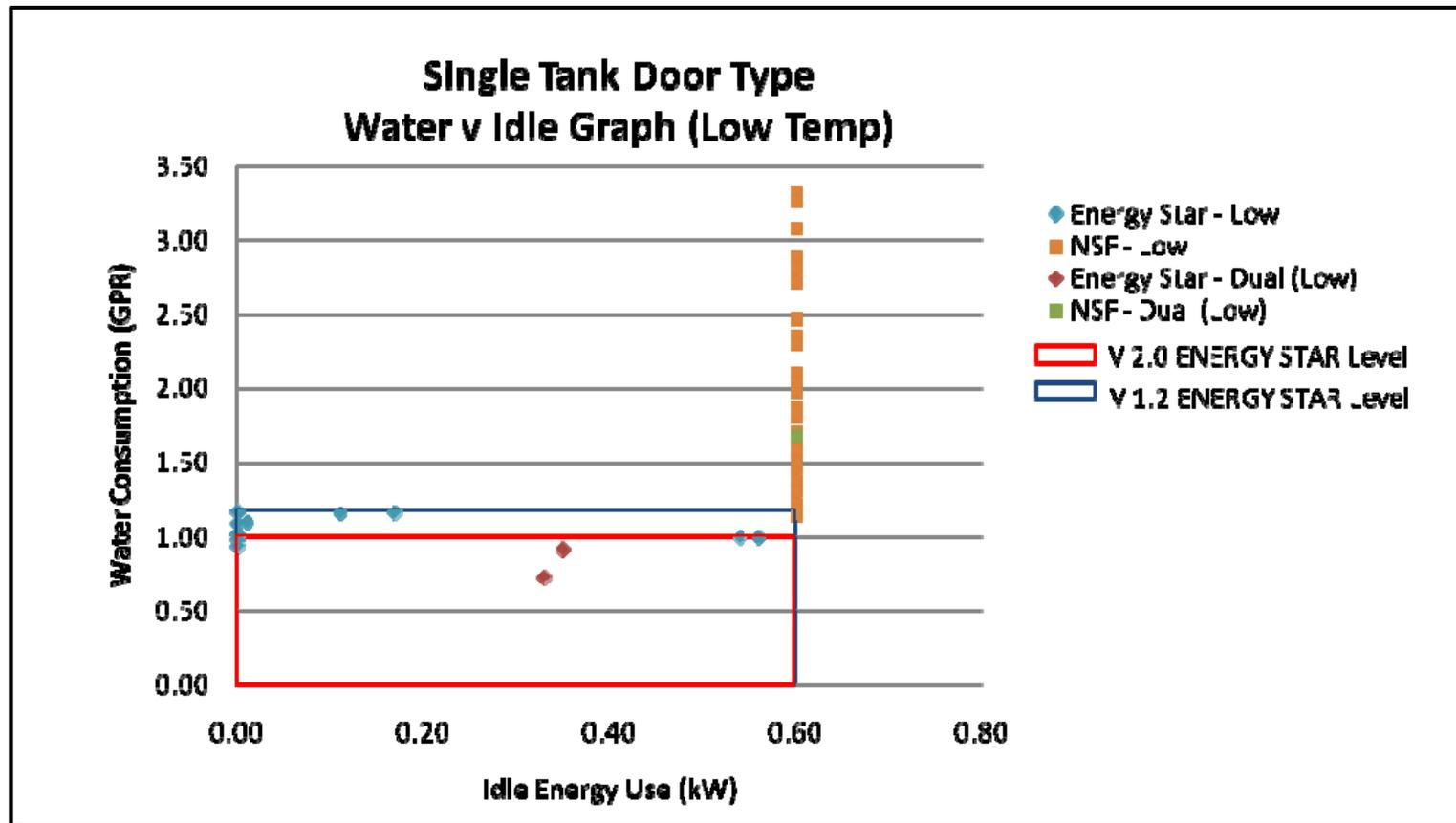
LT ST Conveyor Graph



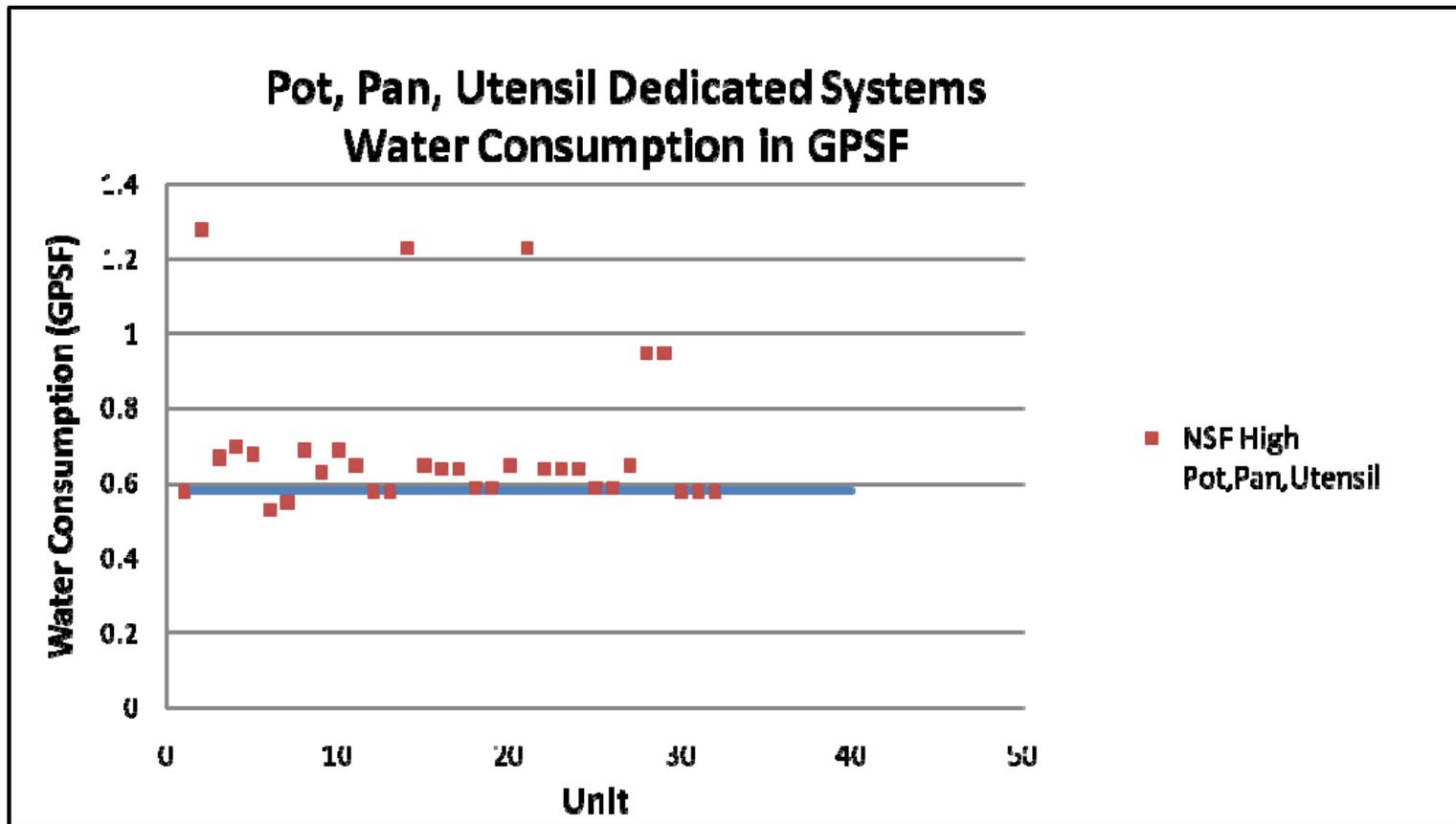
HT STDT Graph



LT STDT Graph



PPU (Dedicated) GPSF Graph



Updated Definitions



- Wash Mode: For stationary rack machines, the dishwasher is in wash mode when the machine is actively running a cycle and is spraying wash water (water that is neither part of the final sanitizing rinse nor the prewashing unit).
- Rinse Mode: For stationary rack machines, the dishwasher is in rinse mode when the machine is at the end of the actively running cycle and is spraying final hot water or chemical sanitizing rinse water.
- Dwell Mode: For stationary rack machines, the machine is in dwell mode when the machine is actively running a cycle but is not in wash mode or rinse mode.
- Idle Mode: A dishwasher is in idle mode when it is not actively running but is still powered on.
- Energy Saver Mode: A dishwasher is in energy saver mode if, after inactivity, the dishwasher converts to a setting that consumes less energy than it does in idle mode (not all dishwashers include this feature).
- Idle Energy Rate: The rate of energy consumed by the dishwasher ~~tank heater~~ while “holding” or maintaining wash tank heater at the thermostat(s) set point during the timer period specified in ASTM Standards F1920-11 and F1696-07.