

# Home Water Use Study - Baseline Analysis



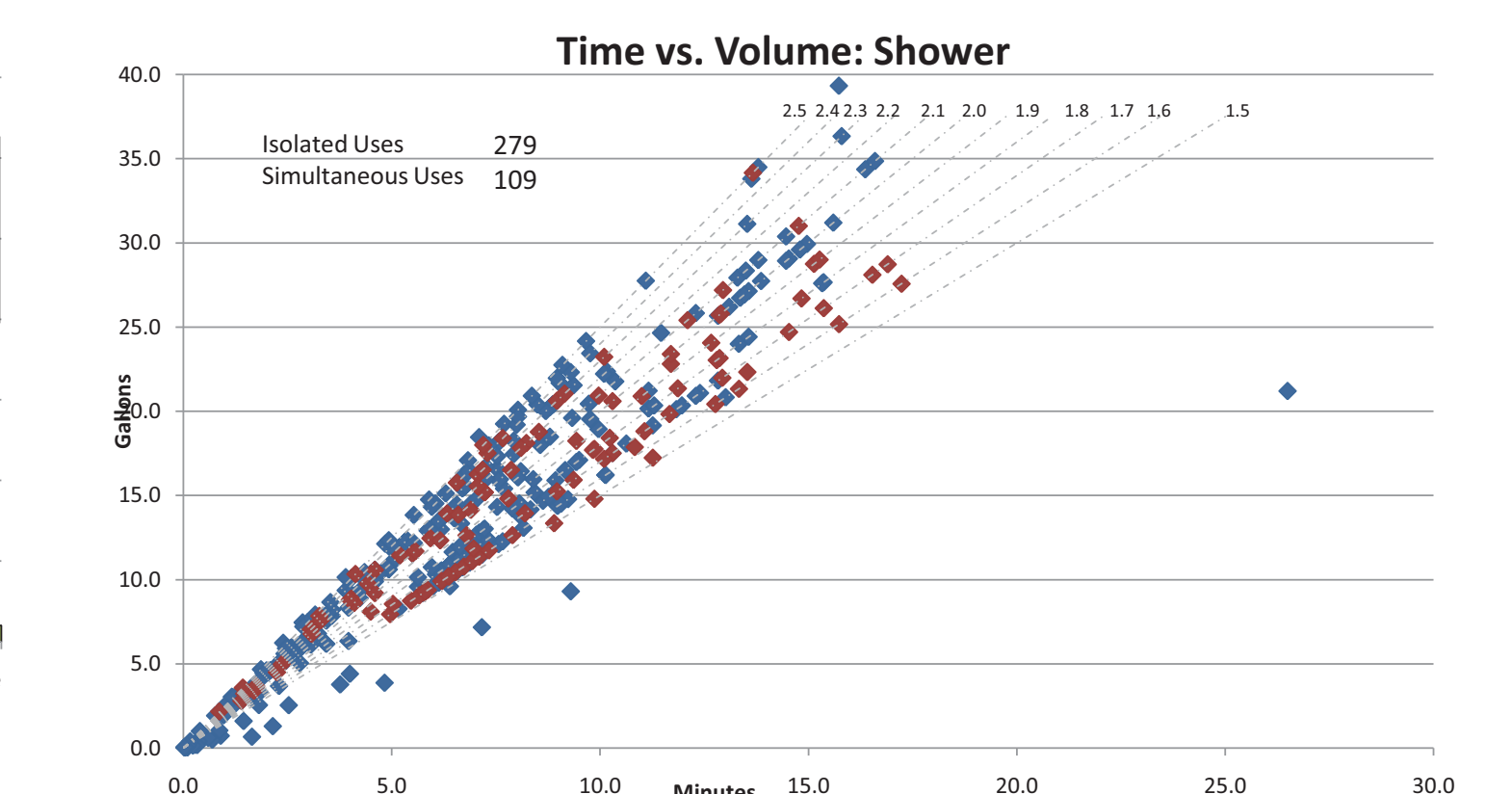
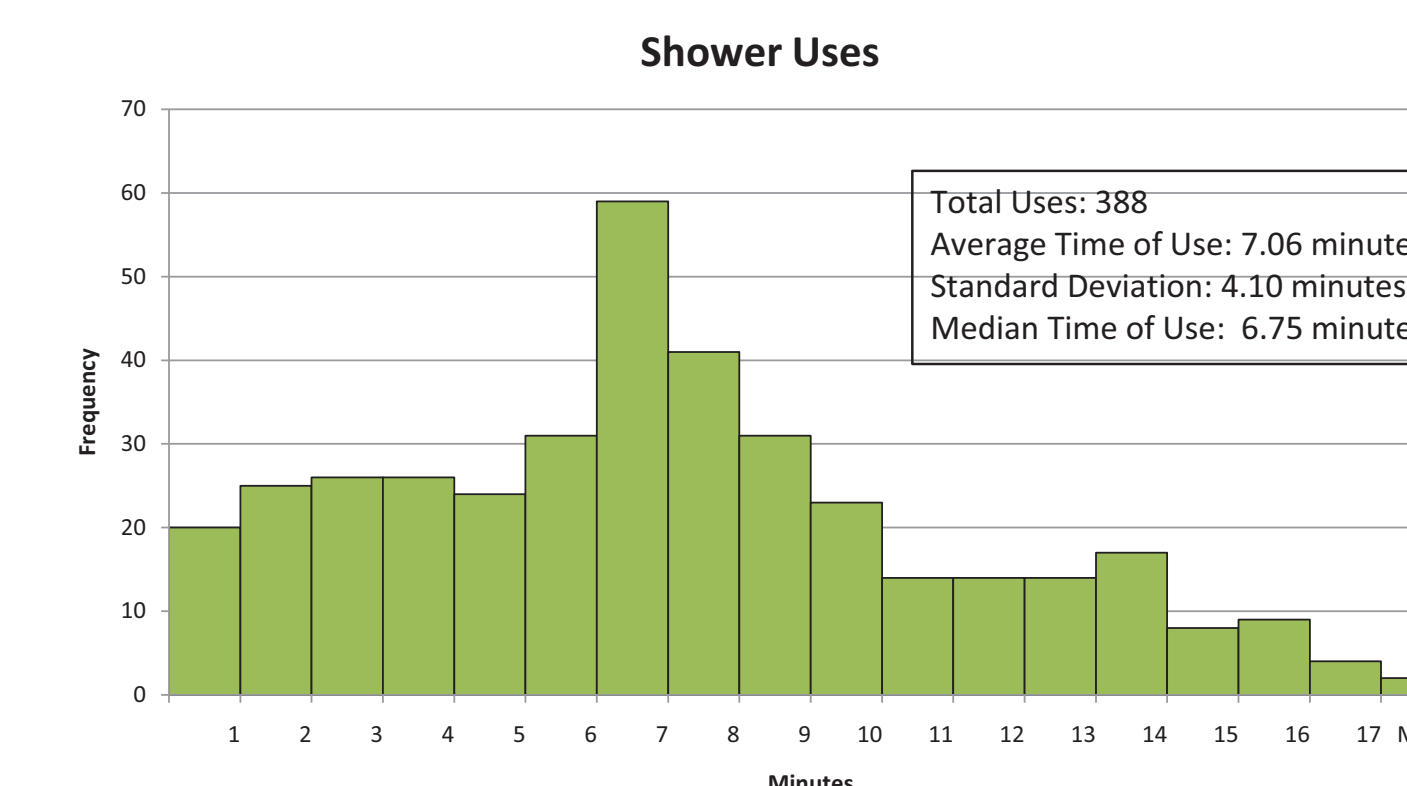
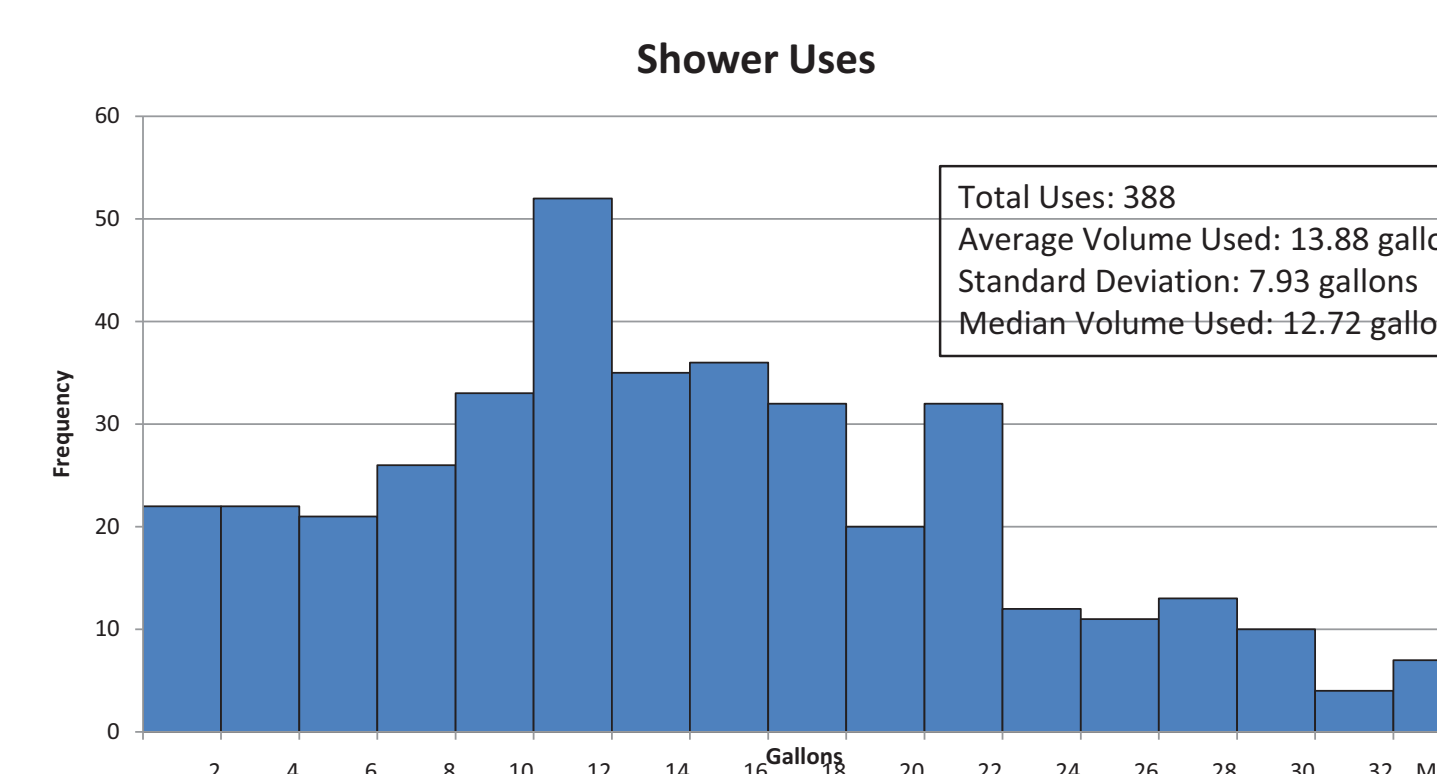
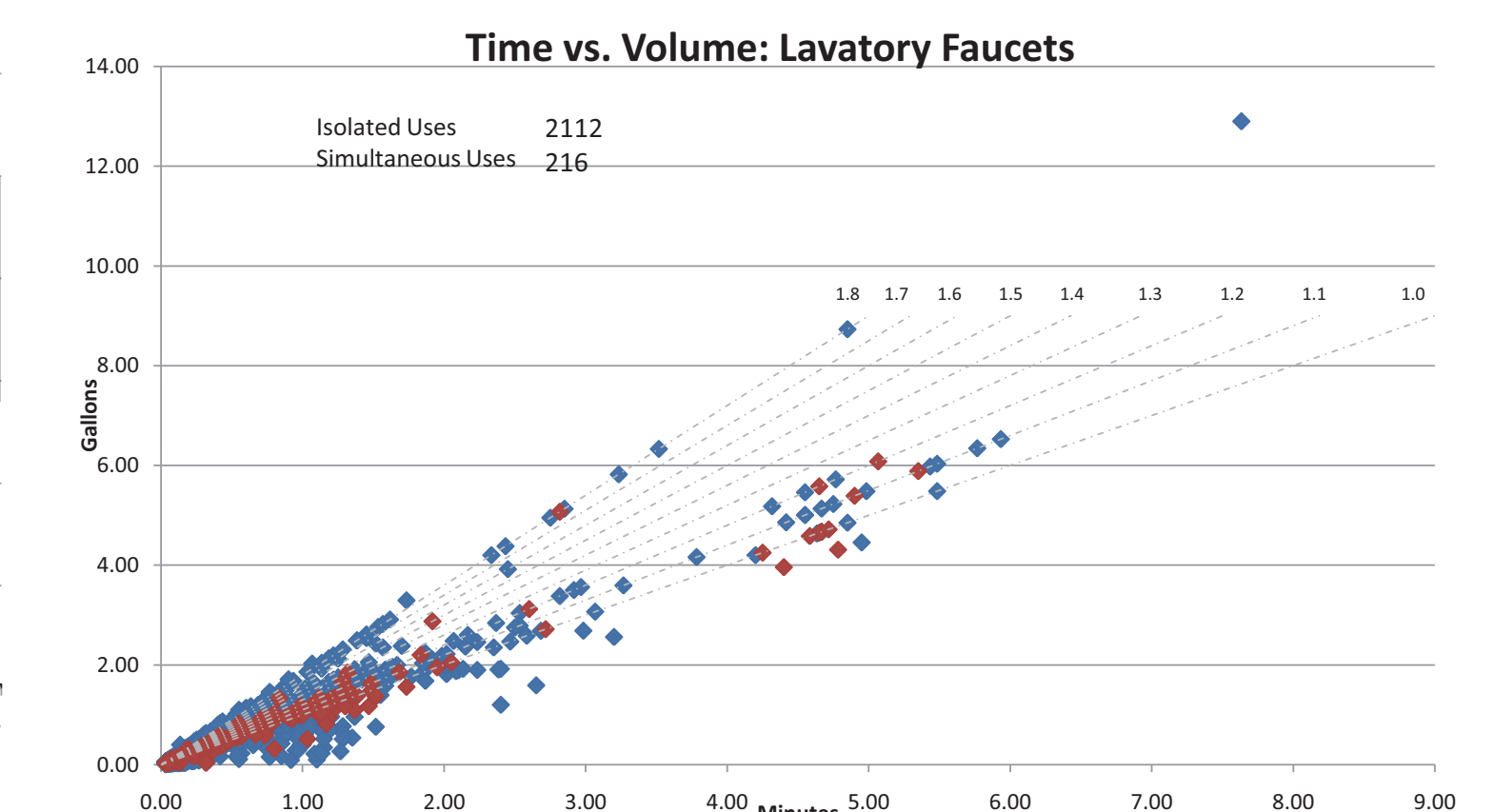
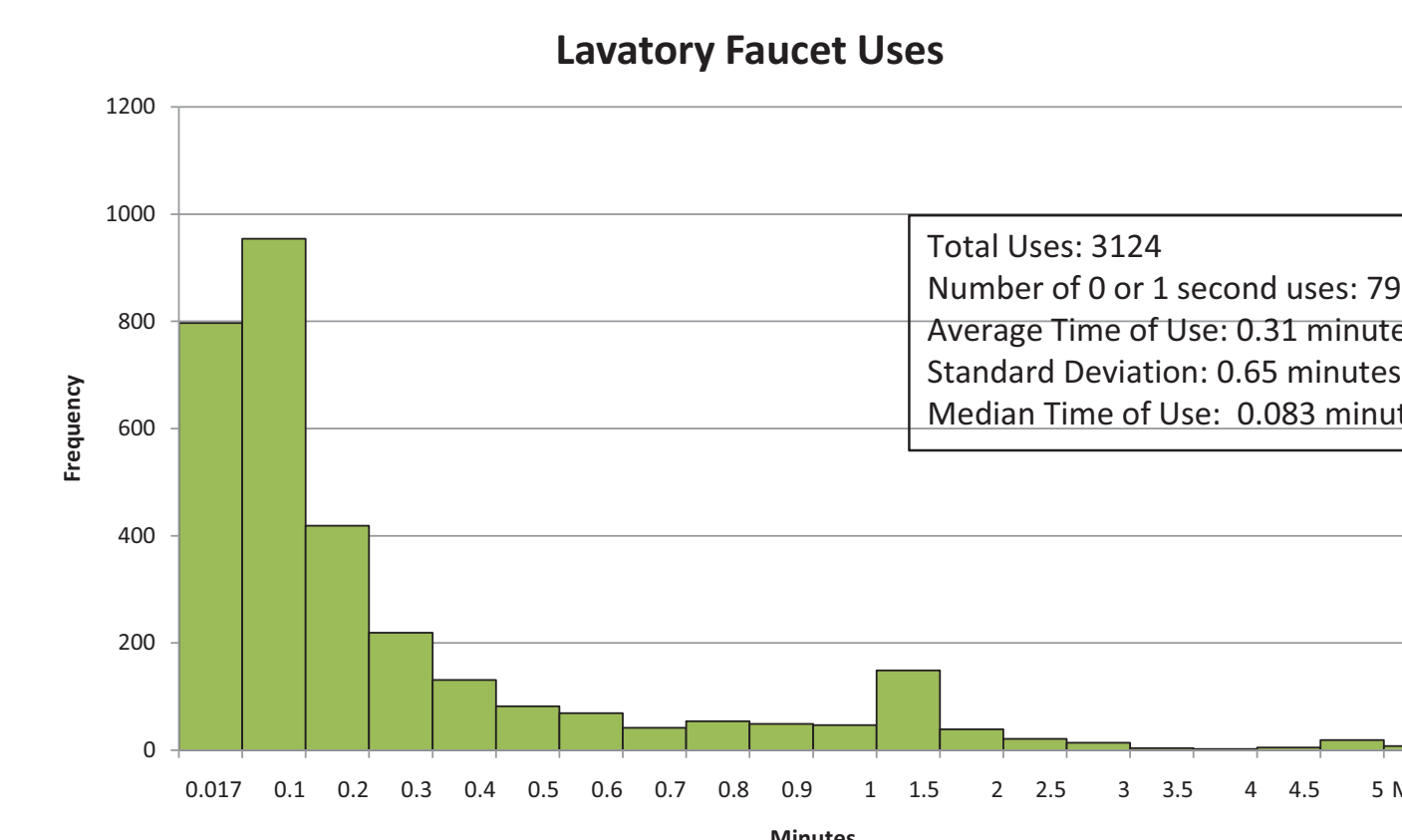
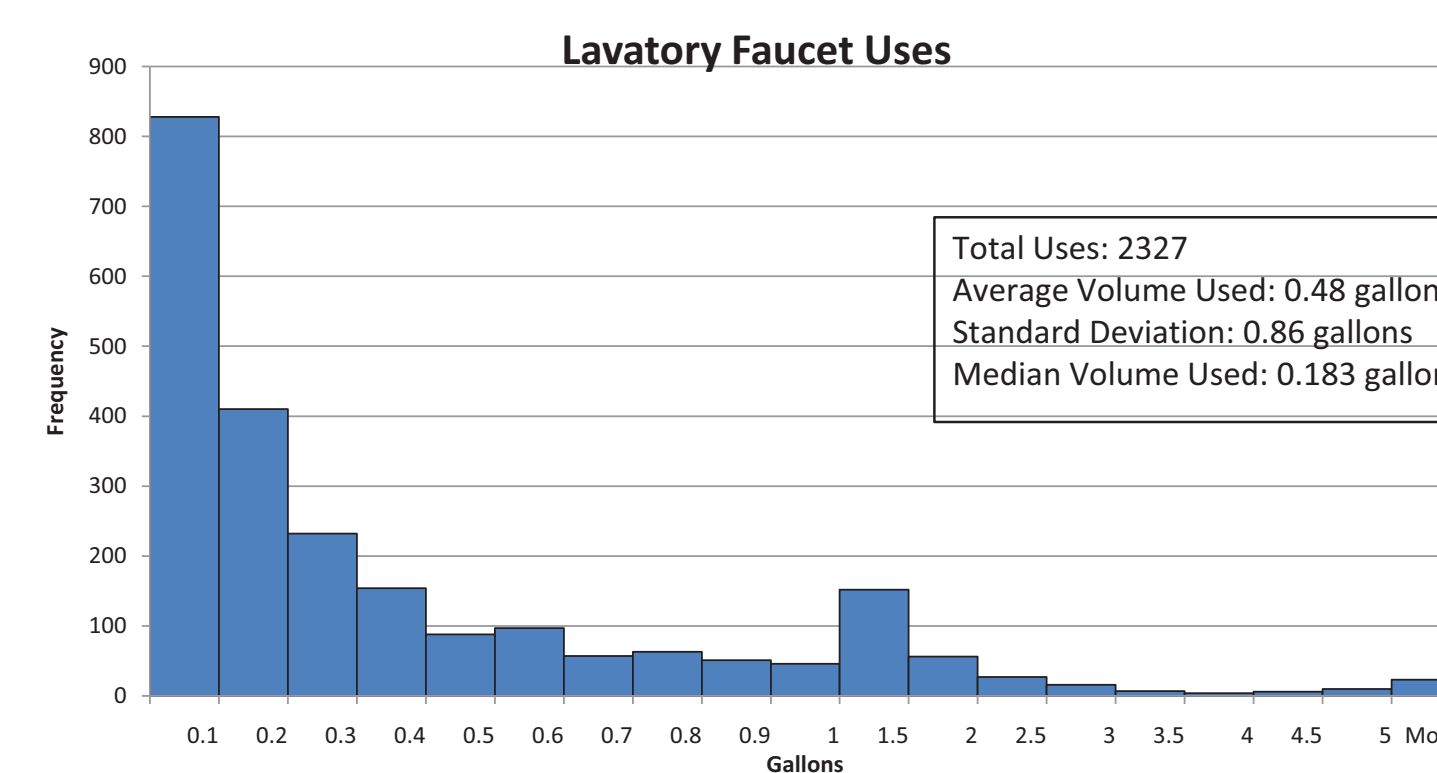
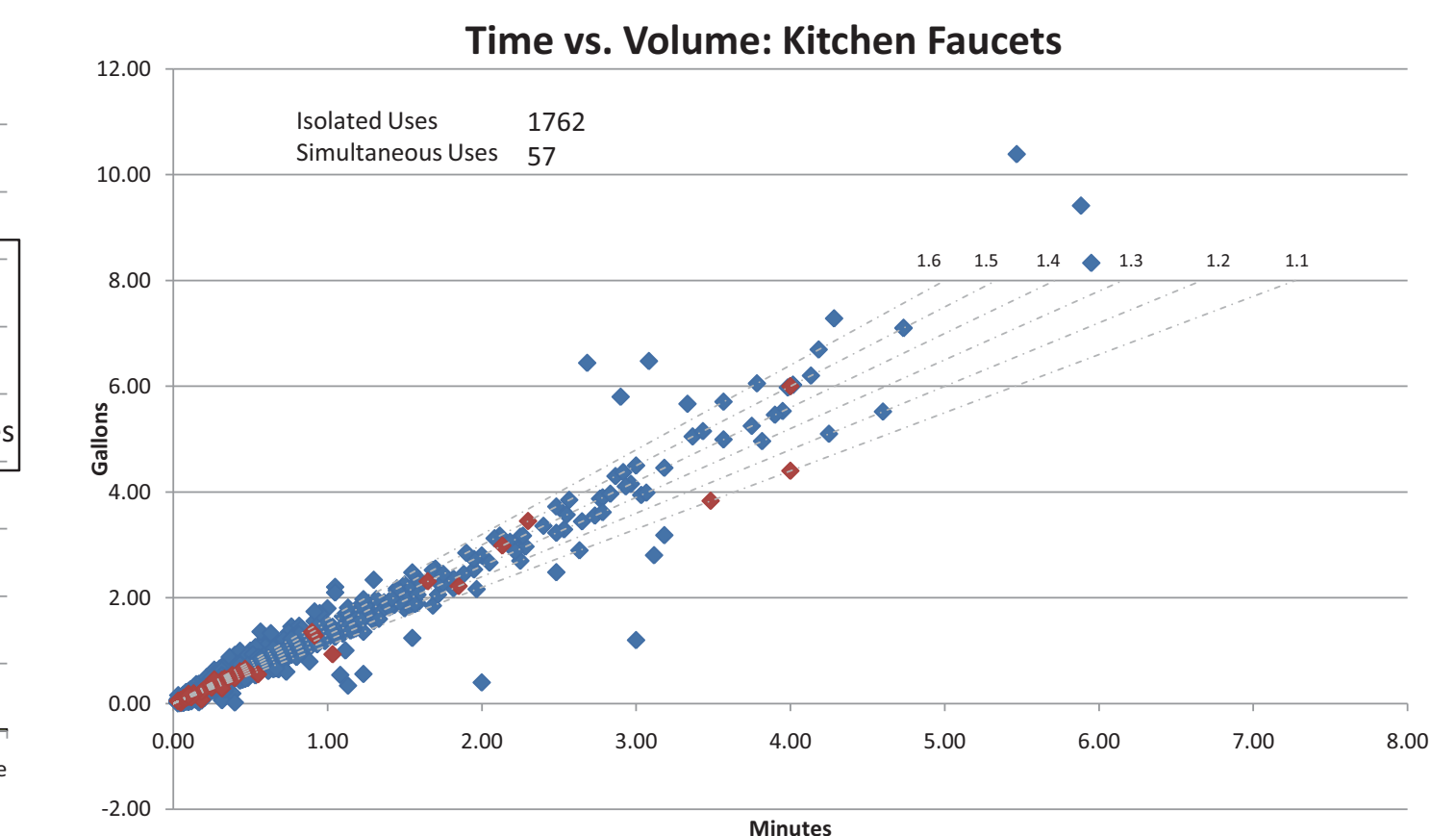
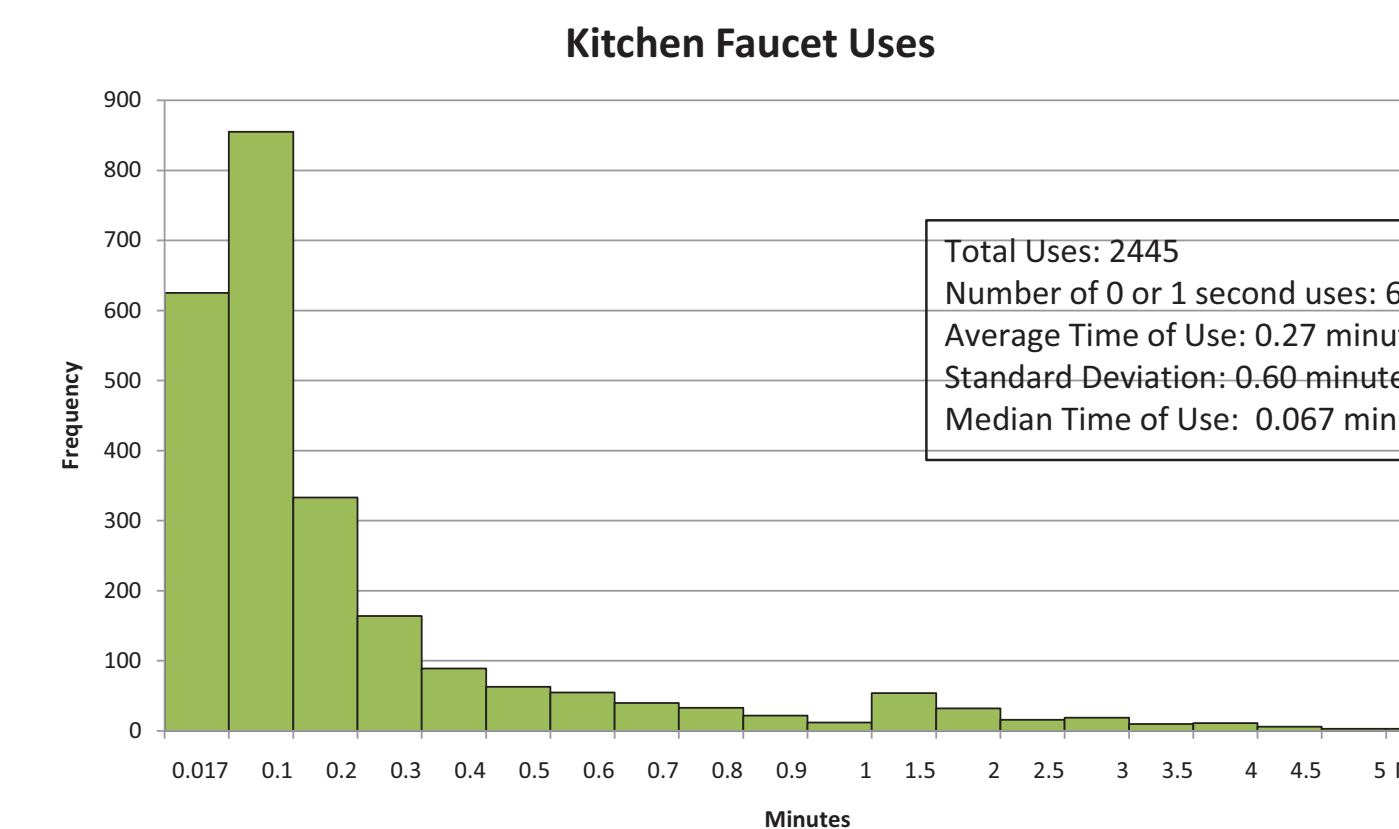
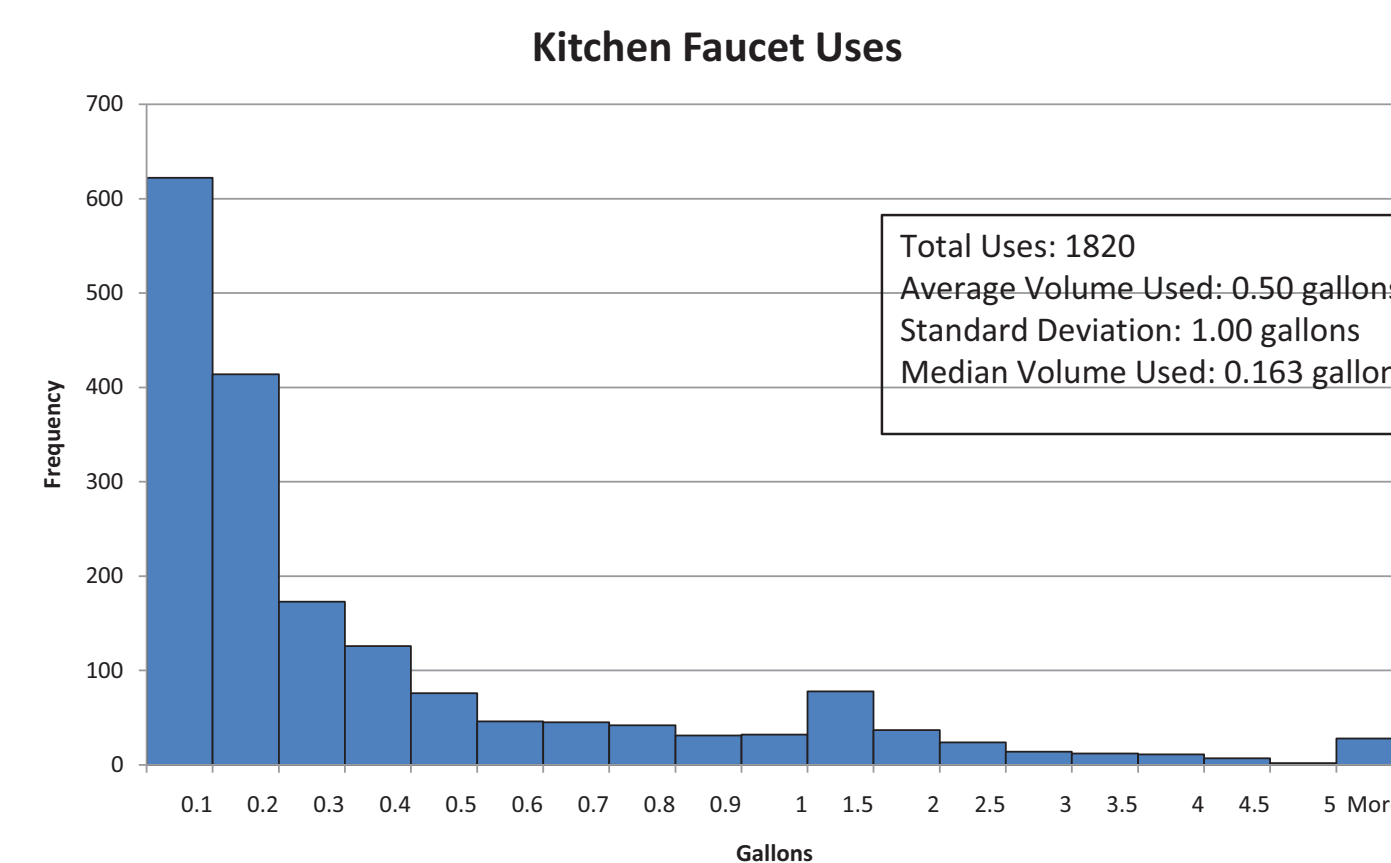
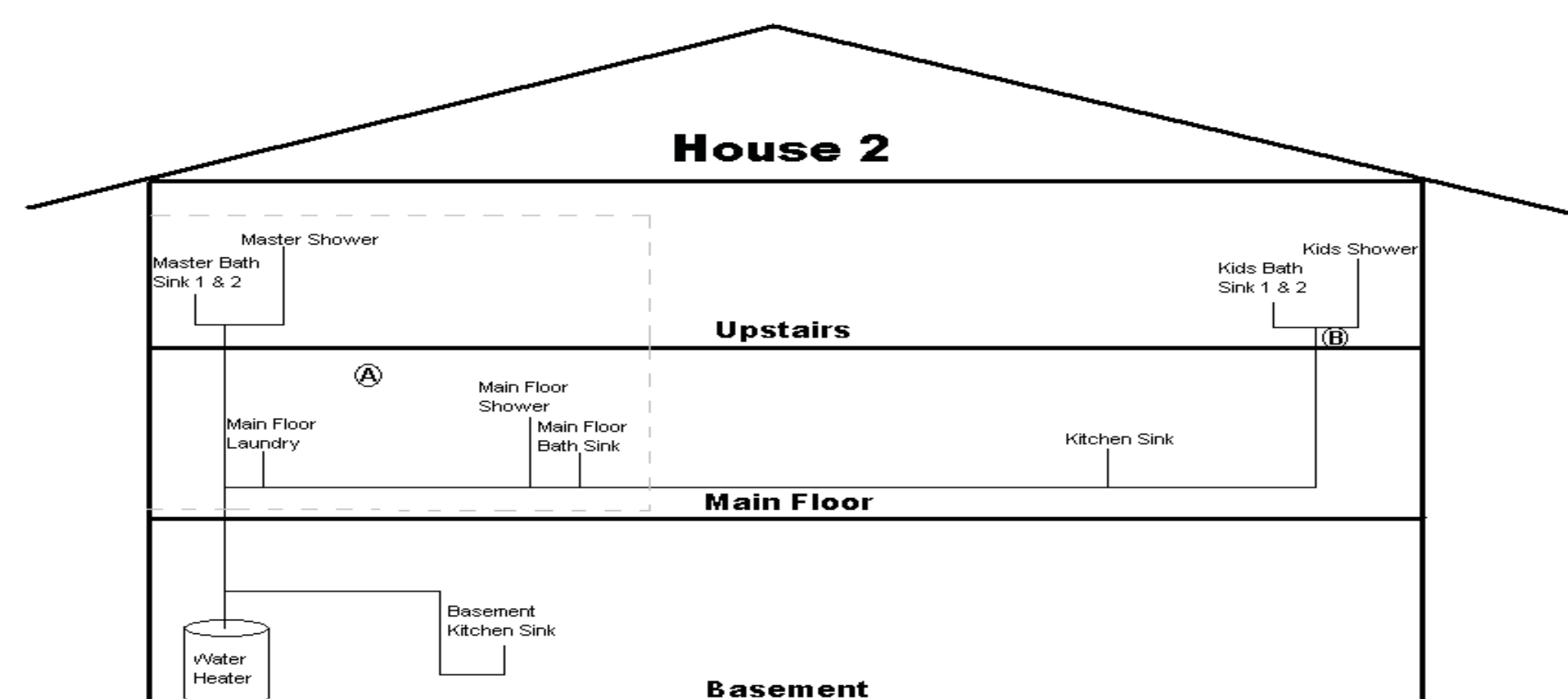
**Purpose:** Determine Home Occupant Use of Hot and Cold Water to identify water conservation opportunities based upon use patterns  
In phase 2 of the Study.

**Scope:** 4 Homes in Indianapolis, Indiana  
December 9, 2009 to February 8, 2010

## Data Collection Design:

Faucets – One node consists of Flow and Temperature Sensors on each hot and cold water supply line.  
Showers – A node of one Flow and Temperature Sensor between showerarm and showerhead.  
Node Data Collection – Collect temperature and flow data on a per event basis, based upon change of state  
Data Analysis – Daily data downloaded from text file to Spreadsheet, each day analyzed on a separate worksheet, sorting by time of day and Node, or by Node and time of day.

The analysis of overall water use in kitchen and lavatory faucets and showers parallels the results of faucet and shower water use in the AWWARF Residential End Uses of Water ((Mayer, DeOreo, et.al. – 1999) and the U.S. EPA – Combined Retrofit Report (Mayer, DeOreo, et.al. – 2005) both in terms of water time of use and volume per use distribution. These other studies also reported significant user variability. A dimension of this study that differs from the previous studies is the ability to measure discrete hot and cold water usage (flow rate and temperature) at each faucet and shower outlet. For Showers, while we measured the outlet temperature, knowledge of the hot and cold supply temperatures provided sufficient information to calculate the proportion of hot and cold water flow rates and volumes for each use. In addition we were able to estimate the volume of water wasted waiting for hot water to arrive



## Significant Variation Among Homes – Behavior Based

| Total Faucet Use | Gallons | Minutes | # Uses |
|------------------|---------|---------|--------|
| High             | 32      | 24.6    | 61     |
| Low              | 13.5    | 8.9     | 28     |

| Total Shower Use | Gallons | Minutes |
|------------------|---------|---------|
| High             | 58.1    | 34:54   |
| Low              | 49.2    | 22:47   |

**Acknowledgements**  
Delta Faucet Company, Jeff Belz,  
Matt Luneack  
Contact: Craig Selover  
[cselover@masco-rd.com](mailto:cselover@masco-rd.com)  
313 792-4457

## Conclusions and Next Steps

1. The information developed from this study will be used to examine hot water demand loads as potential input for improved water heater efficiency test standards and for hot water delivery system efficiency analysis and simulation programs.
2. For both water and energy conservation purposes, the hot water demand analysis may provide sufficient information to allow for plumbing code size reductions of hot water piping – to lower the volume of water in the pipe between the water heater and outlets. The outcome of such a change may result in both energy and water conservation and improved user satisfaction in reducing wait times for hot water.
3. A Second phase of the study will involve lower faucet and showerhead flow rates and installation of demand-controlled hot water recirculation systems to determine both water conservation opportunities and examine any behavioral changes on an individual point of use basis.

