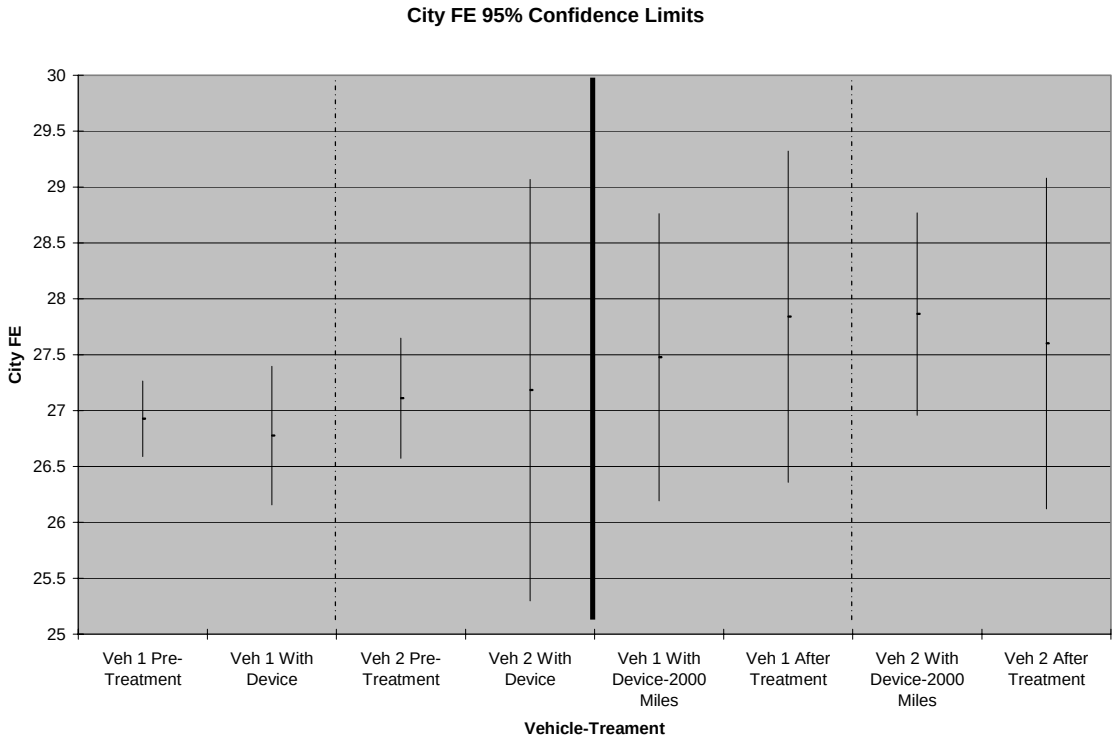
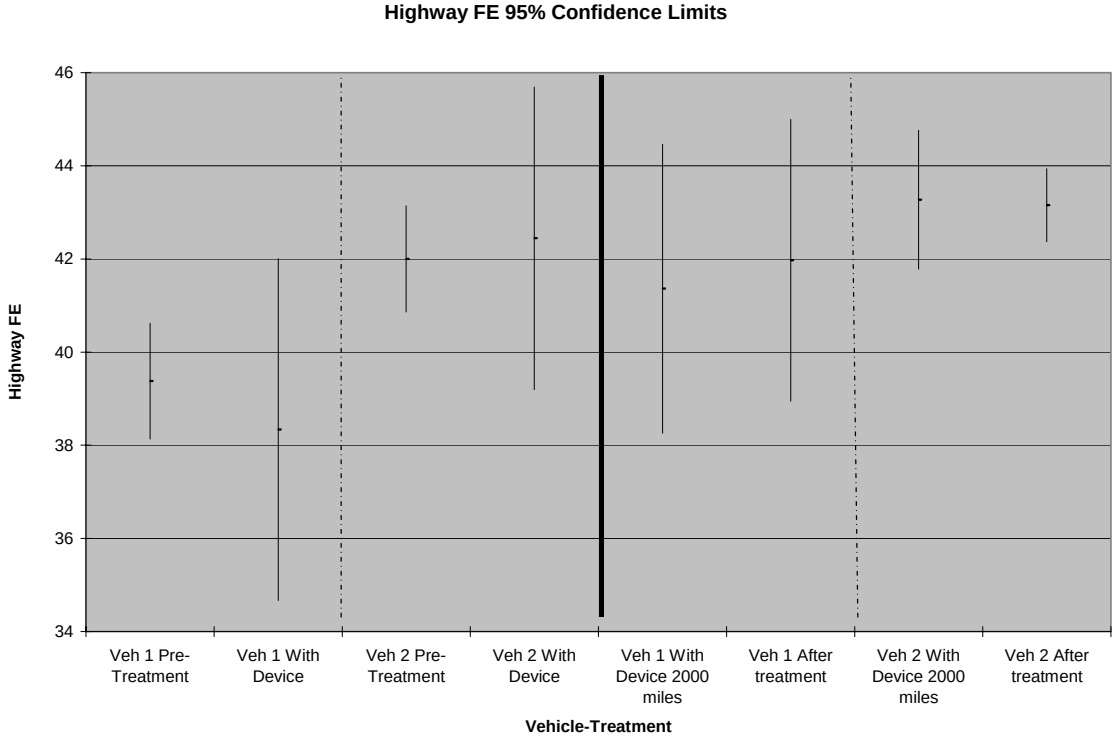
Super Fuel Max Fuel Economy and Emissions Data Analysis

Both fuel economy and emissions measurements were collected for the Super Fuel Max device installed on two vehicles. Three replicates for each vehicle were collected (1) before the installation of the device (Pre-Treatment), (2) after the installation of the Super Fuel Max (With Device), (3) after 2,000 miles of driving with the device installed (With Device-2,000 Miles), and (4) after the removal of the Super Fuel Max (After Treatment). The below charts present means and 95% confidence limits for the city fuel economy (CFE).



The above chart presents side-by-side comparisons of measurements taken with and without the Super Fuel Max device installed in each vehicle. Especially relevant comparisons are after the solid reference line, i.e., after 2,000 miles of driving with the device, because the Super Fuel Max manufacturer recommends driving with device installed for 2,000 miles in order to get improved fuel economy.

A second chart also presents side-by-side comparisons for Highway Fuel Economy (HWYFE):



Both CFE and HWYFE data are analyzed using t-tests. The following tests were conducted: (1) Pre-treatment vs. (2) With Device and (3) With Device 2,000 Miles vs. (4) After treatment. All t-tests of these CFE and HWYFE comparisons for both vehicles are non-significant at the $\alpha = 0.05$ significance level.

Certain t-test comparisons of fuel economy measurements taken before the 2,000 mile drive, however, were significantly different than measurements taken after the 2,000 mile drive. Both CFE and HWYFE measurements for (1) Pre-Treatment (no device) for vehicle 2 were significantly different at the $\alpha = 0.05$ significance level than the CFE and HWYFE measurements taken both for (3) With Device 2,000 Miles and (4) After Treatment.

There are several different possible explanations for having vehicle 2 mean CFE and HWYFE significantly higher in measurements, (3) and (4), taken after driving 2,000 miles than for (1) Pre-Treatment measurements. Different drivers, dynamometers, and vehicle mileage are found in those measurements, (1) and (2), taken before the 2,000 miles drive and those measurements, (3) and (4), taken after the 2,000 mile drive. Vehicle 2 was driven on the same dynamometer in collecting data for (1) Pre-treatment and (2) With Device tests. The same driver was used in five of six samples collected in (1) and (2). Vehicle 2 was driven on a dynamometer different than the one used to collect (1) and (2) data, in four of six measurements taken for (3) With Device-2,000 Miles and (4) After Treatment. Four different drivers were used to collect the six samples in (3) and

(4), and only one of these four drivers was also used to collect just one measurement in (1) and (2).

T-test comparisons for vehicle 1 of (1) Pre-Treatment measurements and both (3) With Device-2,000 Miles and (4) After Treatment are not significant at the α = 0.05 significance level.

Emissions effects were also evaluated using t-test comparisons of (1) Pre-treatment vs. (2) With Device and (3) With Device 2,000 Miles vs. (4) After treatment. All such tests were not significant at the α = 0.05 significance level, except for one CO test. The significant CO results was for the comparison of (3) and (4) in vehicle 1. The result was not confirmed in the vehicle 2 t-test comparison of (3) and (4).

In summary, data were collected to test the manufacturer's claim that the Super Fuel Max device would improve mileage after 2,000 miles of driving with the device. After the recommended 2,000 miles of driving, no statistically significant difference was found for CFE and HWYFE measurements taken with the device and measurements taken without the device. One emissions result for CO was found to be statistically significant for a comparison of measurements taken with the device and measurements taken without the device.