

SPIRIT



FUEL PURIFIER

Honda GC 135, 4-HP Engine Test

With "1.5-gallon" drop-in



Test Summary: Conducted 4/14/2003

For this demonstration, we selected a basic 4HP, 4-cycle air-cooled gasoline engine. This engine did not have any emission control devices, computerized ignition or control systems.

The engine was initially run for one hour allowing it to reach operating temperature, after which the Air/Fuel mixture was leaned to the point the engine just began to run rough, then richened slightly until smoothing out.

Two separate fuel tanks were plumbed into the fuel line of the engine, each with a shut-off valve. Amoco Regular 87 octane gasoline was used in both tanks and purchased from the same pump at the same time. After the 1-hour warm-up period, we ran the engine on "untreated" fuel for 23 minutes. After the first 23 minutes and without shutting off the engine, we immediately switched the fuel valves to cause only the 1.5 gallons of treated fuel, containing a 1.5-gallon SpiritPFC drop-in, to be burned for the final 23 minutes.

Note: There is approximately a 20-second gap in the data recording between the end of the "untreated" fuel run and the beginning of the treated fuel run while the log file was saved and the new one started, otherwise all recordings are continuous.

Emissions were monitored and recorded every (5) seconds using an Autologic brand, PC-Based, 5-gas emissions analyzer. All ambient conditions were held constant. Engine RPM's were maintained at 3000 RPM's (+ or - 10 RPM's). Other than switching between fuel tanks, no interactions of any kind with the engine were made during this test.

The Charts:

Carbon Dioxide (CO₂) - In this chart you will immediately notice large variations in CO₂ levels during the untreated fuel run, but much more consistent levels when running the treated fuel. This is a good illustration of the smoothness of the engine's performance in the two separate runs. You will also notice that averaged out, there is only a slight increase in this gas of .85%. This is a good indication that the mixture adjustments were set very close to optimum at the beginning of the test. **As combustion efficiency improves, carbon dioxide levels increase.**

Carbon Monoxide (CO) - CO levels drop on average 74% when burning the treated fuel. **As combustion efficiency increases, Carbon Monoxide decreases.**

Hydrocarbons (HC) - Hydrocarbons are essentially unburned fuel. Since Gasoline and Diesel Fuels are made up of hydrocarbons, the more hydrocarbons measured in the exhaust, the less complete the fuel-burn was. When observing the untreated run against the treated run you see a reduction of 47% in hydrocarbons. **As combustion efficiency improves, Hydrocarbons decrease.**

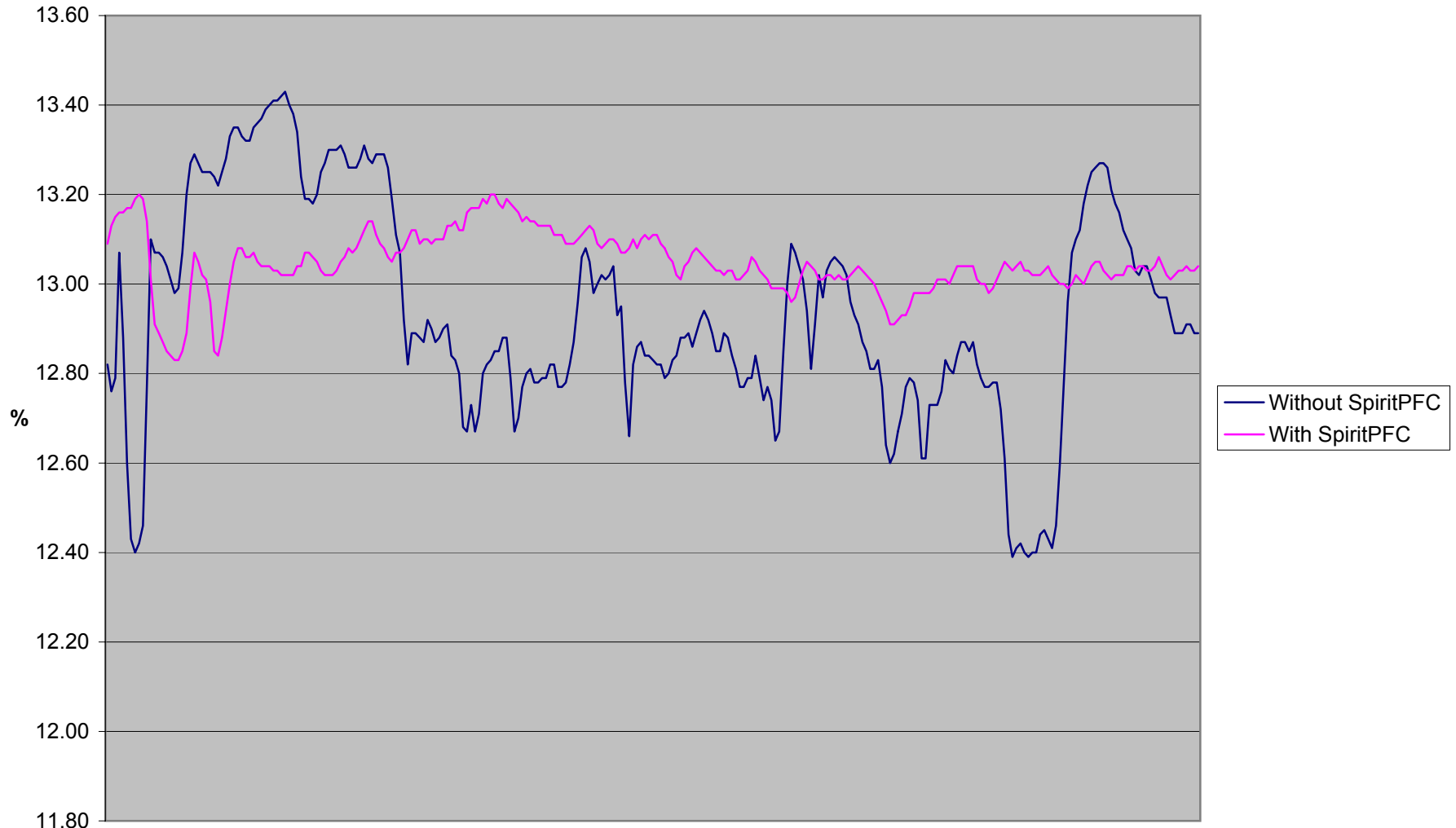
Oxygen (O₂)- Oxygen is one more gas that indicates more complete combustion. You'll notice that during the treated fuel run, the average Oxygen levels climbed 67% over the untreated run. **As combustion efficiency improves, Oxygen levels will increase.**

Air/Fuel Ratio – The Air/Fuel Ratio is the measurement of how many parts of Air versus how many parts Fuel is being burned. A value of 15.00 means 15 parts Air to 1 part Fuel. A 15 to 1 ratio is generally accepted as the theoretical maximum spread or leanest value most engines can burn. Realistically, maximum power and efficiency is achieved at more like 13 or 14 parts Air to 1 part of fuel. As the optimum mixture is exceeded and the engine is leaned further, both power and efficiency are reduced causing a rougher running engine.

A 40-degree increase in exhaust temperature was seen with a 2-degree increase in cylinder head temperature in the second half of the test, indicating better, hotter combustion with the treated fuel.

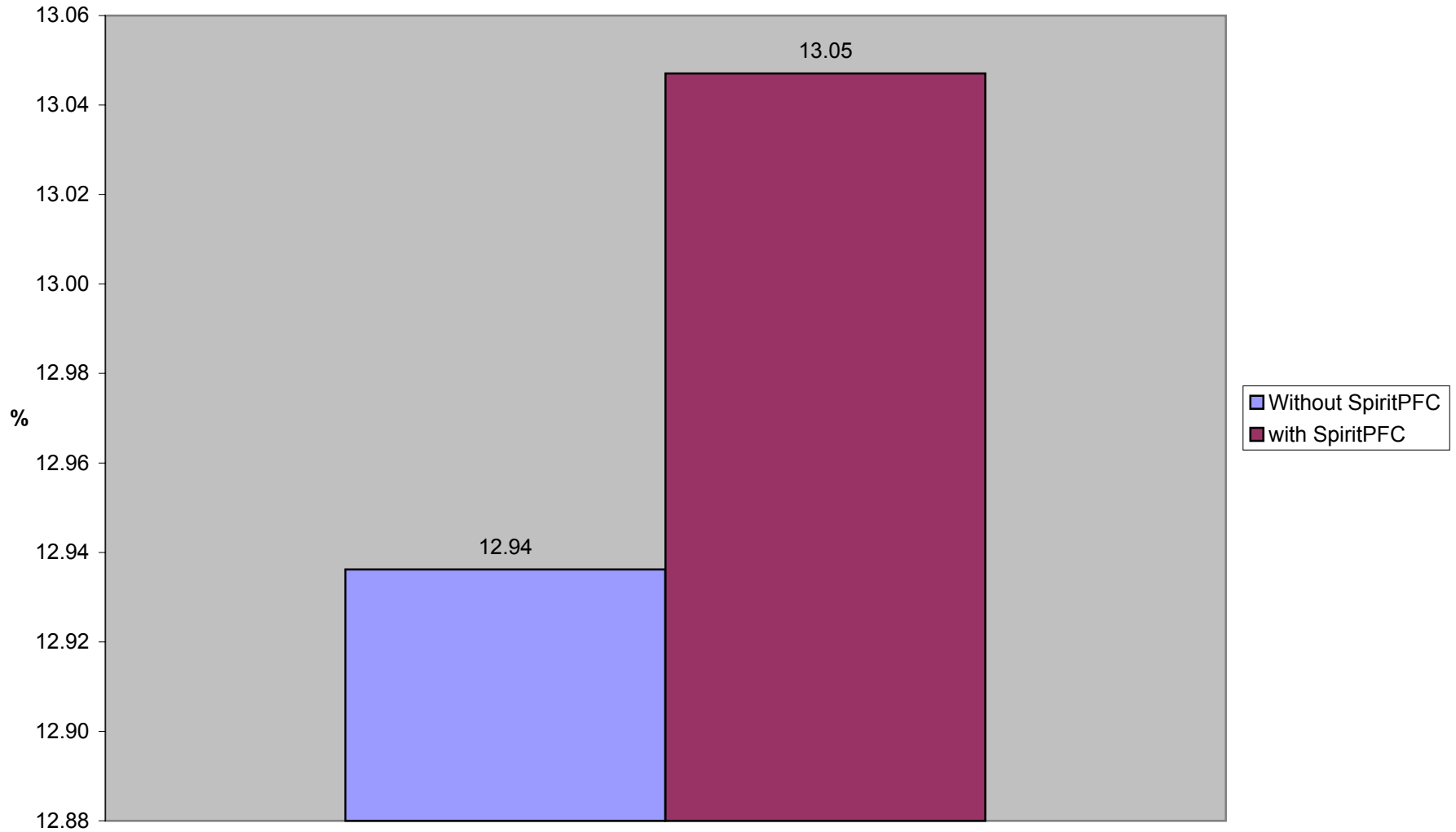
This test illustrates how the removal of these elements from regular pump fuel causes the fuel to burn cleaner and more efficient!

Carbon Dioxide (CO2)



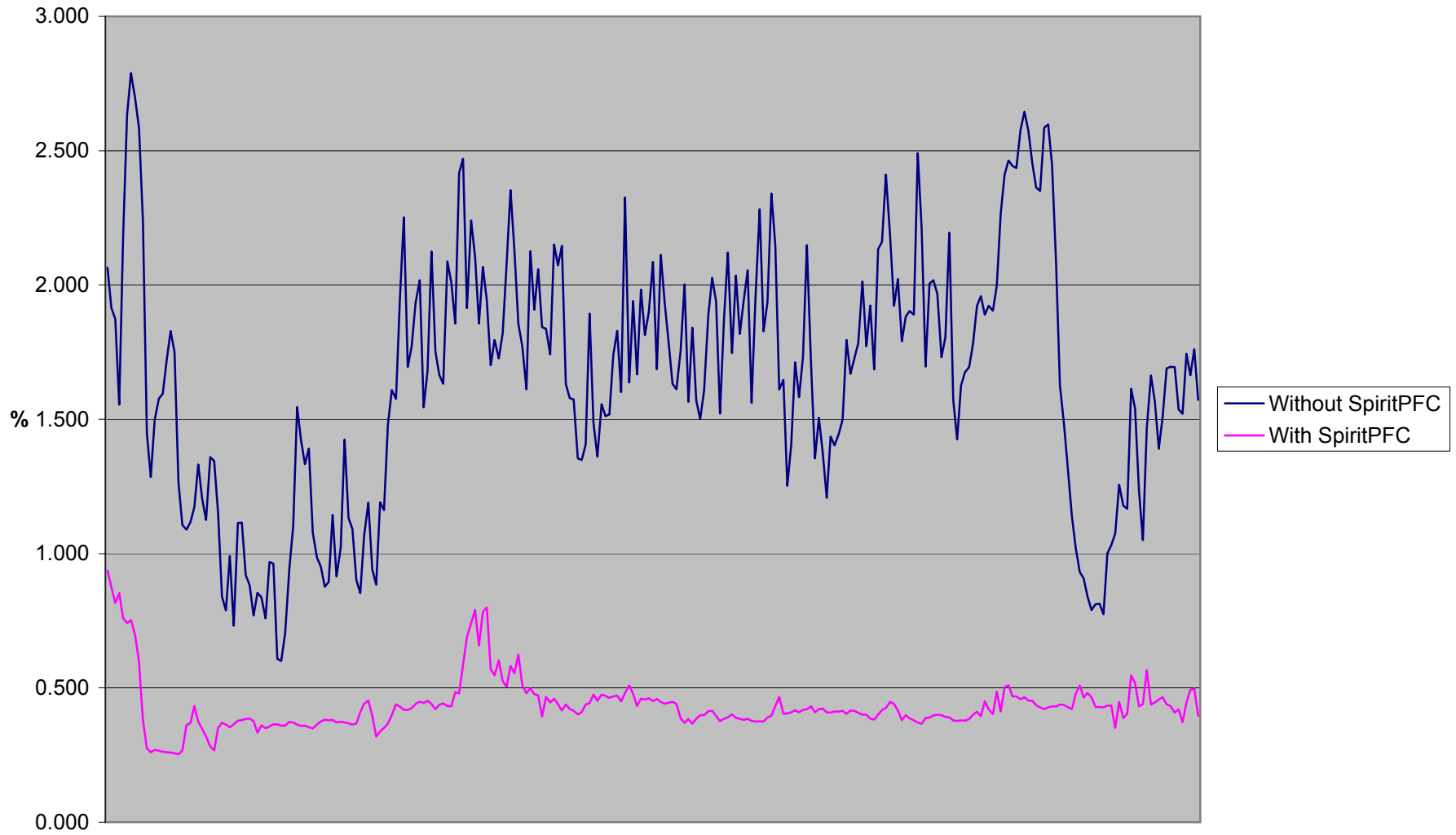
23 Mins. W/O then 23 Mins. With SpiritPFC

Average Carbon Dioxide (CO2)



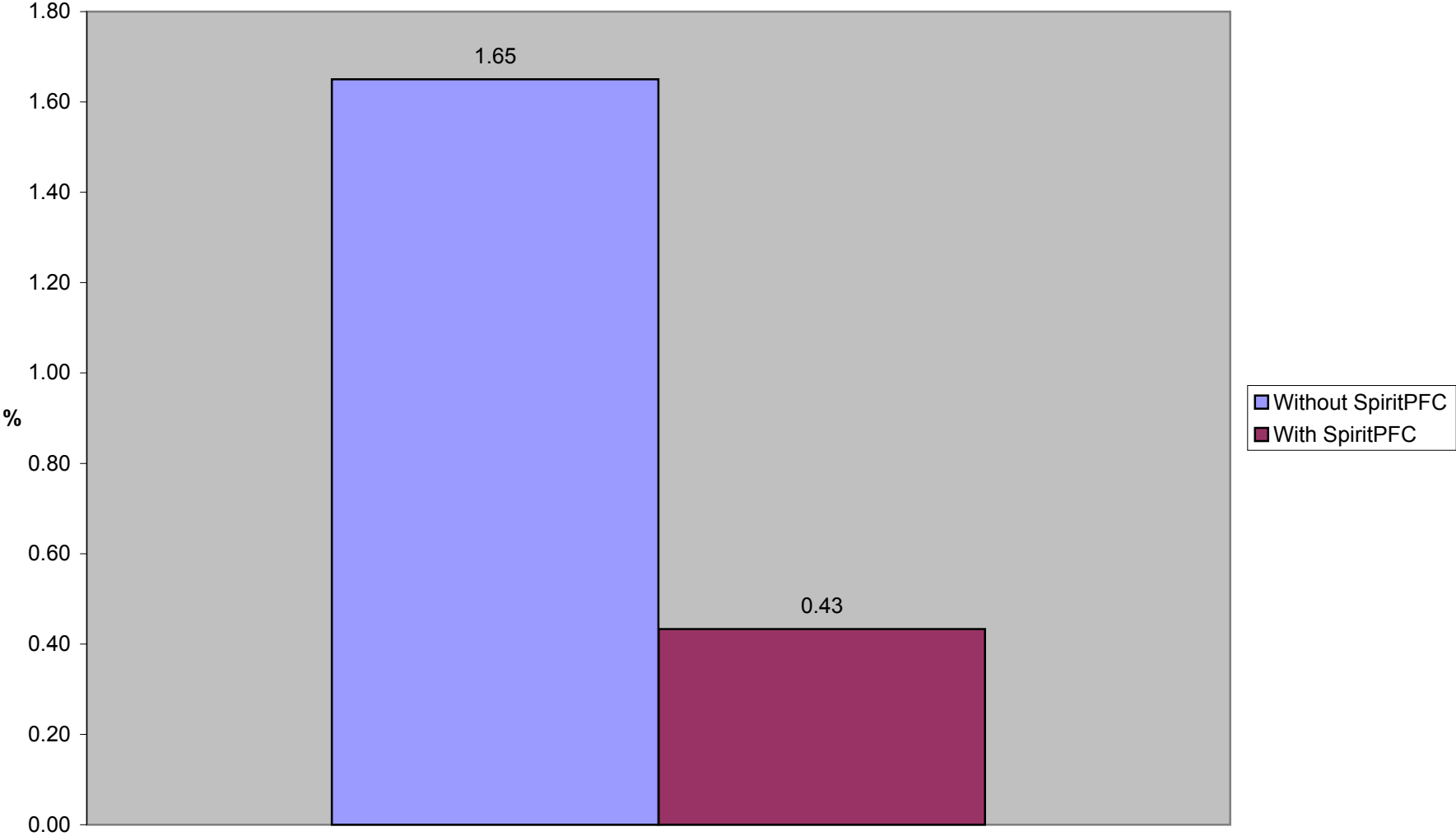
.85 % Increase with SpiritPFC

Carbon Monoxide (CO)



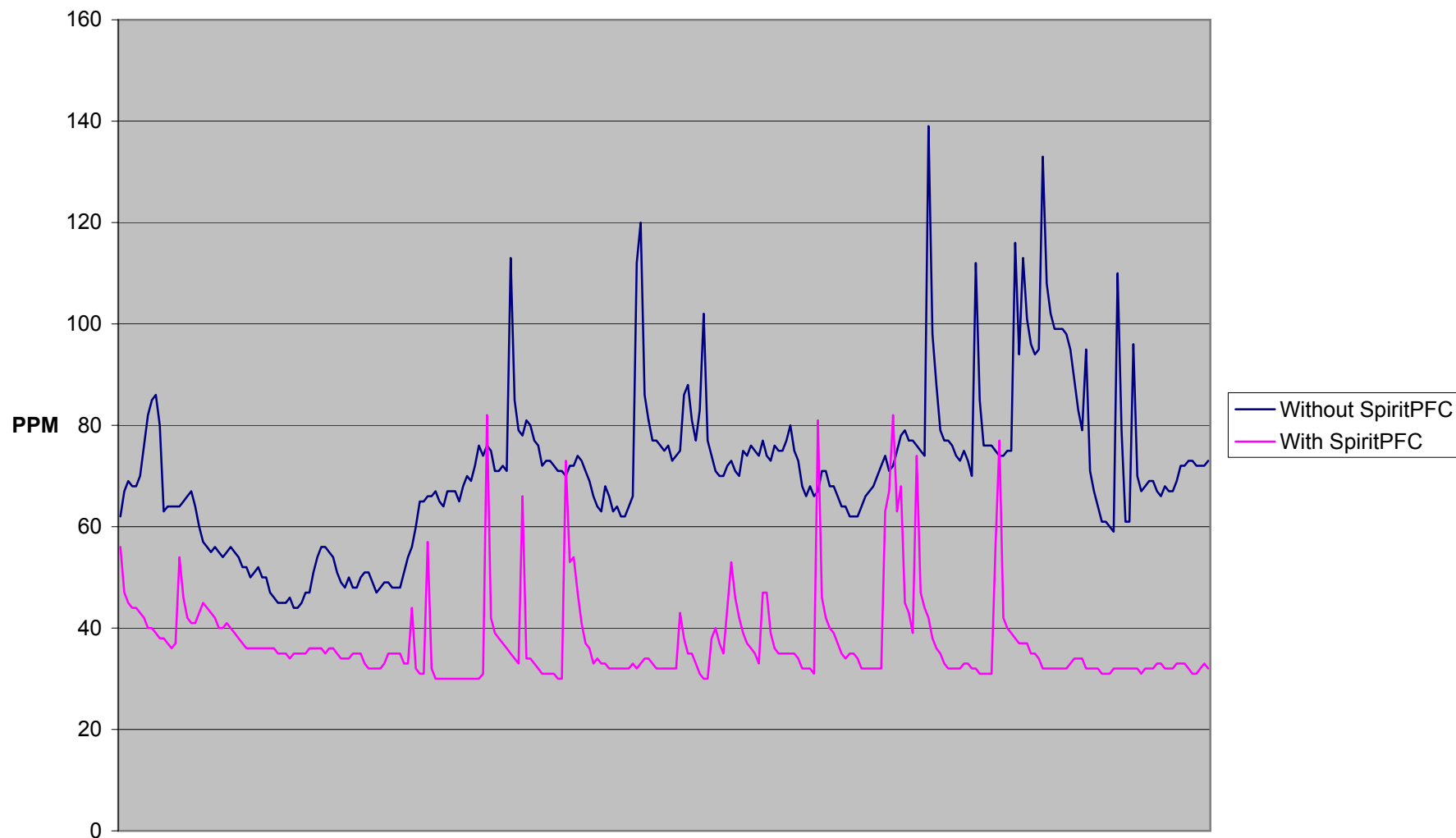
23 Mins. W/O then 23 Mins. With SpiritPFC

Average Carbon Monoxide (CO)



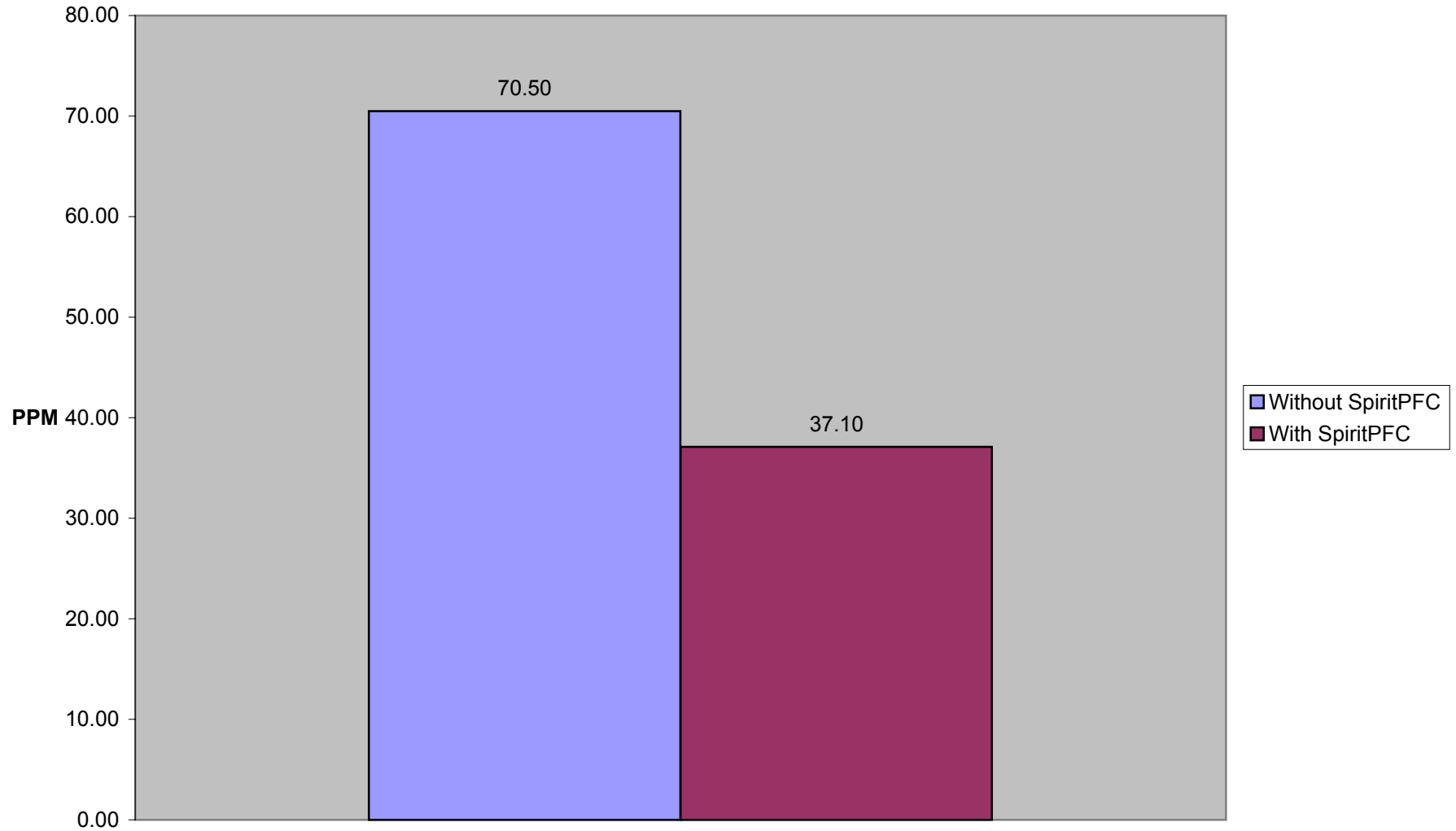
74% Decrease with SpiritPFC

Hydrocarbons (HC)



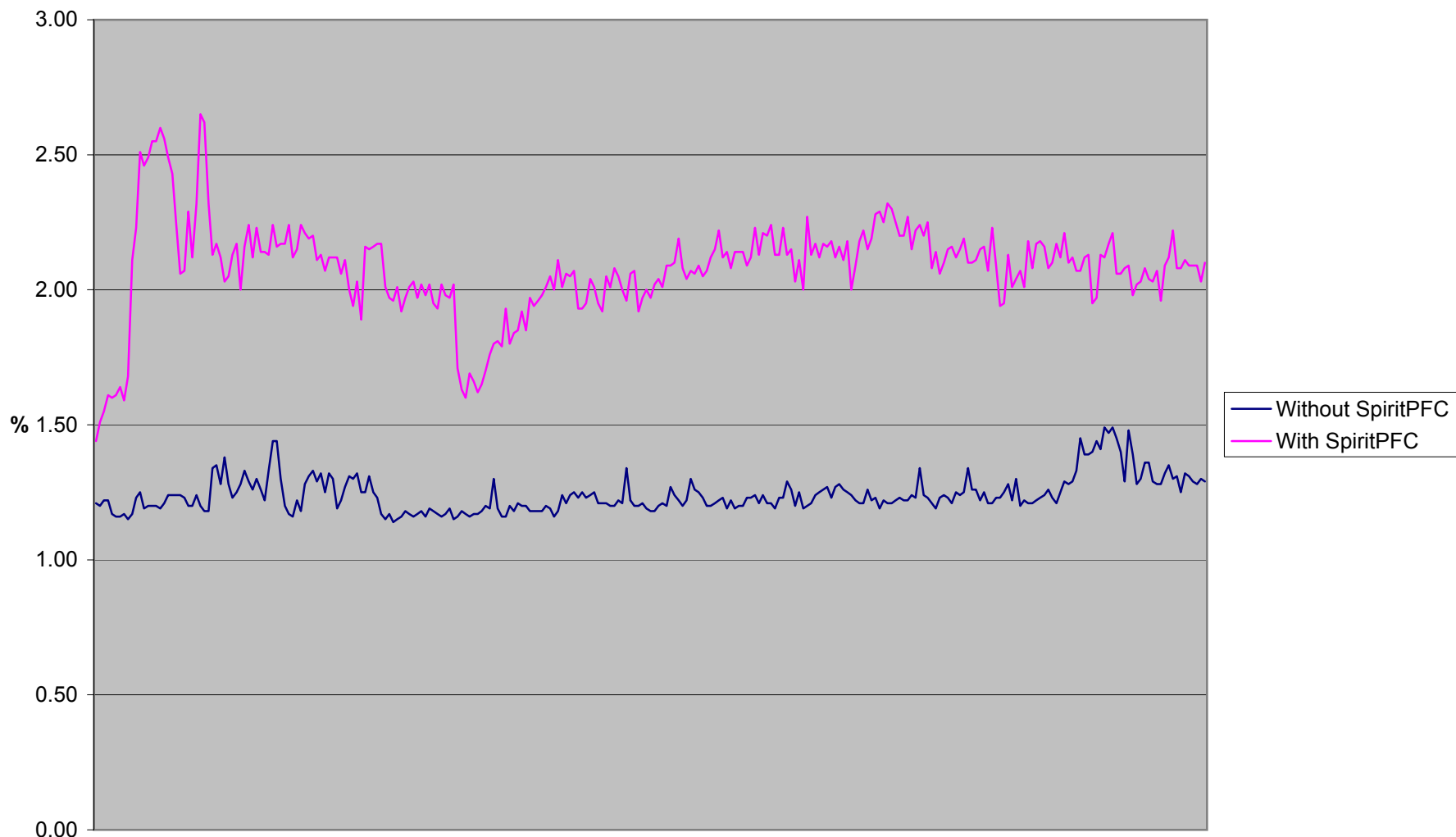
23 Mins. W/O then 23 Mins. With SpiritPFC

Average Hydrocarbons (HC)



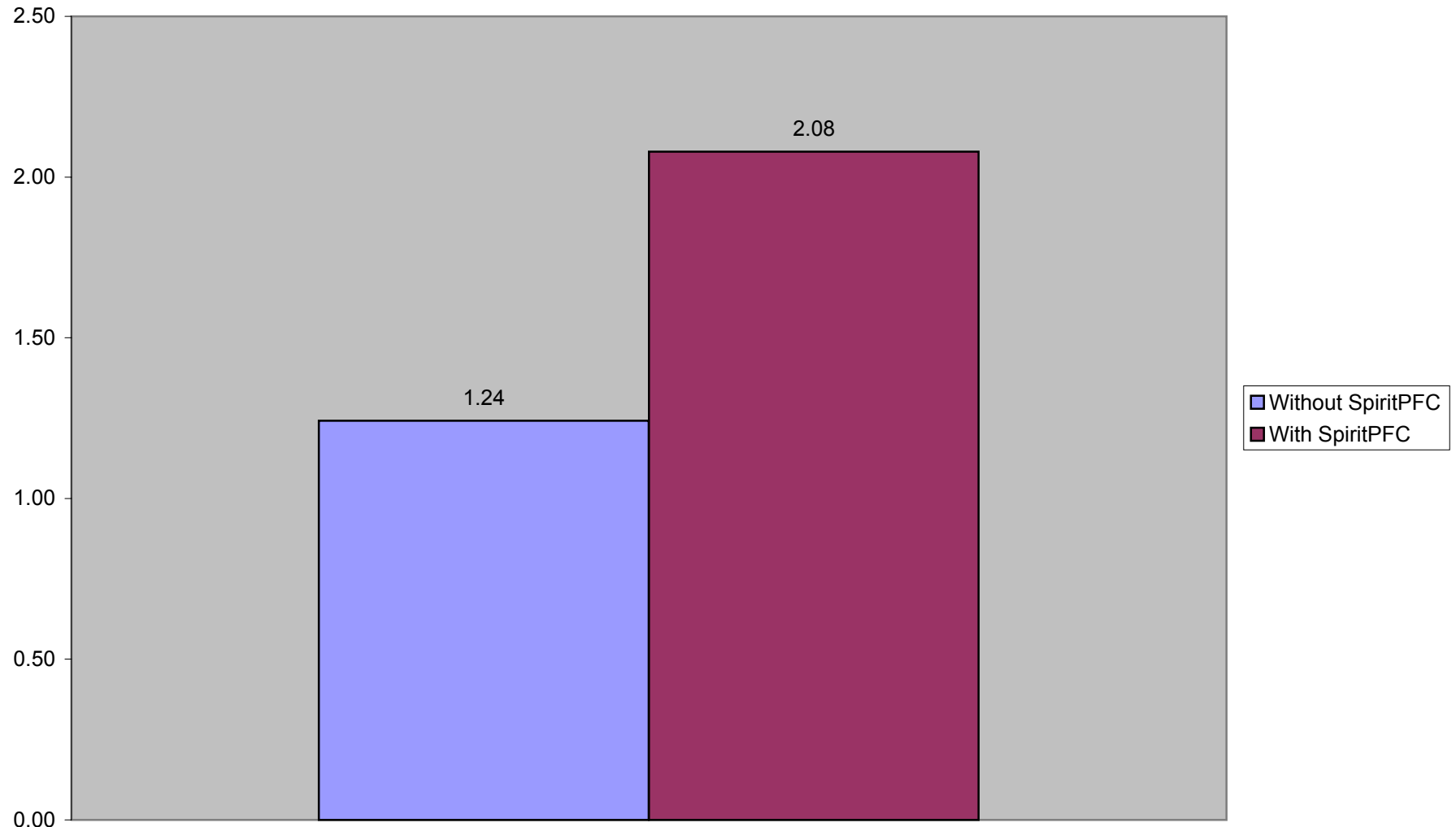
47 % Decrease with SpiritPFC

Oxygen (O2)



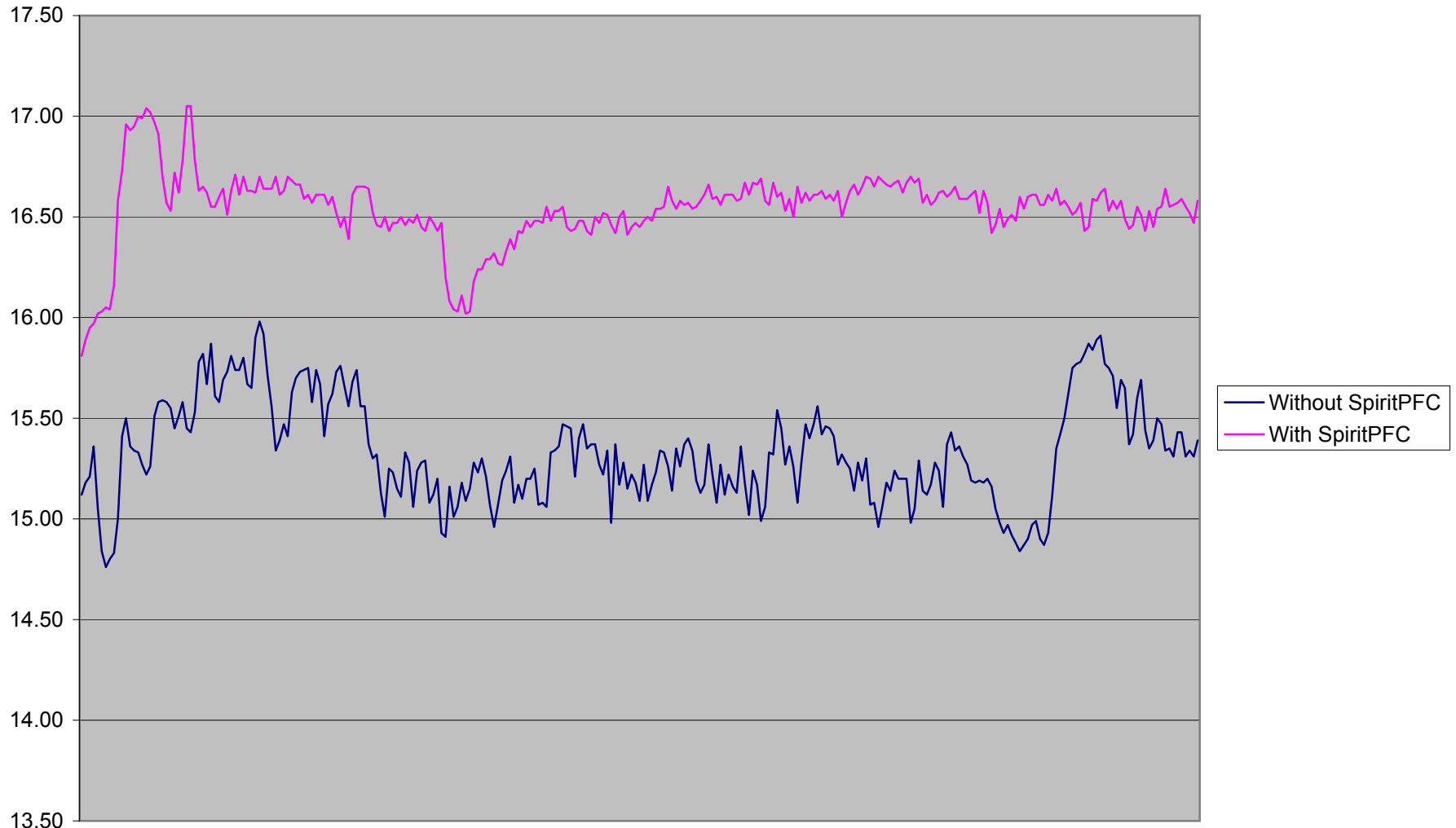
23 Mins. W/O then 23 Mins. With SpiritPFC

Average Oxygen (O2)



67 % Increase with SpiritPFC

Air/Fuel Ratio



23 Mins. W/O then 23 Mins. With SpiritPFC

Average Air/Fuel Ratio

