

GRPE/WHDC/FE36

**DETROIT DIESEL**

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## WHTC Investigations EPA Witness Test Results

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## Background

- The WHDC gtr has proposed amendments for global harmonization which affect the transient emissions cycle, test procedure, and more specifically, soak times for the Heavy-Duty On-Highway Transient Emissions Cycles.
- The United States “EPA” wants to ensure that any amendments to the WHDC gtr will in no way result in a lowering of the high level of environmental protection expected from the US 2010 heavy duty highway program.
- The following is a summary of a “witness” test conducted per EPA guidelines with a DD 15 US 2010 prototype engine.

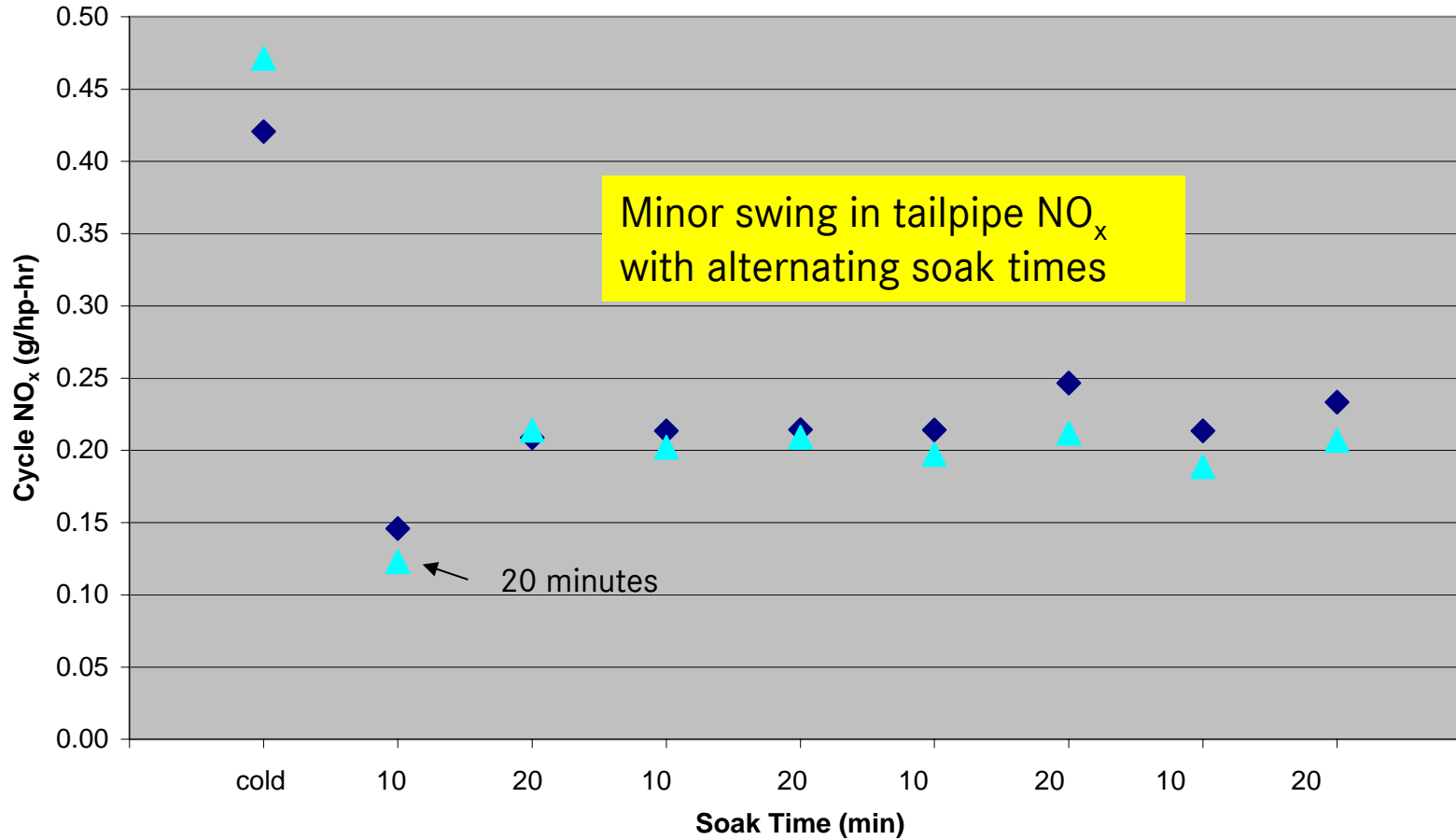
# Test Protocol

## (per EPA guidelines)

- Day 1 - cold/hot FTP (baseline)
- Day 2 - Cold WHTC, 10 min soak, hot WHTC, 20 min soak, hot WHTC, 10 min soak, hot WHTC (repeat sequence to fill allotted time)
- Day 3 - Cold WHTC, 20 min soak, hot WHTC, 20 min soak, hot WHTC, 10 min soak, hot WHTC (repeat sequence to fill allotted time)

# Results

**WHTC Soak Time Investigations - Cycle NO<sub>x</sub>**



◆ WHTC Alternating Soak Times - Day 1    ▲ WHTC Alternating Soak Times - Day 2

# Cycle Data

Test Description	NOx	CO	CO2	THC	NOx+ NMHC	BSFC	Cycle Power
	g/hp-hr					kg/kW-hr	kW-hr
cold ftp	0.4053	0.8239	591.5	0.0063	0.4114	0.2340	27.4
ftp	0.0596	0.2452	585.4	0.0018	0.0613	0.2420	27.5
<b>ftp cold/hot weighted</b>	0.1090	0.3279	586.3	0.0024	0.1113	0.2409	27.5
cold whtc	0.4205	0.6292	576.6	0.0008	0.4213	0.2320	37.4
whtc - 10 minute soak	0.1458	0.0313	562.5	-0.0006	0.1452	0.2360	37.4
<b>whtc cold/hot weighted</b>	0.1733	0.0911	563.9	-0.0005	0.1728	0.2356	37.4

Cold/hot weighted difference primarily due to hot cycle results

## Conclusions

- Minor swing in tailpipe NOx with alternating soak times towards end of test.