

Vehicle Evaluation of Downsized Dow ACM DPF

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Dow Automotive

Present at
Diesel Engine-Efficiency and Emissions Research Conference
DEER 2006

Outline of Presentation

- Test Objective**
- Test Procedure**
- Driving Cycles**
- Results**
 - *Dow ACM DPF*
 - *OEM DPF*

Objectives

- ❑ Evaluation of Dow ACM DPF performance on a MY2005 LD vehicle on chassis dynamometer
- ❑ Comparison between OEM DPF and Dow DPF performance under modified city driving cycles
- ❑ Demonstration of Dow ACM DPF performance and downsizing potential

Vehicle Test Plan

- Development of driving cycles that is able to load ~8 g/l soot per regeneration without modification of OEM engine ECU
- Baseline configuration: CC-DOC+DOC+OEM-DPF(4L)
- Modified configuration: CC-DOC+DOC+Dow-DPF(3L)
- Evaluation of system performance for both configurations under developed driving cycles



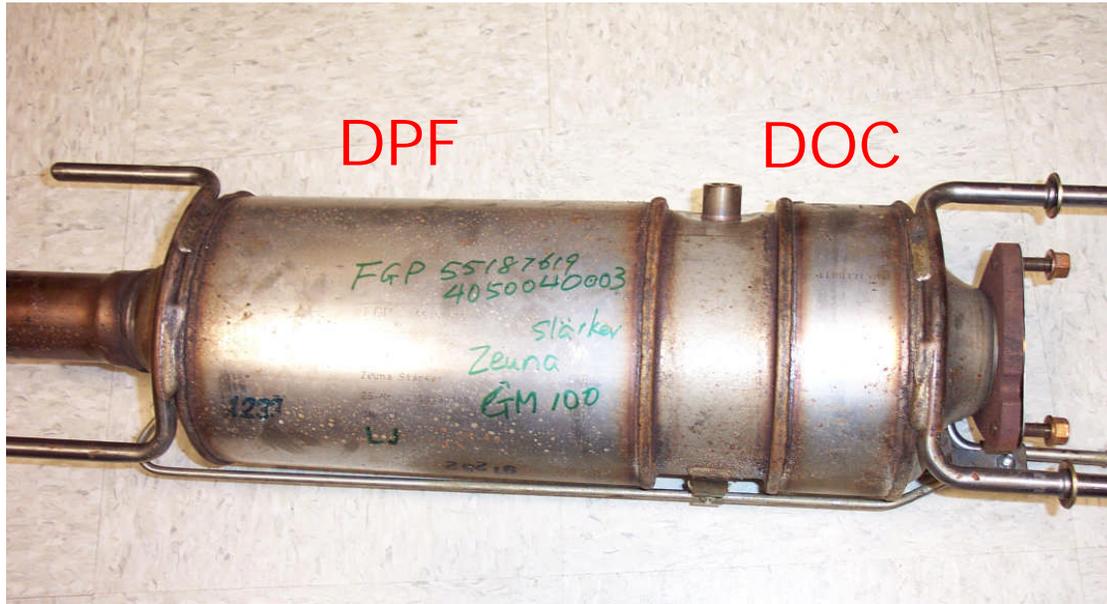
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Test Vehicle

- 1.9 L, turbocharged, Common rail, Diesel engine
- Automatic transmission

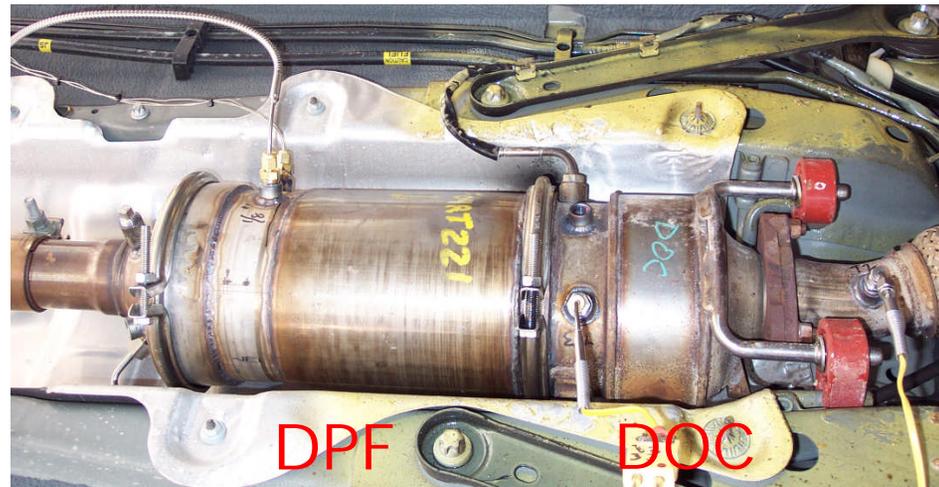


DPF System Configuration



OEM DPF (4L)
with upstream
OEM DOC

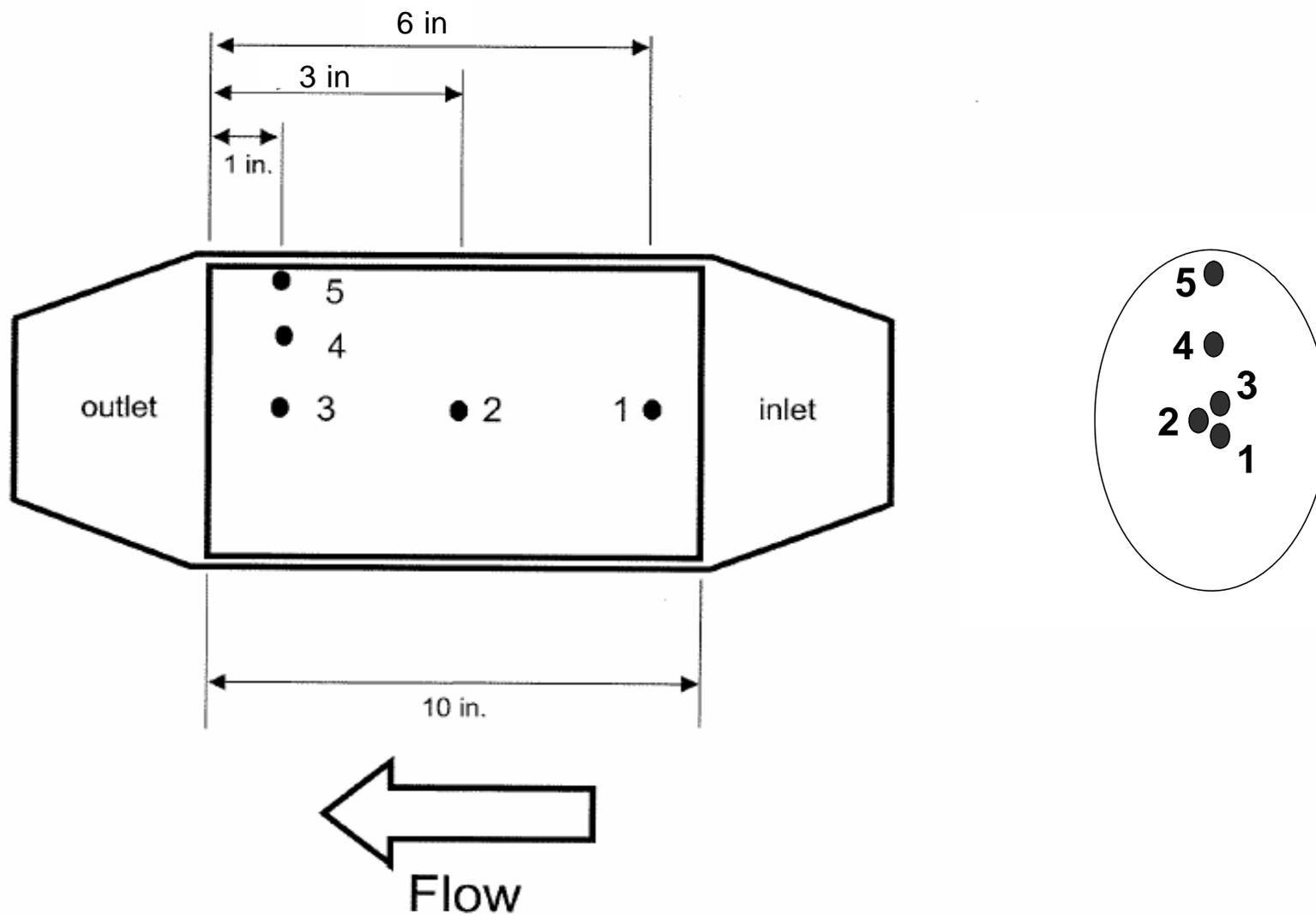
Dow DPF (3L)
with upstream
OEM DOC





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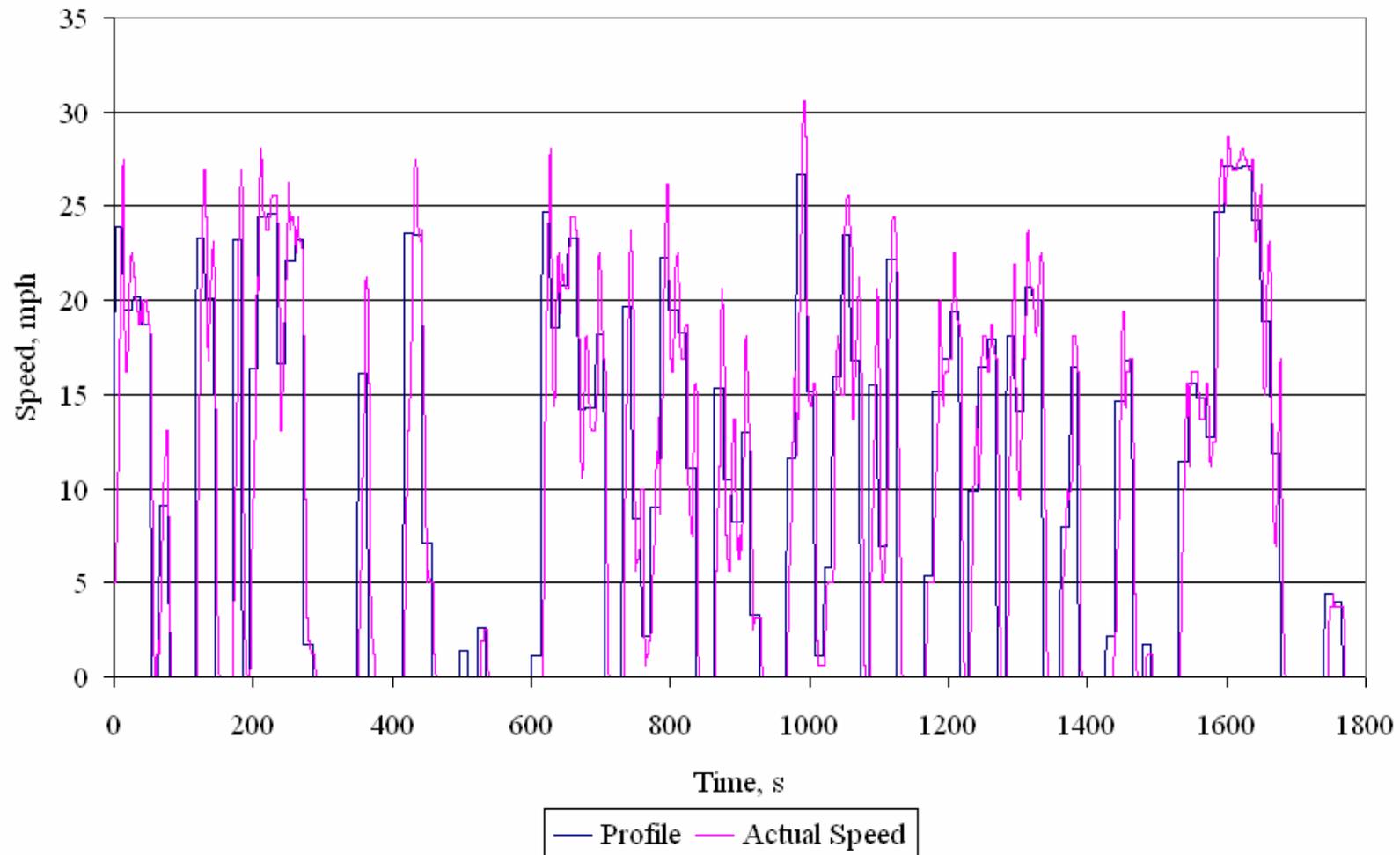
DPF Thermocouple Locations



Vehicle Test Driving Cycle



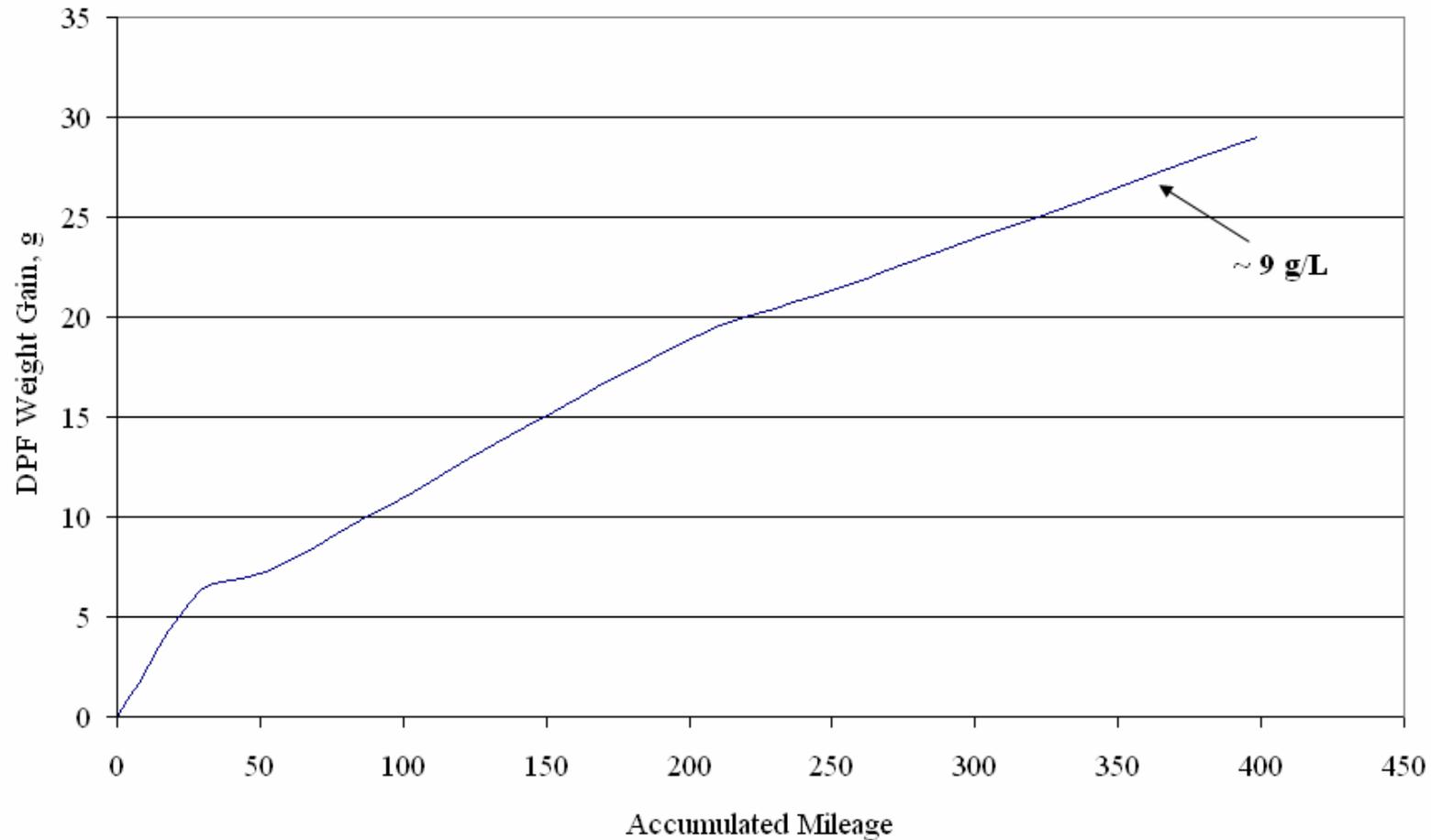
Cycle was developed to load $\sim 8\text{g/l}$ soot per regeneration



DPF Soot Loading Curve



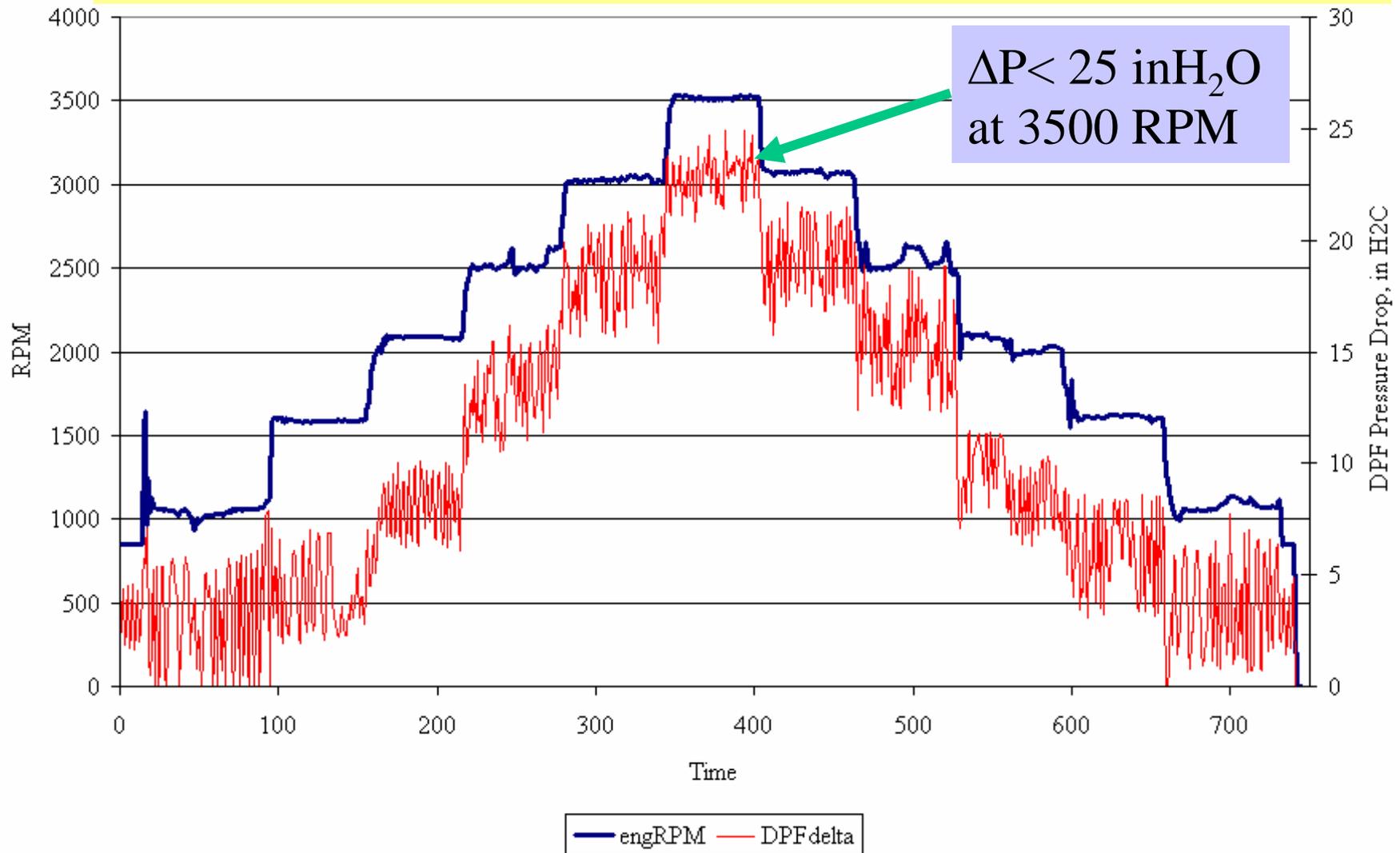
Soot loading rate on a 3L ACM DPF





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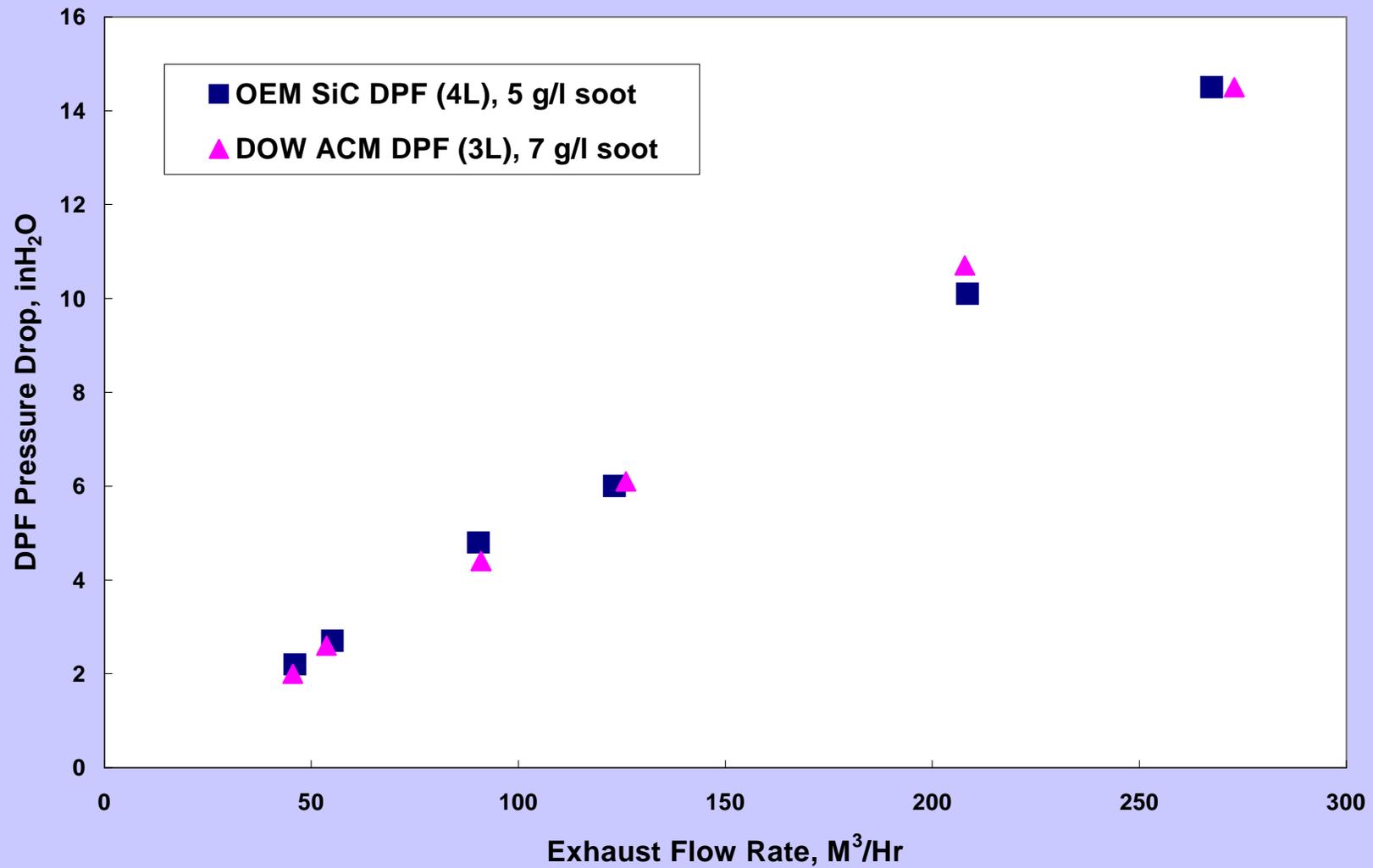
Soot loaded (~9g/l) Dow DPF pressure drop





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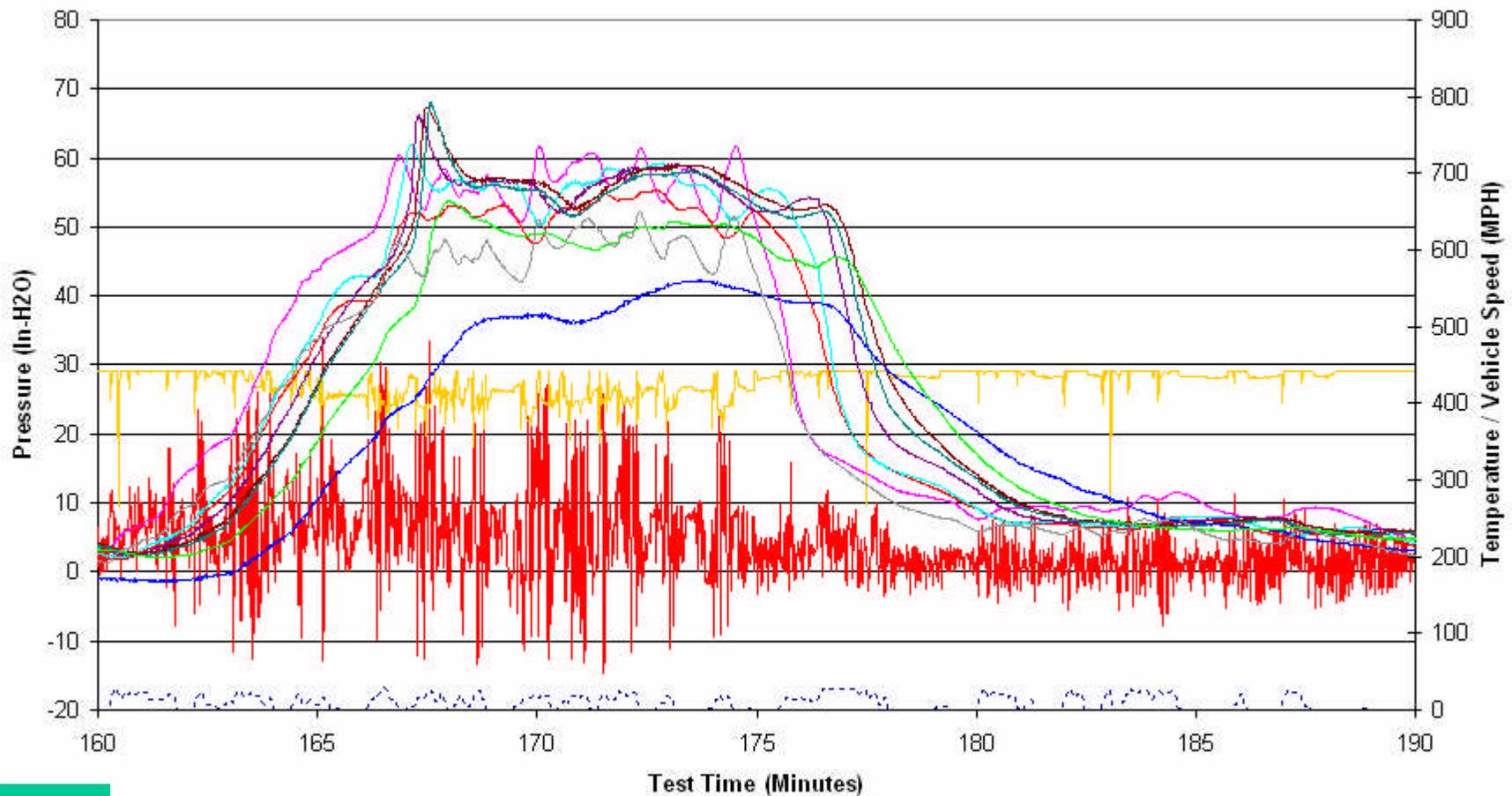
ΔP comparison





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ACM DPF temperature profiles during regeneration



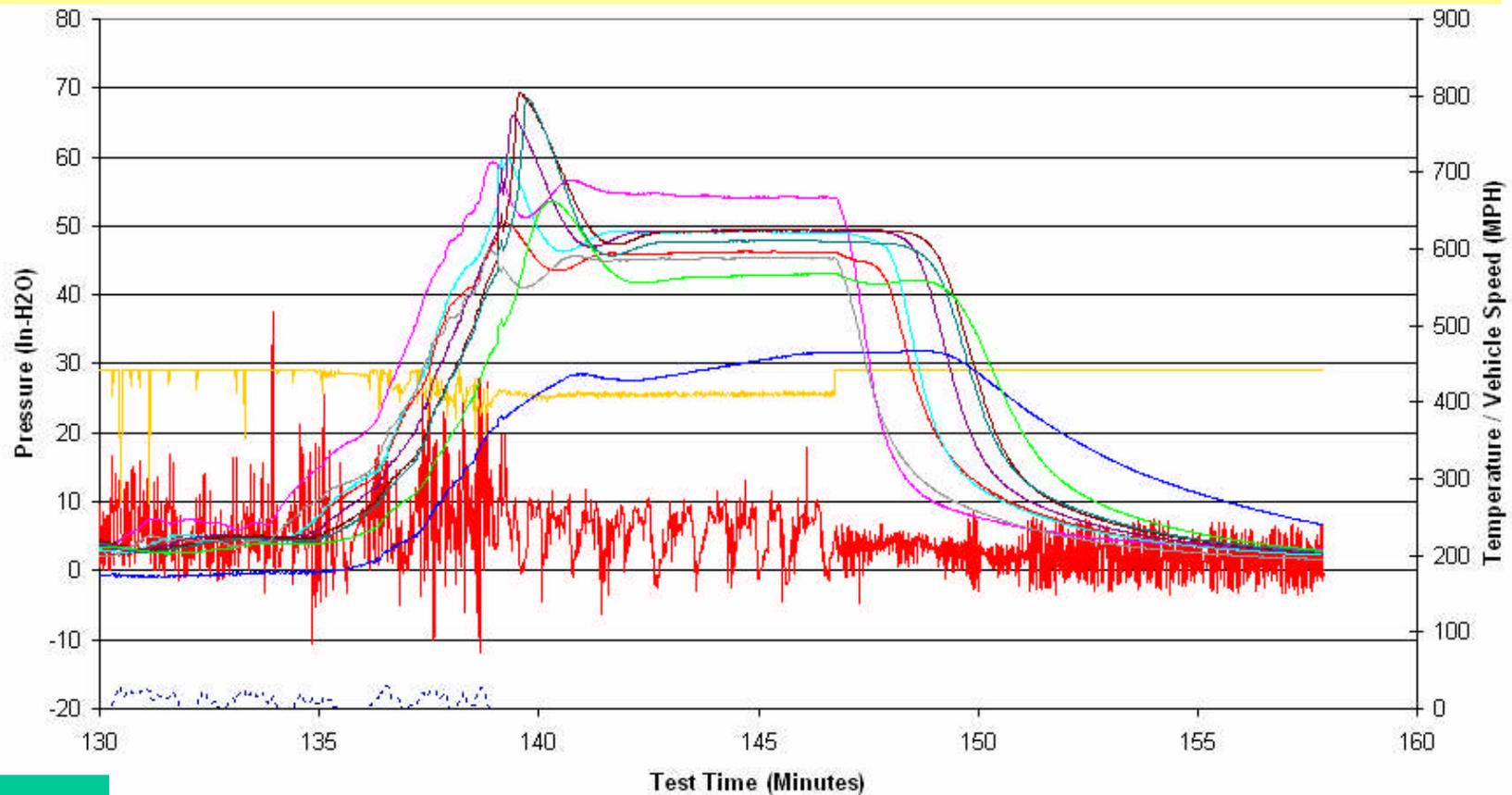
Dow
DPF

DPF Delta Pressure (In-H2O)	AFR	Vehicle Speed (MPH)
CC DOC Inlet (C)	DPF Inlet (C)	DPF Bed1 (C)
DPF Bed2 (C)	DPF Bed3 (C)	DPF Bed4 (C)
DPF Bed5 (C)	DPF Outlet (C)	DOC Inlet (C)



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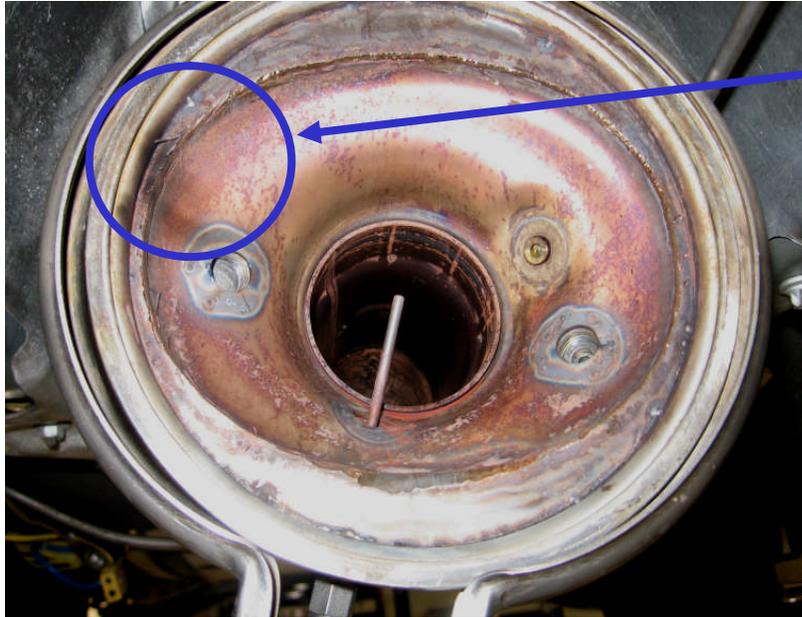
ACM DPF temperature profiles during uncontrolled regeneration



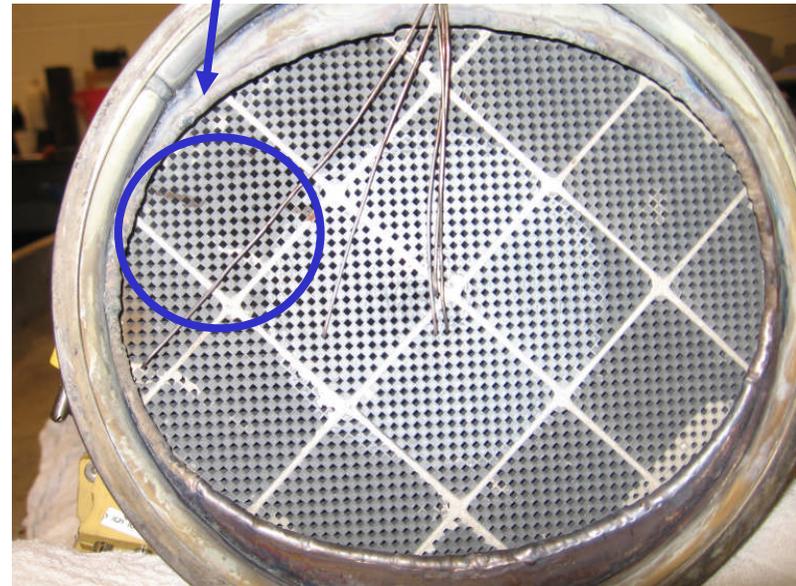
Dow
DPF

— DPF Delta Pressure (In-H2O)	— AFR	----- Vehicle Speed (MPH)
— CC DOC Inlet (C)	— DPF Inlet (C)	— DPF Bed1 (C)
— DPF Bed2 (C)	— DPF Bed3 (C)	— DPF Bed4 (C)
— DPF Bed5 (C)	— DPF Outlet (C)	— DOC Inlet (C)

OEM DPF soot leakage



3 channel leakage observed





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No soot leakage from Dow ACM DPF

(Smoke meter measurements verified)



~ 8 g/l soot loaded inlet



Soot loaded DPF outlet

Summary

- Dow ACM DPF and OEM DPF were tested on vehicle with accumulated 27,000 km and multiple regenerations**

- OEM DPF was found channel crack and soot leakage after 10,000 km vehicle test**

- Dow DPF was not found channel crack and soot leakage after 14,000 km vehicle test with uncontrolled regenerations**

- The size of Dow DPF was reduced by 25% than OEM DPF and kept the same back pressure at higher soot loading**