

Compilation of Existing Particle Number Data From Outside PMP Inter-Laboratory Correlation Exercise (ILCE)

Introduction

At the 54th session of GRPE in June 2007 it was agreed that additional particle number measurement data, accumulated using PMP compliant measurement systems, would be compiled. This would be composed entirely of data accumulated independently from the PMP Inter-Laboratory Correlation Exercise and so not featuring the use of a common (Golden) measurement system and not having been overseen by a Golden Engineer. The intention of this exercise was to give additional confidence in the reproducibility of particle number measurement.

Data Received

Data was received from AECC, CARB, JAMA, SNRA, Concawe, UK Department for Transport, Toyota and Volkswagen. A number of different measurement systems were used. Of these, data demonstrating compliance with PMP solid particle penetration efficiency and volatile particle removal efficiency requirements has only been presented for Matter/TSI and the Horiba Solid Particle Counting Systems. The results from these measurement systems are shown in Figure 1 below. For comparison the PMP ILCE Golden System results are reproduced as Figure 2. Test data was available from CARB for the Golden Vehicle used in the PMP ILCE, providing a reference source for comparison with PMP ILCE results.

It should be noted that these results pre-date improvements in calibration procedures/requirements which were made in August-October 2007 in order to reduce potential differences between measurement systems.

Conclusions

- Mean emissions for the Golden Vehicle at CARB, at 3.8×10^{10} particles/km, were within the range of results from the PMP ILCE.
- The other silicon carbide DPF equipped vehicle showed emissions of around 1.1×10^{11} particles/km, at the high end of the range of results seen in the PMP ILCE for similar technologies. Unlike most silicon carbide DPF vehicle test results, the second by second particle emissions trace for this vehicle showed emissions which follow the test cycle. This suggests that this vehicle had a slightly more porous filter structure than those tested in the PMP ILCE.
- A large number of results were available for cordierite DPF equipped vehicles, these ranged from 1.2×10^{11} - 9.5×10^{11} particles/km spanning the level seen on the single cordierite DPF equipped vehicle tested in the PMP ILCE.
- As seen in the PMP ILCE, conventional multi-point injection (MPI) petrol vehicles showed results at a similar level to those of silicon carbide DPF equipped vehicles.
- GDI vehicle emissions were at least an order of magnitude higher at 1.6×10^{12} - 6.4×10^{12} particles/km. Again these are similar to results seen in the PMP ILCE.
- Conventional diesel vehicles were an order of magnitude higher again at 3.4×10^{13} - 4.7×10^{13} particles/km, consistent with PMP ILCE results for this technology.

Transmitted by the expert from
the United Kingdom

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- Where repeat testing was conducted, repeatability was similar to, or better than, that seen in the ILCE.

These results provide additional confidence in the consistency of results between different examples of the same measurement system, operated independently at different laboratories and also the comparability of 2 different measurement systems meeting PMP performance requirements.

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PMP Chairman

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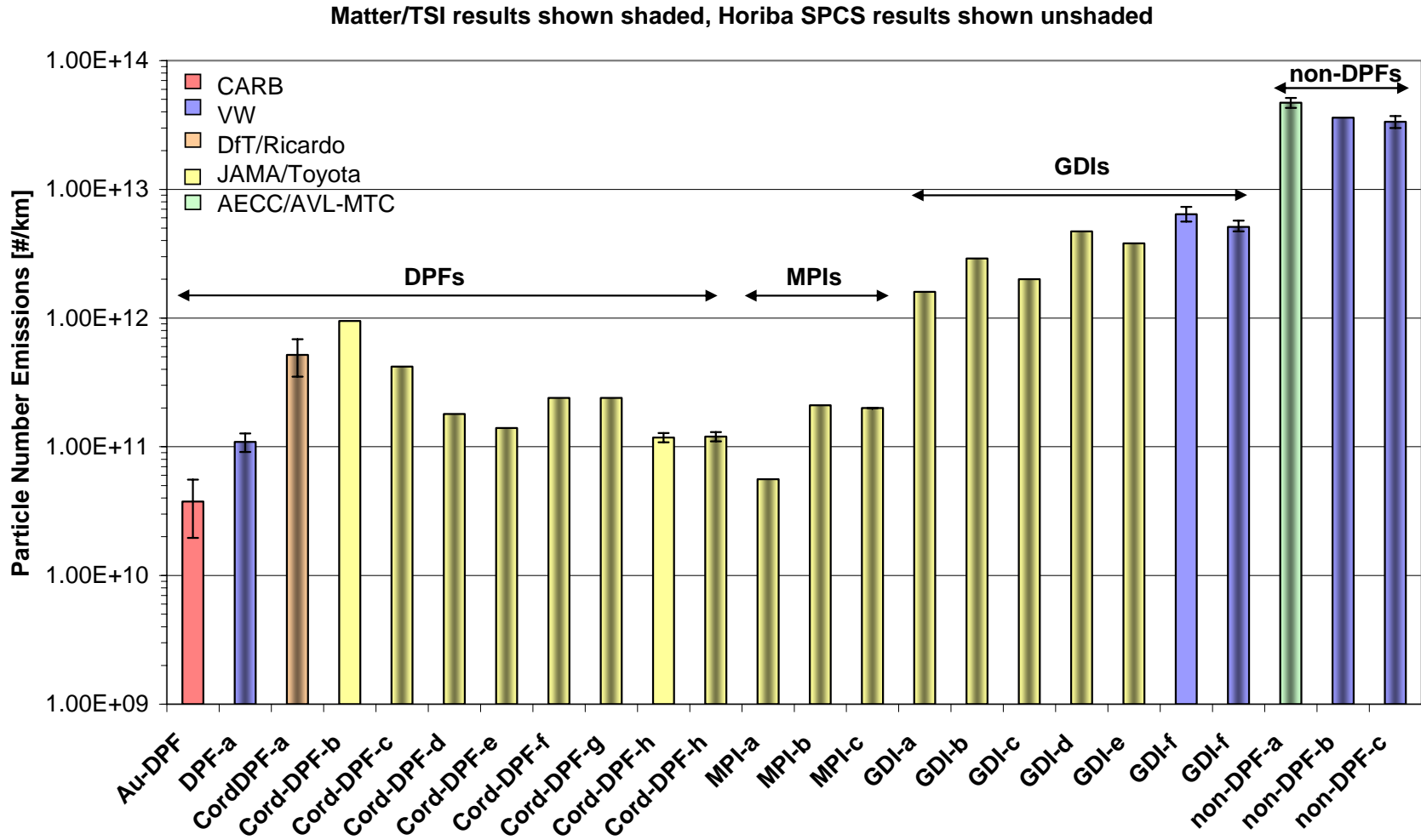


Figure 1. Particle Number Data Accumulated Outside the PMP Using PMP Compliant Measurement Equipment

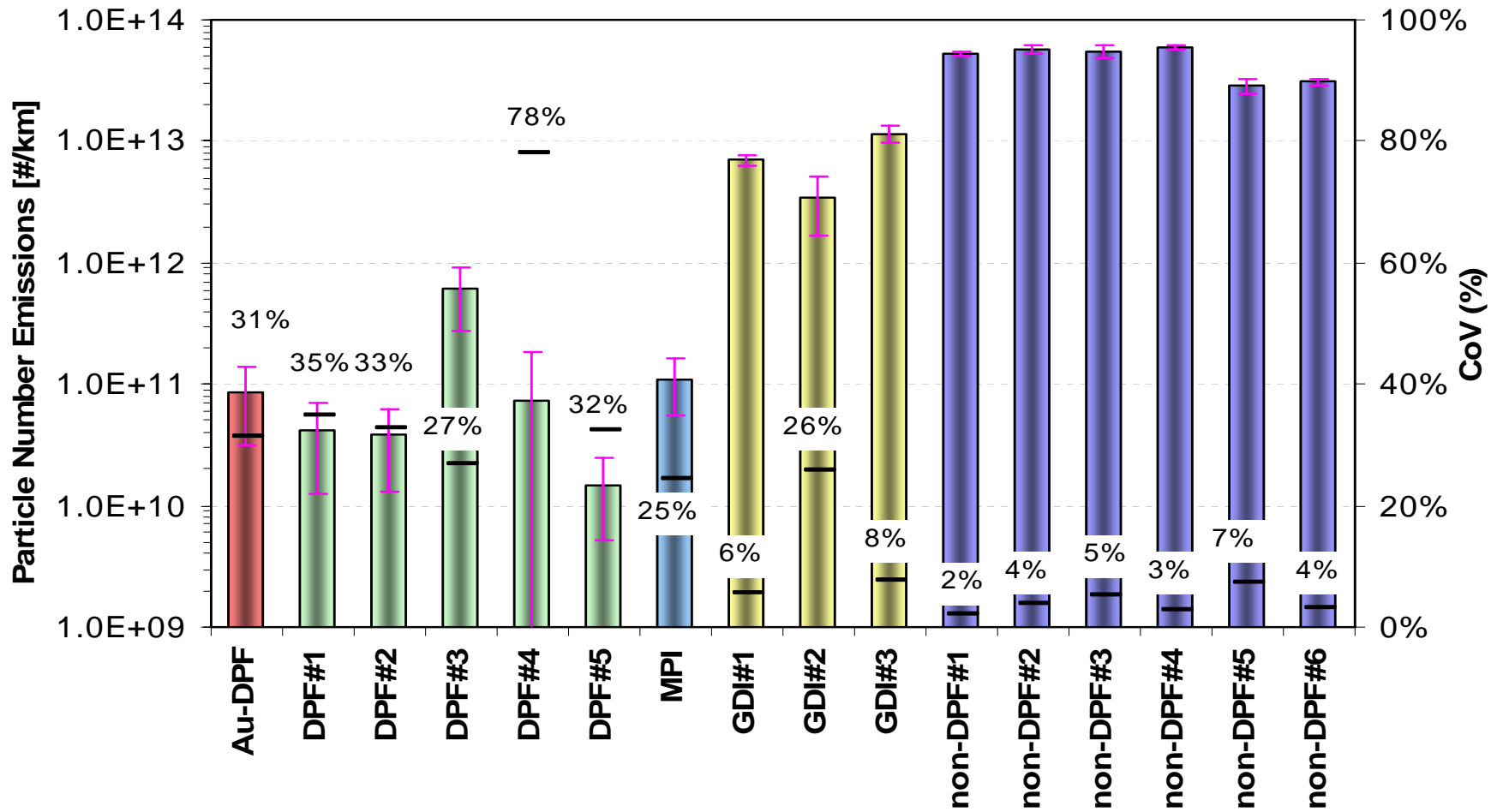


Figure 2. Particle Number Data From the PMP ILCE Using the Golden System