

Thirteenth Plenary meeting of the Working Group On Off-Cycle Emissions 5 and 6 April 2006 The Hague, Netherlands

Agenda Item 1

- A. The draft agenda was reviewed and approved by the plenary group.

Agenda Item 2

- A. The minutes of the Twelfth Plenary Meeting were reviewed.
- B. There being no other corrections or revisions to the minutes, they were adopted by the Plenary Group and will be submitted the GRPE secretary for posting.

Agenda Item 3

- A. **Presentation by TNO.** TNO made a follow-up presentation to the material presented by the representative from The Netherlands at the January plenary meeting. The presentation focused on the WNTe control area evaluation, specifically looking at the issue as to whether the proposed WNTe control area is sufficiently wide enough to represent European heavy-duty vehicle driving patterns. They looked at specific emissions from specific areas of the engine map to determine if there are areas in the engine map (outside the proposed control area) that have a significant contribution in real life operation emissions and if so, to determine how these points could be added to the proposed control area.

The first part of the presentation concluded that the 25th percentile WHTC cumulative engine speed (including idle) is close to the bend of the curve and can be some risk for some engines. A recommendation to increase to 30th percentile is considered more 'safe' and a lower limit increase is only small. TNO observed that excluding engine speeds below the WHTC cumulative engine speed of 30% excludes a high concentration of emissions from the WNTe. OICA previously took the position that a 30% calculation including idle is a good number, because the normalization formula in WHTC includes idle, so we want this GTR to be consistent with WHDC GTR.

The next part of the TNO presentation dealt with a methodology for calculating emission contribution. A larger WNTe zone could increase the amount of time included in the WNTe time-share. Some of the preliminary conclusions were that time share of engine operation in WNTe zone rather low, and emission contribution in the WNTe zone is considerably higher. Emission contribution of idle operation is comparatively low. A WNTe control zone which does not include power values below 30% can exclude a high emission contribution area, depending on the vehicle application, and finally, the NTE carve out for PM seems unnecessary. These conclusions were based on a on a limited dataset of European heavy-duty vehicle operation. Further research is needed and will be executed during a study for DG Enterprise to appraise the suitability to European engines and driving conditions of the draft WNTe control zone concept contained in the draft OCE GTR. TNO stated that it may have a preliminary report available in 3 ½ to 4 months. They will try to provide a status report at the Geneva OCE Plenary meeting in June. New data will not be collected for this study, but existing data will also be used.

The Chairperson asked about the debate between having a 25% vs. a 30% cumulative frequency and if OICA had an alternative method to look at this, because Japan came forward and said that 25% is a good number. OICA stated that the Japanese data excluded idle and if you include idle, the number is not that different.

The Chairperson asked if the three cycles the vehicles were tested over in the TNO presentation represented different types of driving, such as urban, rural etc. and if they were actual real world driving patterns or were a created statistical cycle developed from real world data? TNO stated that the cycles had been developed from multiple data sets and the cycle was developed which best represented the data sets. The cycles were developed by TNO, and they are the same cycles used in the ARTEMIS.

These may not be the best representative cycles based on the new information and there will be more opportunities to do further testing of the representative driving pattern.

The Chairperson stated that the testing was done on a EURO 3 engine and asked if TNO has any information as to whether the story will be different for a EURO 5 or for an engine with NOx emissions equivalent to one-half of the EURO 5 NOx limit? Will it be similar directionally or different? TNO said this is hard to say because there is no data using a EURO 4 or 5 engine. It would also depend on the shape of the engine map, and tailpipe emissions will be different for a EURO 5 engines. The plan is to test these engines in the upcoming study.

EMA stated that in the US, the PM carve out was necessary because the PM emission limits could not be achieved in this part of the zone, but the TNO presentation concluded that the PM carve out would not be necessary and asked for clarification of this conclusion. TNO stated that the basis for the conclusion is that in real life, emissions are higher (slide 11), but because engines do not operate very much in this area, the contribution is low, therefore concluded that it is not necessary to have this carve out. Out of a 30 second interval, you are only in the area for 1 to 2 seconds, not the whole 30 seconds.

EMA responded that this was the rationale for having the PM carve out in the US and it was developed on a technical basis. The trade-off is there because the PM limit would have to be increased in the zone if there is a significant amount of driving there. OICA responded by stating that because the GTR is a regulation for the future, DPFs will be widely used, and thus the carve out will not be needed. EMA reminded folks that the GTR is being written for a number of technologies, so there may be a need to maintain the idea of a carve out.

The Netherlands stated that in the future, the carve out may have no meaning in this GTR, and the GTR will have to be revised to take into consideration future technologies, so it may complicated the GTR now to keep this carve out for PM.

The Chairperson reminded the group that the 1998 Agreement discusses the possibility of emission limits for countries which may not be as progressive as the US, EU, and Japan, therefore we have to take this under consideration for these developing countries. Perhaps we will have to ask the broader group to determine if this group wants to limit the GTR to advance emission levels only.

- B. **Presentation by EC-JRC.** The European Commission's JRC made a presentation on the evaluation of WNTE and some alternative options. The data and calculations were based on real world driving conditions using a EURO 3 heavy-duty diesel truck. The presentation showed data from two vehicles (though the committee has data from up to nine vehicles). The data is from a EU PEMS (Portable Emissions Measurement System) project. OICA stated that 5 of the vehicles used are from 5 different manufacturers. The reference load was chosen by each manufacturer. The main purpose of this testing was to establish a protocol for evaluating Portable Emissions Measurement Systems, not necessarily to gather data from real world driving operation. JRC stated that in the US, the trucks operate in open spaces for long hauls, whereas in the EU it is mostly stop and go traffic.

In order to evaluate the in-use data collected, a homologation of the data must be established. The approach to do this was separated into three categories: "Control area" (WNTE, US-NTE); Work-based (could also be Fuel-based); and, Compliance Factor (or BSFC based).

The Control Area approach was not based on entire engine operation but rather on a "control area" that can match – to a certain extent – the control area from homologation cycles, such as US NTE and the WNTE approach contained in the current draft of the OCE GTR. Some preliminary conclusion presented, and based on the data, were that the Control Area approach was a very efficient tool to capture random operation of the engines in a definite control area. With the current definitions (US-NTE or WNTE) and a 30s minimum sampling rule, it provided a very good tool to capture the operation of "long-haul" HD vehicles, (in particular if operated with a cruise control), which is typical of the US heavy-duty long haul operation, but what about other types of operation, such a EU driving cycles and/or urban buses. The size of the "Control Area" and the associated rule could be adjusted to reflect wider regulatory needs. In the Work Window approach, brake specific emissions are calculated for a defined