

Fourth plenary meeting of the Working Group On Off-Cycle Emissions 19 May 2003, Geneva, Switzerland

Meeting Minutes

Agenda Item 1.

- A. Jane Armstrong, the Chairperson of the Off-Cycle Emissions Working Group, commenced the proceedings by reviewing the draft agenda that was circulated prior to the meeting. The Chairperson indicated that the agenda for this meeting is a continuation of the topics discussed at the Third Plenary meeting (3rd) in Geneva on 14 January, 2003.
- B. The Agenda for the Third Plenary Meeting was approved by the membership.

Agenda Item 2.

- A. The minutes of the 3rd were adopted by the membership.
- B. The Chairperson stated that the 3rd minutes had been submitted to the 46th GRPE and are marked as Informal Document No. 1.

Agenda Item 3.

- A. The representative from the European Commission provided an overview of the current status of off-cycle emission regulations in the EU. Mr. Greening indicated that nothing has changed since Directive 2001/27/EC was finalized in 2001. The Commission is looking to address operating conditions which will strengthen the current Defeat Device language.
- B. The representative from Japan indicated that no additional progress had been made. A discussion group has been established to address off-cycle issues. The Ministry of the Environment is looking to set some guidance on off-cycle for heavy-duty engines for Model Year 2005, but the work has not begun yet.
- C. The representative from Environment Canada indicated that Canada has finalized new regulations for heavy-duty engines and is in the process of proposing nonroad regulations. He further stated that Canada has adopted a policy which aligns the national regulations with those of the United States.
- D. The Chairperson, representing the US EPA, indicated that an number of engine families have already been certified to meet the more stringent 2004 emission standards for heavy duty engines, which require compliance with the transient and steady state test procedures. Furthermore, manufacturers who elect to make the NTE compliance statement with their applications for certification have been able to avoid the lengthy discussions which surround the use of AECS. Finally, a manufacturer run in-use program has been finalized, but is not yet in effect.

Agenda Item 4

- A. The Canadian delegation submitted OCE Informal Document No. 4 for consideration. This document is intended to provide clarity to the draft OCE definitions for Element of Design and AECS. The representative from Canada repeated the statement that Canada has a policy to align its national standards with those of the United States. In most instances, the Canadian regulation cites the specific sections from the Code of Federal Regulations in their text. Certain elements of the regulations are required to be clearly laid out in the regulations, among which are definitions. The definitions proposed today may not be identical in wording to the current definitions which appear in the Code of Federal Regulations, but the meaning is the same. It was decided that the suggested language proposed by the Canadian delegation be adopted. The new OCE draft definitions for Element of Design and AECS are as follows:

ELEMENT OF DESIGN

Element of design means, in respect of a vehicle or engine,

- (a) any control system, including computer software, electronic control systems and computer logic;
- (b) any control system calibrations;
- (c) the results of systems interaction; or
- (d) any hardware items.

AUXILIARY EMISSION CONTROL STRATEGY

An Auxiliary Emission Control Strategy (AECS) means any system, function, device or element of design, installed **on** an engine or on a vehicle, that senses or responds to operating variables, such as vehicle speed, engine rpm, transmission gear, temperature, intake pressure or any other parameter, for the purpose of activating, modulating, delaying, or deactivating the operation of **any part** of the emission control system.

Agenda Item 5

- A. The representative from the Engine Manufacturers Association (EMA) made a presentation which contained new definitions for the following terms: Emission Control System, Base Emission Control System, Auxiliary Emission Control Strategy and Defeat Strategy.

Emission Control System (ECS):

The Chairperson asked the question if this definition was necessary. The Chairperson stated that it is her understanding that the emission control system is not just limited to a timing map, which is generally divided in two; a base timing map which is generally active and an auxiliary timing map. The representative from the EU suggested that there might be instances, such as cold operating conditions, where the auxiliary map is generally active, not just temporarily. A representative from OICA stated that what is described as severe cold and what is described as extremely cold has to be defined, and if an engine is shipped to an extremely cold location, it will operate more than temporarily in the auxiliary map. A discussion has to take place as to what should be included in normal ambient conditions and in severe conditions.

Base Emission Control System (BECS)/Auxiliary Emission Control Strategy (AECS):

The Chairperson suggested that System be changed to Strategy to be consistent with the definitions for AECS and DS. The representative from Germany did not understand the difference between a BECS and an AECS and asked for an example of each. The member from OICA stated that there is a need to reduce the workload that is associated with the applications for certification in the United States. The current draft OCE definition for AECS does not make a distinction between a BECS and an AECS as defined by EMA. The draft definition is inappropriate because it could be interpreted to include base timing maps, which are independent of AECSs. The Chairperson asked the other regulators/approval authorities present how this distinction would impact their ability to effectively complete the task of certification. The response was minimal, but one authority indicated that there is no formal process in place. The manufacturer may be asked to run some additional test points and some informal discussion may take place. The member from OICA stated that the new European Directive clearly gives authorities the ability to request that all applied strategies be defined. The authorities indicated that when they receive information such as this, any information that is labeled business confidential is kept as such and is not shared with other approval authorities. The representative from Germany asked EMA to define what it means by "generally active" and "proportionate level of control" as illustrated in the diagram used to show how the definitions flowed in a logical manner.

In response to these questions, the Chairperson suggested that the concept of Not To Exceed avoids the problem of precisely defining these terms. If the engine manufacturer makes the statement that it complies with the Not To Exceed requirements, there is no extensive scrutiny of the BECS or the AECS. The NTE is an all temperature test coupled with caps on altitude. The belief is that it provides a

proportionate level of control across all temperatures. It is an accepted belief that the engine will always operate within the range without adjustment. The Chairperson stated that one of her colleagues at the US EPA has stated that the “beauty of the NTE is that the agency does not have to have these discussions... and that manufacturers have found a safe harbor...”

The representative from Germany stated that what he is seeing here is the concept of having fundamental definitions, which are general, and a secondary set of definitions which provide the detail, for example “proportionate level of control”, “generally active”.

Defeat Strategy (DS):

The Chairperson read the draft OCE definition of DS. The EMA proposed definition of DS shows that the concept of a BECS should be accepted.

The second bullet point of the EMA definition differs from the draft OCE definition in that it excludes the words “only temporarily and under certain reasonable conditions”. The Chairperson believes that by removing these words, the scope of the exclusion is opened too much. The Chairperson asked for some clarification on how this exclusion is used today: when would this exclusion be triggered. The member from OICA stated that in the EU Directive they do not have such a definition, whereas in the US there exists the concept of a frail engine. The working group members agreed that for the time being, the words will remain in the definition, until a justification can be provided to rationalize why they should be deleted. Today, in the US, both manufacturers and the US EPA understand what the words mean and how they are interpreted, but this may not necessarily be the case in other countries, where the regulations are interpreted any number of ways. Thus if it was decided that if the words are to remain in the definition, a definition for “temporarily” and “under certain reasonable conditions” must be defined.

The third bullet point is also slightly different than the draft OCE definition. The member from OICA stated that looking to the future, we cannot just focus on the engine, but the engine systems which will exist when this regulation is implemented. Future technologies have to be taken into consideration, for example if an SCR system is used, during the warm-up period, until the SCR is functioning properly, an exclusion may be necessary. Manufacturers do not know what strategies will have to be employed to assure that a future, unknown technology, can function as it should. A suggestion was made by the member from OICA that wherever the word engine is used in the definition, it should perhaps be changed to the word engine system, which can incorporate both the engine and any engine system.

The fourth bullet point describing the emission trade-off exception, is something which does not exist in the draft OCE definition for DS. A question was asked when such a trade-off would occur and if examples of such a trade-off could be provided. An example was given of a strategy for altitude where the PM emissions increase, a trade-off could occur with NOx emissions; the NOx emissions at altitude would be increased slightly to allow a decrease in PM emissions at altitude. The Chairperson asked how this trade-off would occur in a vehicle which is equipped with a particulate trap. The OICA member stated that manufacturers do not have much information on how this would function, but there may be conditions which exist at altitude which may prevent a particulate trap from functioning effectively. There will be a need to review the definitions as technology advances. The representative from Germany stated that this particular exclusion may not apply to other vehicle types and perhaps it should be an independently defined term. The Chairperson asked the members of OICA how their concept of the virtual engine fits into this exclusion. The response was that the virtual engine would be a fully compliant, certified engine with its own emission control strategies.

The representative from Germany suggested that the time is ideal for all of the working groups developing GTRs to work together to share definitions and to see

where the same definitions can be adopted for common terms. The Chairperson agreed that the Secretariat would communicate with the Secretariats of WWH-OBD, WHDC, WMTC to share definitions which are being considered, with a view to harmonizing the definitions for common terms.

The Chairperson stated that perhaps the working group members need more time to come to a comfort level with the concepts introduced in the EMA definitions. The working group will give further consideration to the EMA definitions at the next meeting, but EMA is asked to provide real life examples, where possible, to provide further clarity to the definitions.

Agenda Item 6

- A. A brief discussion was held on operating regions and conditions. The Chairperson repeated the three options we could consider for setting operating regions and conditions (please see the minutes of the 3rd plenary meeting).

The member from OICA stated that it is not possible to design an engine which will meet all conditions, even if it was technologically feasible, it does not make sense to do so because the vehicle would be very costly and certain markets will have engines with technology to meet conditions which will never be encountered. OICA made a presentation on the concept of block operating conditions, which was first introduced at the 2nd Plenary meeting. This concept is based on a limited number of temperature and altitude conditions that would apply to engines used in vehicles in different parts of the world; the thresholds to be met would be dependent on where the vehicle was being registered. For example, Australia would have to comply with Basic, plus High Temp.; the Canadian Rockies would have to comply with Basic, plus High Altitude; Northern Canada would have to comply with Basic, plus Cold Temp. Engines would be additionally modified to meet the climactic and/or geographic conditions for the specific region the vehicle would be registered in.

The Chairperson stated that the conditions set today in the US regulations and even in Europe are artificial. The altitude of 5500' was set in the US because there are not very many cities at levels higher than this. If the US regulates something as Basic, why should this working group consider it Severe?

Furthermore the question came up as to how can engine manufacturers know where an engine will end up being in service and if it meets the appropriate conditions. Today, different approaches are used for different markets, with appropriate tradeoffs being made to ensure good engine life, proper cooling packages installed to protect the engine and protect against an increase in emissions.

The Chairperson used Mexico as an example, that because of its climactic and geographic conditions, engines would be required to meet the most stringent requirements, thus resulting in a more expensive engine that they could least afford. If the concept of NTE existed, as well as an In-Use program, this would allow the manufacturer to show that they did the best they could from a technological standpoint and a cost standpoint.

A comment was made that perhaps just the operating conditions can be harmonized, rather than attempting to harmonize engine standards for operating conditions.

Finally a request was made by Germany to OICA to provide a color coded map of the world showing where they believe the different block concepts will apply, to better understand the concept.

OICA agreed to prepare some materials describing how there is a level of reasonably available technology which can help define basic operating conditions.

Additional Items

The next plenary meeting of the Off-Cycle Working Group will be on a date to be announced. A draft agenda and any working and informal documents will be circulated to the membership prior to the meeting.

Dated this 22th day of May, 2003

Joanna Vardas, Secretariat