

**Minutes of the 1<sup>st</sup> meeting of the Off-Cycle Emissions Work Group  
Ann Arbor, Michigan December 3, 2001**

**Chair:** Jane Armstrong, U.S. Environmental Protection Agency

**Attachments:**

Agenda (wpd)  
U.S. EPA's Not-to-Exceed Program for Heavy-Duty Engines (ppt)  
European veh./km/temperature/altitude distribution (draft) (pdf)  
Off Cycle Emissions - Current Status in Japan (ppt)  
Heavy-Duty Diesel NO<sub>x</sub> Screening Test Development Project - California (pdf)  
Attendees (wpd)

**Discussion:**

1. The meeting began with a welcome from the Deputy Director of EPA's Office of Transportation and Air Quality, introductions of those present, and a statement from the Chairman of the Worldwide Heavy Duty Certification (WHDC) work group. The statement was read by the chair, Ms. Armstrong, since Dr. Havenith was unable to attend.

2. Bill Charmley from U.S. EPA made a presentation on EPA's experience in developing the not-to-exceed (NTE) concept as a compliance test for off-cycle emissions. His presentation addressed the need to control off-cycle emissions, EPA's historical reliance on defeat device policies, and its recent design of the NTE. The NTE includes several key concepts:

- \$ defined engine operating region
- \$ defined ambient operating conditions (temperature and altitude)
- \$ defined in-use operating conditions, and
- \$ specific numerical limits

EPA's regulations require control to 38 degrees Celsius at sea-level and 30 degrees Celsius at 1676 meters. Rick Gezelle of EPA reported on experience to date in applying the concepts in certification.

3. Lars Gustavsson representing OICA presented information collected in Europe about the distribution of vehicle-kilometers by temperature and altitude, showing that the vast majority of driving occurs at altitudes below 800 meters and temperatures below 30 degrees Celsius. This presentation triggered a discussion of the need for control at higher altitudes and temperatures. Bill Charmley and Stefan Rodt from UBA Germany suggested that it was equally important to consider where human populations were exposed to vehicle pollution. Mr. Gustavsson suggested that the group think about categorizing normal versus severe versus extreme operating conditions.

4. Bob Jorgenson from Cummins related some information from experiences derived in testing of older technology trucks in Mexico City, which is 2240 meters above sea level. The increase in emissions with increasing altitude was mitigated by the introduction of newer engine technology. Bill Charmley stated that more recent data suggest that trap-equipped vehicles may show no significant increase in particulate matter (PM) at altitude and temperature extremes.

5. Paul Greening (European Commission - DG Enterprise) described Europe's approach to off-cycle emissions, which requires testing on both steady-

state and transient cycles with some allowance for engine damage protection and smoke management above 1000 meters and 30 degrees Celsius.

6. Mr. Narusawa from the Japan's National Traffic Safety and Environment Laboratory presented a current status of off-cycle emissions in Japan. Japan's regulations require that the emissions control system function reliably while the engine is in operation and that there must be no auxiliary system that will cause marked deterioration of the function of the emission control system. An Engine Design Rules Study Committee supported by the Ministry of Environment was established in June 2001. This committee will study the definition of Auxiliary Emission Control Devices (AECD's), establishment of temperature, elevation, and load ranges that may be used for adjustment of emission reduction requirements, and test methods and numerical values.

7. The off-cycle work group agreed that it would be useful to collect available data and develop a common view to address AECD's, defeat devices, and ambient conditions when building a global regulation.

8. Andrew Reading of Sensors, Inc., a manufacturer of emission measurement equipment, made a presentation on Sensors' approach to on-road, in-use diesel emission measurement. The presentation was followed by an opportunity for meeting participants to observe the system in operation on an Ann Arbor Transit Authority bus.

9. Mridul Gautam of West Virginia University, Carl Fulper, and Rick Gezelle of EPA discussed their experiences with in-use measurement of emissions from heavy-duty vehicles. There are various measurement instruments, which may be considered for in-use purposes. Both the tapering element oscillating microbalance (TEOM) and the quartz-crystal microbalance were discussed for particulate measurement. EPA issued a solicitation for a Cooperative Research and Development Agreement (CRADA) in June to identify a firm or firms to take the current concepts further toward potential commercial development.

10. John Urkov from the California Air Resources Board (CARB) explained the work that California is doing to develop a chassis test for NO<sub>x</sub> from heavy duty vehicles. California has begun a test program which will do baseline testing, conduct repairs, and retest 100 heavy duty trucks that exceed cut points for NO<sub>x</sub>.

11. Representatives from the U.S., Europe, and Japan agreed that the ultimate goal was to have an in-use measurement approach which addresses off-cycle emissions.

12. Finally, the group discussed what should be the next steps. It was proposed that a precise mandate be sought from GRPE and WP.29 to pursue the development of a global regulatory structure for addressing off-cycle emissions. More specifically, the group will propose a draft charter for the work at the January meeting of GRPE. The Chair will request some time for a meeting without interpretation at the Palais in the morning of Tuesday, January 15, 2002.

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