Draft Report of

1st Meeting of the Informal Working Group

on

Quiet Road Transport Vehicles for a Global Technical Regulation

July 18th - 20th 2012,

held at the NHTSA Head Quarters, Washington D.C.

1. Welcome and opening remarks by the Chairman

Christopher Bonanti, Associate Administrator for Rulemaking at the United States National Highway Traffic Safety Administration, welcomed the participants and expressed his pleasure in seeing the high interest and active participation in this first meeting of the informal working group for the development of a GTR on Quiet Road transport vehicles. He informed the group that the anticipated United States NPRM for quieter vehicles was not yet published and could therefore not be discussed at this meeting. However a presentation on the scientific NHTSA work performed would be delivered during the meeting. He pointed out that the intent of the group should be to develop a GTR that is data driven, performance based and repeatable.

2. Introduction of participants and organizations

Canada, EU Commission, Spain, Japan, Korea, France, Germany, Brigade Electronics, Nissan NA, American Honda Motor, OICA, Globalautomakers, Daimler AG, Denso International, Alliance of Automakers, JASIC, JAMA, Nagasaki University, Ford Motor Company, Toyota NA, German Fed. of the Blind, Volvo, Harley Davidson, NFB, MEMA, GM, ISO, Hyundai-Kia NA, NHTSA, DKA, BMW NA, NHTSA's VOLPE Centre (via audio)

3. Adoption of the agenda

4 Review of Terms of Reference approved at the 157th Session of the WP.29 and latest developments on WP29/AC3 level. (ECE/TRANS/WP.29/2012/60)

Mr. Ezana Wondimneh, the Chairman of the QRTV informal working group presented the final Terms of Reference for the group including the latest updates as agreed during 157th session of WP29 in June 2012. He also presented excerpts (GTRQRTV 01-07e) of discussions from the March and June sessions of WP.29 related to the development of the GTR for QRTV. The ToR contain provisions for a 2-step approach concerning the scope of vehicles that would

be covered by the GTR. In the initial step, the scope of the GTR will be restricted to EVs and HEVs; the second step will evaluate the need to add ICE vehicles. He particularly pointed to section II, paragraph 4 that explicitly defines the tasks of the working group. These tasks foresee a finalisation of the work by end of 2014, with intermediate status reports to be given to GRB and W.P29 at various stages of the development of the GTR. The GTR will take into account views and input from other W.P29 working groups, i.e. GRSP, GRRF and GRSG because the GTR will need to consider acoustic as well as safety policy issues.

The distribution of documents to participants of the IWG meetings was discussed. The group agreed that documents will be actively distributed by email to the core participants (still to be identified) only. Non-core participants would be able to access these documents at their discretion from the UNECE website, which will be kept up to date. These measures were decided to avoid the unnecessary mailings to a "mass list" of persons that may only occasionally attend the meetings. In addition to the core and non-core groups of participants, acoustics experts and other relevant guests may be invited to individual sessions as necessary.

5. Review of the official report (GTRQRTV-01-06e) of the original QRTV Informal Working Group.

The Chairman pointed out the need to develop definitions for the various propulsion types that may be covered by the GTR. Considerations include the ability to make meaningful distinctions between various operating modes. These definitions will also be taken into account during the development of the US legislation on quiet vehicles. The definitions that will be developed are likely to become out-dated such that there may be a need to revisit the issue throughout the development of the GTR and beyond. As a first step, the chairman encouraged all participants to attentively read the definitions proposed in the final report from the original QRTV IWG and prepare comments and input for the next meeting of this group.

The findings from this working group may well influence the final outcome of the US national law on quiet vehicles which will be finalised not earlier then late 2013/early 2014. The Chairman noted that NHTSA is open to comments from any stakeholder even after the official comment period on the U.S. NPRM (which will be for a 60 or 90 day period following its publication). This is fortunate since it will almost certainly not be possible for the IWG to comment on the NPRM within the given period because of the requirement for the IWG to route its comments through both the GRB and WP.29/AC.3. The Chairman indicated that the group should strive to develop a GTR that is globally applicable and that shall contain sufficient flexibility for any member state that has signed the 1998 Global Agreement to transpose the GTR into national law. The GTR requirements should be harmonized to the highest extent possible, while offering ways to accommodate necessary national differences.

6. Report from NHTSA

6.1 Overview of the U.S. NPRM on QRTV

The NPRM was not yet published and therefore its presentation and subsequent discussion was postponed to a future meeting.

6.2 Overview of current U.S. testing

NHTSA (supported by its VOLPE Centre staff via Audio) presented an overview of its recently published research report on the development of sound specifications for EVs and HEVs (GTRQRTV-01-10e). The findings may be reflected in the NPRM.

It revealed that a wide spectrum of 1/3 octave bands must be considered when creating an artificial sound that is qualified to make quiet vehicles acoustically recognisable in urban traffic, ranging from 315 Hz centre frequency at the lower end up to 5000 Hz. In order to determine the necessary sound pressure levels of the individual 1/3 octave bands, a background noise level of 55 dB(A) is assumed. A rational for the magnitude of the background level could not be given at this time and NHTSA referred to a time after the publication of the NPRM. **ISO** questioned if it was possible to exclude some of the 1/3 octave band in the case that other bands had a higher level. **NHTSA** stated that this might be possible but due to a lack of statistical robustness, such an approach could currently not be confirmed. **Volpe** mentioned at several occasions that more data from industry would be highly appreciated as the available test results may not be sufficiently informative to work out adequate proposals for acoustical requirements. Results considered so far are based on data received from OICA in 2011, where industry was asked to deliver whatever data was available. This was delivered in an unstructured manner so that the data is somewhat unfocussed on specific results. Seen the weak robustness of the elaborated results, VOLPE signalled flexibility in terms 1/3 octave bands and their individual sound pressure levels.

OICA requested justification for the requirement of frequency content below 400Hz.**VOLPE** stated that is necessary in order to let the vehicle sound as an ICE. **OICA** raised concerns of annoying perceptibility inside the vehicle, as this effect becomes more and more significant with the decrease of frequencies . Technically it is increasingly difficult if not impossible to attenuate frequencies below 400Hz emitted by a speaker being installed in a vehicle. Sounds below this frequency will transmit into the vehicle. Effectively this risks leading to serious customer complaints up to the rejection of technology. **VOLPE** was not aware of this concern but is willing to investigate. However, measurement data is necessary and Industry is asked to support.

OICA also pointed out the possibility of a single speaker system not being the adequate technology to produce the proposed sound pressure levels of a frequency range as large as currently under investigation. This may require more sophisticated

systems, such as a combined system consisting of one piezoelectric element and a conventional speaker, with adverse consequences of increased costs, difficulties in packaging due a higher installation space as well as a negative weight impact.

OICA also mentioned that data is taken from many different vehicles and questioned if all of them are qualified to contribute to the determination of a typical ICE sound characteristic. If frequency content from both loud and decent vehicles is averaged with 4-/6- and 8 cylinder engines, the result is not necessarily representative for ICE vehicles.

7. Reports from other governments and organizations

7.1 Presentation '*Effects of Age on Feasible Sound Level of AVAS*' (GTRQRTV-01-05e)

by **Dr. Katsuya Yamauchi**, Faculty of Engineering, Nagasaki University

Dr. Yamauchi presented the results of a study that was intended to determine the typical effect of increasing age on the ability of perception of acoustical information. For this purpose, probands of age between 20 and 70 were invited to detect

a) Adequate Level (clearly audible and can be reliably detected)

b) Minimum Level (just audible)

from 5 different sounds in 3 different (but typical) ambient noises. The sounds are composed according to the requirements from the UNECE guideline as laid down on R.E.3 (GTRQRTV-01-08e)

The analyses of test data revealed the following:

- The adequate level of older subjects does not differ from other age groups
- The minimum level of older subjects was higher than of younger ones
- The adequate level of young subjects was slightly higher (use of headphone audio?)
- Quieter environment (less than 50 dB?) possibly requires a higher level than the environmental noise level
- One of the sounds is clearly more difficult to detect than the others

7.2 Presentation '*CARS 21– A strategic vision towards increased internationalisation in the automotive sector'* by the European Commission (GTRQRTV-01-12e)

by **Dr. Nickolas Kakizis**, European Commission

The representative from the **European Commission (COM)** in detail explained the background and motivation of the so called CARS21 (*Competitive Automotive Regulatory System for the 21st Century*) initiative and its impact on European competiveness and international legislation.

It was pointed out that the problem of vehicle noise emissions is a complex issue with many parameters and diverse factors involved. In terms of perceptibility of quiet vehicles he explained that the COM aims at creating a technology neutral legislation which however may also result in the installation of a sound generating device. At the same time he pointed out the importance of not mandating the fitment of such a device. In contrast the decision to fit AVAS to a vehicle shall remain optional for the vehicle manufacturer. He also stressed that technology evolves and that other means of communication between vehicle and pedestrian may require further assessment at a later stage.

The representative from **Germany** particularly supported the EC's request not to mandate the fitment of a sound generating device but to keep it optional. The C**hairman** pointed out that the starting point for the development of the GTR shall be threefold: the NPRM, the Annex 2 of the Consolidated Resolution on the Construction of Vehicles (R.E.3) and the official report (see item 5). COM expects the QRTV-GTR to exhibit the necessary flexibility, based on the potential developments in technology or proposals made by interested stakeholders. Its proposal is not in contradiction to either the development of a 'device-related GTR', regulating the requirements of a device to be fitted, or to a 'vehicle-GTR' regulating the behaviour of a vehicle as a whole notwithstanding its technical realisation. Germany proposed the development of a qualification test which would allow vehicles from the scope to be excluded from the requirements in the case they emit sufficient sound without additional measures.

8. Review of minimum sound test method

Doug Moore (ISO) gave a detailed report about the latest changes in terms of the development of the ISO test procedure on the 'Acoustics - measurement of minimum noise emitted by road vehicles' (GTRQRTV-01-09e). He made clear that so far the procedure was developed taking into account vehicles of categories M and N only. However L-vehicles are not covered. He proposed that the specification from paragraph 7.1.6.2 '*requirements to measure the minimum vehicle noise emission without external sound generating systems of any kind*' could be used for the before mentioned qualification test.

9. Presentation of Japanese concept for the development of the GTR for QRTV (GTRQRTV-01-13e)

by **Dr. Ichiro Sakamoto**, deputy Director of National Traffic Safety and Environment Laboratory

Dr. Sakamoto presented the Japanese outline for a concept for the development of the GTR. In contrast to the US, Japan intents to base the GTR on the R.E.3, the recommendations from the report (see item 5) and the principles of the 1998 Global Agreement. He stressed the importance that the Regulation should be quantifiable and not abstract and that the sound level shall be sufficient but not excessive. This concept was explicitly supported by the European Commission, Germany, France and OICA. The US questioned that concept as it contradicts with the anticipated US legislation in terms of a mandatory on/off switch and sound emitted at idle. **Germany** again mentioned the possibility of including options in the GTR, allowing individual member states to apply the GTR as nationally required.

10. Next steps for the Informal Working Group

The next meeting of the IWG is planned to be held in December 2012 in Germany. Details will be posted in the IWG section of the UN website.