MINUTES

3rd MEETING

WORKGROUP ON QUIET ROAD TRANSPORT VEHICLES

13, 14 and 15 July 2010

Tokyo, Japan

13 July Meeting location: Megaweb

1.0 Welcome and Opening remarks by Kenneth Feith, Chairman, QRTV Workgroup

Objective of QRTV: First, review and assess the research activities that are underway throughout the world. Second, determine role, if any, of the international community (WP-29) in the development of acoustic warning devices for electric vehicles and hybrid electric vehicles. Third, identify to WP-29 those acoustic alerting systems that may be candidates for a global harmonized technical regulation.

1.1 Welcome and Opening Remarks by Mr. Shima, Director, Engineering Planning Division, Ministry of Land, Infrastructure, Transportation and Tourism (MLIT)

The agenda for the first day of presentations and vehicle demonstrations was presented by Mr. Yoshihiro Shirahashi, JASIC / Nissan Motor Co.

1.2 Introduction of Participants

(list attached – please note that JAMA participants were only present for the 13 July meeting)

2.0 Adoption of Agenda – adopted with the proposed July 13 revisions presented by JASIC.

3.0 Review of Japanese Guideline and Detailed Explanation

3.1 **Japanese Activities on AVAS for HEVs and EVs**, (Concept of the Japanese Guideline Developed by Study Committee)

Presented by **Professor Minoru Kamata**, Institute of Gerontology, University of Tokyo, Chairman of Study Committee

Please see document QRTV 03-02

Essential points:

1. Background information concerning quiet road transport vehicles:

Resent progress has been made in the development of environmentally clean vehicles; EV's and HEVs are due to concerns for global warming and environment; sales have increased - 2009 sales increased almost 1,000,000 in Japan. Around 2005 the issue of quiet vehicle started to be investigated; in 2007 investigation was conducted by MLIT and JAMA of the following:

- Current situation of EVs / HEV's and pedestrians
- Development of vehicles equipped with approach audible alert system
- Testing on perception of EVs
- Testing on acceptability of audible system-equipped vehicles
- Evaluation of respondents to survey of audible system equipped test vehicles

2. Details concerning the dedicated Study Committee (under MLIT)

"Does sound need to be added to vehicles that have been made quiet? We may not need any measure if drivers pay more attention to pedestrians; visually impaired pedestrians audibility recognizes the presence and behavior of vehicles. The vehicle sounds play an important role as a tool of communication. With the diversity of drivers and human errors being considered, it is not realistic to expect drivers alone to do something about this situation. Conclusion: There needs to be audible measures."

In 2008 Toyota took over investigation to study perceptibility, and at that time, the delectability by the driver was an issue. This led to the following:

- 2009 study committee meeting held at MILT
- Members of committee includes members from several sectors: Academia, private and government organizations

Points of study: Possibility of non-audible measures: how about building a system where vehicle and pedestrians can check each other's location using communication technology?

Committee discussed: determined that it (sound) needs to be easily noticeable even by elderly. The system needs to allow pedestrians to recognize presence/behavior of vehicles naturally and easily even without prior knowledge. Determination was made that engine sound was not acceptable.

Conclusion: A sound that reminds us of running vehicles.

Committee discussed: In manual mode, the driver must make sure the sound is turned on when necessary. If the soft horn or other short single sounds are used, pedestrians cannot grasp the behavior of vehicles.

Conclusion: Continuous sound option was selected. Basically, the sound will be kept on permanently. A temporary stop switch will be allowed, but the system must automatically resume the sound when vehicle is restarted.

Committee discussed: The equipment needs to be mandatory to ensure its widespread use. However, mandatory equipment on in-use vehicles is difficult due to many technical and economic issues.

Conclusion: Mandatory on new vehicles. They debated on what should be included on existing car

The Committee reviewed many different studies that have taken place in the past. The results of studies from 3 years placed safety of visually impaired as highest priority. However, the problem is not just visually impaired, it's for all pedestrians. The Committee determined that just adding a sound to the quiet vehicle is not the ultimate solution. Measurement is not ultimate solution - adding a sound. Safety relies on drivers but hope study will increase awareness on traffic safety.

Conclusion: The Committee decided to employ sound system until vehicle reaches 20 km/h. After 20 km/h the noise level of HEVs and EVs become almost the same as ICE's. Under current guidelines we are not looking at sound while in stop position. There is no requirement in the stopped position. The federation of blind asked for that, but the study committee didn't decided that way.

The initial proposal was adopted as final recommendation to MLIT.

3. Publication of the Study.

The hearing process generated 408 comments

<u>Questions and Answers:</u>

Question: should voluntary switch include a timer?

Answer: Committee decided to employ sound system until vehicle reaches 20 km/h. After 20 km/h or higher the noise level of HEVs and EVs become almost the same as ICE's. Under current guidelines we are not looking at sound while in

stop position. Sound only initialize when car starts moving. The switch and sound generation at idle - the committee has not reached a decision.

Mr. John Pare: I urge you to consider sound at idle for blind. There is a lot of information that is used to determine how to travel safely. Why was this decision made?

Answer: We also received similar request the sound at idle was necessary from blind. On the other hand, there was a strong opposition from public as well. After discussion, we concluded only emitting the sound when tyre starts moving.

Mr. John Pare: What reference was used to determine how loud vehicle should be?

Answer: 3 yrs ago carried out experiment to compare different sound levels.

Mr. Wolfgang Schneider: for clarification, was the conclusion an obligation to introduce generation of sound but government decided on guidelines, is that correct?

Answer: yes, this is still a guideline. The regulation, making provisions mandatory, is not decided yet. It is first a guideline.

Question: did the Study Committee assess the information needed by the visually impaired persons and pedestrian during turns at the intersections and during acceleration phases?

Answer: yes, the Study Committee did it and recommends to use a change of frequency or pitch.

3.2 Detailed Review: “Guidelines for Measure Against Quietness Problem of HVs”

Presented by **Mr. Takeshi Korenori**, Deputy Director, Ministry of Land, Infrastructure, Transportation and Tourism (MLIT)

Please see document: QRTV 03-01

"The quietness of these vehicles owing to their structure could cause accidents, such as hitting pedestrians (especially blind or visually handicapped) who are not aware of their approach; Large sound difference at low speed; Sound levels became the same over 20 km/h; Louder background noise the harder it is to detect vehicle for blind pedestrians; The noise level difference become smaller as the vehicle speed exceeds 20 km/h."

Questions and Answers:

Mr. Douglas Moore: In changing sound volume and frequency, are there guidelines for stationary and 20 km/h?

Answer: We have not decided on how much.

Ms. Catrice Jefferson: Was the 5 seconds (decision time) determined in a controlled environment or real world setting?

Answer: Experiment in controlled environment (test course); will consider the sound emission while car is moving in low speed lane. The car was coming from side street to crossing.

Mr. Serge Ficheux: Did you consider different noise when vehicle is going forward and backward?

Answer: The guidelines say both when car is moving forward and backward but not referring to different type of sounds.

Mr. Serge Ficheux: The use of a pause switch seems to make sense but might be in contradiction with other regulation, maybe UN/ECE Regulation 28. Therefore this matter needs to be taken into consideration and maybe some regulations should be slightly revised to make sure that no contradiction between the deferent regulations exist due to the introduction of Audible Vehicle Alert System (AVAS).

Question: What is the time for detection vs. breaking distance – how is this determined (breaking from when vehicle reach 20 km/h?) Together, the duration from when driver realizes the need to stop until time of break (foot on break) until 0 km/h. Depending on type of vehicle there is a certain momentum, so I am having difficulty reconciling distance to detection to point driver applies foot to break. At high speed the driver can be closer to the pedestrian.

With respect to 5 second rule – persons who are elderly can't process information as rapidly as younger person and time for decision is critical. Electric vehicle has high torque that may be heard on startup but in stationary mode can't detect?

Answer: This is area that there were many comments and much discussion in committee. The majority of opinion is visually impaired notices highest danger when car started moving so we have discussed that if we can produce start up sounds this may alleviate problem. Slide number 5 shows the details of the

Japanese assessment of the safety and braking distance. This is how conclusion was reached.

Statement: suggest that further consideration be given to this area.

Mr. Christian Theis: Did you discuss strategy in short and long-term solutions other than noise?

Answer: At this moment, we considered use of communication strategy for the future. However, because of present technological level it's not viable. If certain technological evolutions are available, other solutions than sound based solutions would be assessed and probably adopted. The use of sound by the Guideline is short term strategy (1 – 2 years ahead).

Mr. Christian Theis: Focus is on the handicapped pedestrian and sound provide help, do you think focus will remain on sound because sound is not necessary in safety but for orientation of blind person on the road?

Answer: We believe sound is not effective for all. Also, we understand that just by adding sound will not ensure safety. We believe the ultimate responsibly to ensure safety belong to driver. For long term solution we may be able to consider communication technology to control speed, for example. We need to have further verification so this may take some time.

Mr. John Paré: To better understand the 5 second time is that the amount of time for driver to stop from 20 km/h – does this correspond to having enough time to determine sound?

Answer: The 5 second rule is not supported by scientific evidence but thought tentatively for visually impaired to detect movement of car.

Mr. Paré: Does this mean you should be able to hear car when it's 5 seconds away?

Answer: Yes, that's how the 5 seconds have to be interpreted.

Mr. Moore: Your presentation mentioned you are still working on testing procedure for confirmation and harmonize with ISO and vehicle testing procedures.

Answer: Yes

Statement: Expressed disagreement concerning the expressed fear that drivers speed up to avoid the burden caused by AVAS in the car: There is concern a person will increase speed to avoid system from turning on. If a vehicle is

coming to interception it's counter intuitive that one would speed up so this is not legitimate for justification for turning off system.

Question: In terms of sound, did you consider impulsive sound instead of stable sound?

Answer: We didn't have enough time while formulating guidelines on sound characteristics. The only expression used is type of sound that reminds people of motor vehicle that is running. Next issue will be to come up with detail definition of sound characteristics.

Chairman The mandate of workgroup is to look at all vehicles, not just cars. This includes buses, trucks, motorcycles, trolleys. Near term we are looking at electric cars but there are a plethora of quiet motorcycles that we will see on the road soon so the problem goes beyond cars.

3.3. Publication of the Japanese Guideline.

Published in January, 2010 as guidance forvehicle manufacturers.

3.4 "Ideal Sound for AVAS" -

Presented by **Mr. Kenji Iwamoto**, Yamaha Corporation

Please see document QRTV 03-04

"Presentation is supplemental to previous two presentations but includes psychoacoustics. Yamaha was established in 1897. Music instruments are not only part of business, we do semi-conductor, PA equipment and acoustic consulting."

"Ideal sound for AVAS as of January 29 is summarized by three words: sound associating vehicles, acceptance, and perception. Perception sounds can be annoying. Immune to frequency means when you hear sound many times and in repetition you will not be tired of hearing it. It is hard to meet two requirements, recognizable and comfortable, at same time. Sound content have to take into consideration aging and hearing loss. The sound up to 1 kHz is preferable for the elderly. However, the frequency needs to be determined taking into account other factors (such as human ear characteristic that high frequency sound (3 - 5kHz) is more noticeable) as well. Due to psychoacoustics the human ears tends to be sensitive to sound variation and fluctuation. The sound of fluctuation is noticeable even when background noise is present."

Key points:

The ideal sound should address the following things:

1. association sound – vehicle
2. acceptance
3. perception

To address all these concerns, the use of advance psychoacoustic knowledge is necessary.

Questions and Answers

Chairman: Have you carried out additional work in synthesizing various combinations of sounds and running past focus group in presence of high ambient noise?

Answer: Yes. During our experience we selected representative sounds to verify different affects.

Chairman: I'm please that you've identified problem of hearing degradation by aging. Have you carried out studies between people with normal hearing and elderly population? Is the detection different than others?

Answer: We have not conducted with cars but have for televisions.

Mr. Moore: For frequency range, how low does sound need to cover?

Answer: We have not looked into this area for specific values.

Mr. Moore: In fluctuation do you have information on how acceptable this sound is to driver?

Answer: We know at this stage that slower fluctuation would be preferred.

Mr. Guichard: Is the graph on slides 12 and 13 showing an example of fluctuation in amplitude and frequency?

Answer: yes, both were applied.

Chairman: Have you developed recommendations for clients to what is presently believed to be acceptable acoustic systems that can be used on vehicles that convey information for pedestrians to make decisions?

Answer: We are going to support but it will be what automobile company will have to do from this point on.

Chairman: Auto manufactures do not focus on building acoustic signals. What do you recommend to client, what acoustic system should be?

Answer: Yes, we are making recommendations to many auto companies in terms of what ideal system should be.

3.5 Presentations by Nissan, Mitsubishi and Toyota

These powerpoint presentations are available only to members of the QRTV Workgroup - they are classified as company confidential and are not for public release. Please contact the QRTV Secretariat to request a copy.

3.5.1 "Development of AVAS for Nissan"

Presented by **Mr. Toshiyuki Tabata**, Nissan Motor Corporation

"Nissan received a letter from blind association in Japan, so Nissan conducted research in this area." Mr Tabata explained to the group the current state of development and current conclusions of Nissan.

3.5.2 "AVAS for Toyota

Presented by **Mr. Yoshiaki Matsuo**, Toyota

"Organizations for visually impaired have expressed concerns to Toyota, so organization decided to investigation subject." Mr Matsuo explained to the group the current state of development and current conclusions of Toyota.

3.5.3 "Approach Vehicle Audible System (AVAS)" – Proto for i-MiEV

Presented by **Mr. Hiroyuki Asada**, Mitsubishi Motors Corporation. Mr Asada explained to the group the current state of development and current conclusions of Mitsubishi.

3.6 Vehicle Demonstrations

Report from Jasic will follow

3.7 Discussion of Demonstrations and Summary of Japanese Guideline

Mr Theiss: Proposed to take over the guideline in the ECE R51 as a first step.

Mr. Paré: The definition of the reference vehicle is difficult. U.S. NHTSA is proposing to specify how a sound shall be (absolute) instead of specifying a sound level in comparison to an ICE equivalent vehicle.

Mr. Schneider: Some tests conditions at very low speed were misleading. With higher acceleration, the AVAS demo was very convincing.

Mr. Paré: stated U.S. NHTSA considers also conditions at very low speeds

Mitsubishi: Repeated the need to compromise between environment, safety and burden caused by such a system.

Chairman: The exposure times are very short. So it's not a big issue if a sound is a bit disturbing and a bit higher.

Mr. Ficheux: Expressed the opinion that the Japanese Guideline is a good basis for ECE R 51

Chairman: Expressed opposition to that and asked Mr. Paré how he assessed the efficiency of the AVAS systems e.g. deceleration:

Mr. Paré: he could not hear them

Mr. Guichard: Was one of the vehicles equipped with the Yamaha solution?

Answer: yes

14 July – 09:30

Chairman asked the group to report about comments concerning the past day and the demonstrations organized by Japan.

Mr. Moore: Expressed his surprise at how low the sound levels of the cars were in an ambient noise environment at low speed. Mr. Moore also expressed surprise at the influence of the pitch of the sound in the detection of the vehicles. Mr. Moore asked the Japanese colleagues whether the measurements during the demonstration could be shared so that they might be compared with those of the ISO.

Mr. Moore: U.S. NHTSA is carrying out similar experiment as demonstration of yesterday – some of the ambient sounds are similar and they may have difficulty picking up anything. At higher speeds vehicles were able to be detected. Pitch shifting was easily identified.

Mr. Guichard: Asked if the background noise and its spectrum was representative of urban and commercial zones.

Mr. Shirahashi: Yes. Japanese ran tests in three different areas and measured background sounds. Heavy & medium traffic areas and there was no change in peak sound pressure level. Spectral content is the same no matter what community the measurement took place.

Chairman: Nissan's presentation was impressive. Most important part was human factor analysis of frequency characteristics and identified most sensitive frequencies of human hearing - approximately 600 and 2500 Hz, which are extremely important. Personal opinion is we need to look at human response to sound. In particular, there are some disagreements in human response times. Localization information – we didn't detect vehicles making turns because demonstrations only involved straight pathway. Signal detection criteria – the vehicle with chime (not permitted under Japanese guideline) was easier to detect even with background noise. The baseline sound criteria of the Japanese Guideline was sound level of a reference car (ICE), one of the quietist vehicles in the fleet. While there is some logic to using this criterion the problem is that the reference car is too quiet. Need to carefully look at what is used for baseline sound level criteria. We need to think of signal detection in presence of broadband background noise. If we believe we will be faced with regulation in future, the regulators will have to define parameters of what is being regulated (i.e., performance). What band of frequencies and at what sound level is detectable over ambient background noise.

Mr. Pare: What was heard in demo will not solve the problem.

Mr. Schneider: The test done was not urban normal driving. Very low speed and we could not hear ICE. The normal driving was detected by all of us, so we should be concerned with detectability of what isn't considered normal driving. The condition was special so we shouldn't be so concerned about the fact that we could not hear. If acceleration is at high speed it can be detected. The AVAS systems at very low speed could not be detected which is not normal driving.

Mr. Pare: Low speed (5 and 10 km/h) is relevant because this is heart of problem. It's hard to detect.

Chairman: Low speed cannot be discounted because it's reflected in some normal driving (i.e., stop and making a turn)

Mr. Guichard: All vehicles will drive low speed but acceleration was missing from demonstration. The conditions in demonstration were not real because there were no accelerations.

Chairman: Synthesized noises are sounds we were hearing. Is the characteristic of this noise what we think will provide information to pedestrian? What critical frequency spectrum should we look at to detect presence of vehicle in broadband background noise? The chime was noticeable due to its intermittent characteristics. What level of sound (dB) must vehicles be to detect above typical ambient sound levels? Do we want sound characteristics that will demonstrate the performance of vehicle? Has anyone carried out focus groups to determine at what sound level the vehicle is detected in differing ambient noise environments?

Mr. Shirahashi: Yamaha showed constant sound but changing of time domain and combine frequency may resolve problem. Additional discussions are needed.

Chairman: In frequency domain the characteristics are different in terms of detectability - it's warbled (frequency moving back and forth). The time domain changes which makes sound uniquely different from background sounds. People are accustomed to hearing different sounds for a short period of time.

Did Nissan look at just the frequency domain around 600 cycles versus domain around 2,000 cycles instead of blending to produce sound? Was this done separately in some background?

Mr. Shirahashi: Combined it and changed pitch. Time domain shifting is easier to detect. They did a frequency domain test.

Chairman: Did you look at difference of sound amplitude versus background noise, that is signal to noise? Must it always be positive or can it be negative? At some point we will have to be able to point out detectability in several noise environments.

Mr. Shirahashi: It can be negative.

Mr. Guichard: All vehicles passed the test under acceleration or deceleration conditions due to the pitch. The transient noise was detectable also by rather high ambient noise.

Chairman: Did the OEM performed jury tests?

Mr. Shirahashi: Yes – tests in stereo lounges were done

Chairman: Asked for parameters which could be used for specifying the performance of a suitable alerting signal.

Mr. Shirahashi: The time domain shifting is very relevant and some frequencies are efficient: 600 hz and 2,5 khz

Chairman: Posed the question of the necessary intensity of a sound to be detectable and proposed to address this question by using the ratio of signal to noise. He also

raised the question of vehicle detection in the presence of ambient noise around the vehicle.

Mr. Guichard: Remembered about the tentative of the IG ASEP with external microphones and the related technical difficulties of a moving microphone. So this would be difficult to do; the microphone would probably only detected the sound of the wind

Mr. Shirahashi: Explained that the state of the art has been presented.

Mr. Moore: Emphasized another criteria for detectability: the use of sound patterns

Chairman: Asked for quantitative values and not only qualitative statements.

Mr. Moore: Advised work is on-going regarding the pitch and volume depending on the vehicle speed. Association of the sound with a vehicle performance is important and will help.

Ms. Jefferson: Reported about a meeting with a 70 year old blind woman who lost her sight at 33 years of age. She said first that a car has to sound like a car. After reflection she said: it's not necessary. She could be trained to recognize a new kind of sound. But it must be one new sound. It wouldn't be possible to train to recognize many different sounds.

Mr.Moore: presented a report concerning the SAE activities. Questions have been raised. See **Document QRTV 03-05 and QRTV 03-06**

The question of the detectability has been discussed.

Mr. Paré: Reported about a part of the NHTSA study concerning the time to detect the car needed for a safe distance between the pedestrian and the car. He quoted the figure 2.3 for a vehicle speed of 20 kph.

Chairman: Raised the question of the signal to noise ratio. What shall be an appropriate level of signal to improve the safety? So far, a lot of qualitative data are available. Now quantitative values are needed.

Mr. Moore: Explained that the basis of knowledge and the state of the art is the result of the Japanese results and the Japanese guideline.

Chairman: Stated he missed quantitative requirements in the Japanese Guideline

Mr. Ficheux: Stated that Japanese Guideline is a good starting point for the work of this group. Also, in a regulatory point of view, in the sense that the first need is to make this kind of technology officially not illegal.

Mr. Schneider: A first guideline with qualitative requirements is sufficient. “we should not over-regulate”

Mr. Theis: Expressed his agreement

Chairman: Is it the opinion of the group?

Consensus:

> Address within the group two different problems:
>
> 1 – short term, as addressed by France and EC
>
> 2 – Longer term, as addressed by the chairman to define a GTR
>
> A list of concerns/goal’s has been drafted by the group (see attachments **QRTV 03-05**)

Chairman: Asked Mr. Paré whether the need of noise in stationary condition is for safety or for navigation. Mr. Paré answered it’s for safety and described both navigation situations and safety situations, e.g. in a parking lot or a situation with an accident on a highway where an alerting system would be useful for the blind. The group expressed opposition to addressing exceptional situations i.e. highway accidents.

Mr. Paré: Stated the NFB fights for the complete deletion of discrimination and does not accept a single situation, where a blind person should be restrained compared to non blind.

Chairman: stopped this discussion.

Mr. Moore and Mr. Schneider: Exchanged thoughts about the SAE draft. The SAE method can be used to measure the minimum sound generated by a vehicle.

Chairman: Asked if it can be used to collect information about alerting systems.

Answer: Yes.

Mr. Moore: The development of this measurement standard is on hold, waiting for development and input from the IG QRTV. The draft will be circulated to the workgroup.

Further Work

*Recognition aspects: Research needs – What characteristics of the sound convey the information? Human factors research experiments to answer questions.

- Spectral components (same as Ken's demonstration on board)(some amount of sound energy is needed within some band)(this type of test is better carried out in a laboratory)
- Frequency shift with speed (pattern recognition)
- Amplitude shift with speed (volume)
- Other patterns (modulation, fluctuation)
- Correlation to detection distance; what is necessary detection distance
- Detection in various ambient environments (55, 65 dB Leq ?); detection distance (time)
- Is sound necessary when vehicle is stationary but in operation?
- Is different sound necessary when vehicle is backing?
- Other? (values, test method, TBD from Japan)

*Possible metric to use:

- dBA
- Spectral components and/or 1/3 octave
- % frequency shift with speed
- % amplitude shift with speed
- Other pattern information

*Tools to assess requirements

- Total vehicle measurements
- Subsystem measurements

KEY ELEMENTS

1. Information Content (or what are we trying to convey?)
   - Do we need to know vehicle presence in all conditions? Do we need to know what the vehicle is doing? Speed, distance, acceleration/deceleration, and direction

2. Determine the suitable acoustic signals that convey information to pedestrian in order to make decisions
   - Spectral components
   - Frequency shift with speed (pattern recognition)
   - Amplitude shift with speed (volume)
   - Other patterns (modulation, fluctuation)

3. Determine parameters that govern the detectability of the acoustic signals
   - Correlation to detection distance; what is necessary detection distance
   - Detection in various ambient environments (55, 65 dB Leq ?); detection distance (time)
   - Localization

4. Determine the environmental impact of the acoustic signals on vehicle occupants (drivers and passengers) and third parties (people outside the car)

   - Environmental Impact

   - Driver Deactivation

5. Evaluation/assessment of adequacy of these systems for meeting these objectives

Chairman: Also suggested subsystem measurements for low frequency that governs range of detectability and high frequency that govern directionality.

Question for QRTV work group:

1. What, if anything, is needed in terms of standard measurement tools?
2. What are operating conditions where system is needed?
   - stationary

- moving
- detectability in different acoustic environments

Japanese don't currently have a measurement tool. They are coming at it from a subjective approach rather than an objective approach. The governments need to decide on how to approach this.

Chairman: Need to factor in stopping distance and use of the DOT guidelines on stopping distance at various driving speeds.

Mr. Moore: This was something that Nissan's work included.

Chairman: We need indication on minimal amount of time that pedestrian process information? That time can be related to vehicle speeds. Need to understand decision making in relation to distance.

Mr. Pare: This decision should not be based on braking, because people drive differently.

Consensus: These are these things the workgroup must consider:

- Distance for detectability
- Detectability in different sound environments (don't have control over this)
- Parameters: Spectral content, time domain, fluctuation

Chairman: Work group needs to identify what is missing in the work plan.

Mr. Moore: What should WP.29 do?

Consensus:

- Japanese guideline can be used as interim step, but need to determine if it is sufficient as written?
- Human impacts – Manufacturers look at sounds and characteristics that convey information. This has been looked at from pedestrian needs.
- Research is needed for real world scenario based on vehicle characteristics and when it is detectable.

When reviewing vehicle characteristics when are sounds detectable and are those sound characteristics favorable to general public. These two issues need to be reviewed and then determine what is suitable.

From a manufacturers standpoint Japan's guideline is acceptable at this moment. In the future, additional work may be required and may be able to move to a regulation.

U.S. NHTSA is trying to specify what the level of sound should be. Japan is doing the same but coming at it from a different angle.

Mr. Schneider: This may become a regulation or an annex to some regulation. We should not over regulate today because there is not enough information to propose a regulation. In regulation 28, frequency is specified in 3rd octave band.

Mr. Pare: There are gaps in all of the studies that have been carried out. Idling is a problem because this is absent from most cars. This workgroup needs to look at gaps in all studies.

Mr. Schneider: Believe the guidelines can be starting point in leading manufacturers in right direction but need to identify areas that require additional research and specify what that research entails.

Mr. Shirahashi: Agreed that the Japanese guideline is starting point but Japanese will continue to study the issue.

Chairman: Questioned whether workgroup should suggest that Japanese guideline is sufficient but encourage individual groups to carry out additional study. What parameters must be identified? Need to identify what has been done today and what can be done in future.

Mr. Theis: Guidelines can be used today but parameters can be set for what is needed in future.

Closing by Chairman: What should be considered tomorrow? We need to think about what we are planning to recommend. We will discuss Japan's test protocols and identify potential issues. Are NHTSA's test protocols different from Japan's? Per Mr. Moore, NHTSA is using a number of subjects sighted and blind to carry out recognition tests of sounds. In phase 2, they plan to use simulated background sound environments and subject will detect when sound is present.

15 July – 09:30

Chairman opened meeting with brief review of previous two days work. He proposed that the group now focus on those items that should be included in the September report to the GRB and the subsequent report by GRB to the November WP-29 meeting.

The Work group agreed to this approach. Discussions were carried out to identify those items and recommendations that needed to be more clearly defined. In this regard the charts number 2 to 4 of the document QRTV 03-07 were developed to assist in focusing the issues.

The report to the GRB and WP-29 should include, as a minimum, the following work required and both present and future status information as described on the slide 5 to 9 of the document QRTV 03-07.

During the next QRTV (in September 2010) work group will review the Japanese guidance document and provide information to GRB. GRB will collective review the document in preparation to submit recommendations to WP.29 (in June 2011).

Doug Moore made a request for CLEPA to provide future details of their demonstrations.

Germany has extended an invitation for the next meeting. The next QRTV meeting will be in Berlin from Monday 27th September (2:00pm) in the VDA offices to Wednesday 29th September (5:00pm)

The meeting was adjourned by Chairman