Progress Report

DTP Subgroup

Lab Process Internal Combustion Engines

(LabProcICE)

Geneva, 12. January 2011

Overview

1) State of the working progress

1.1) Course of action

1.2) Approach to develop the DTP proposal

1.3) Meetings since June GRPE 2010

1.4) Work in progress

1.5) Improvements in CO2 representativity/ reproducibility

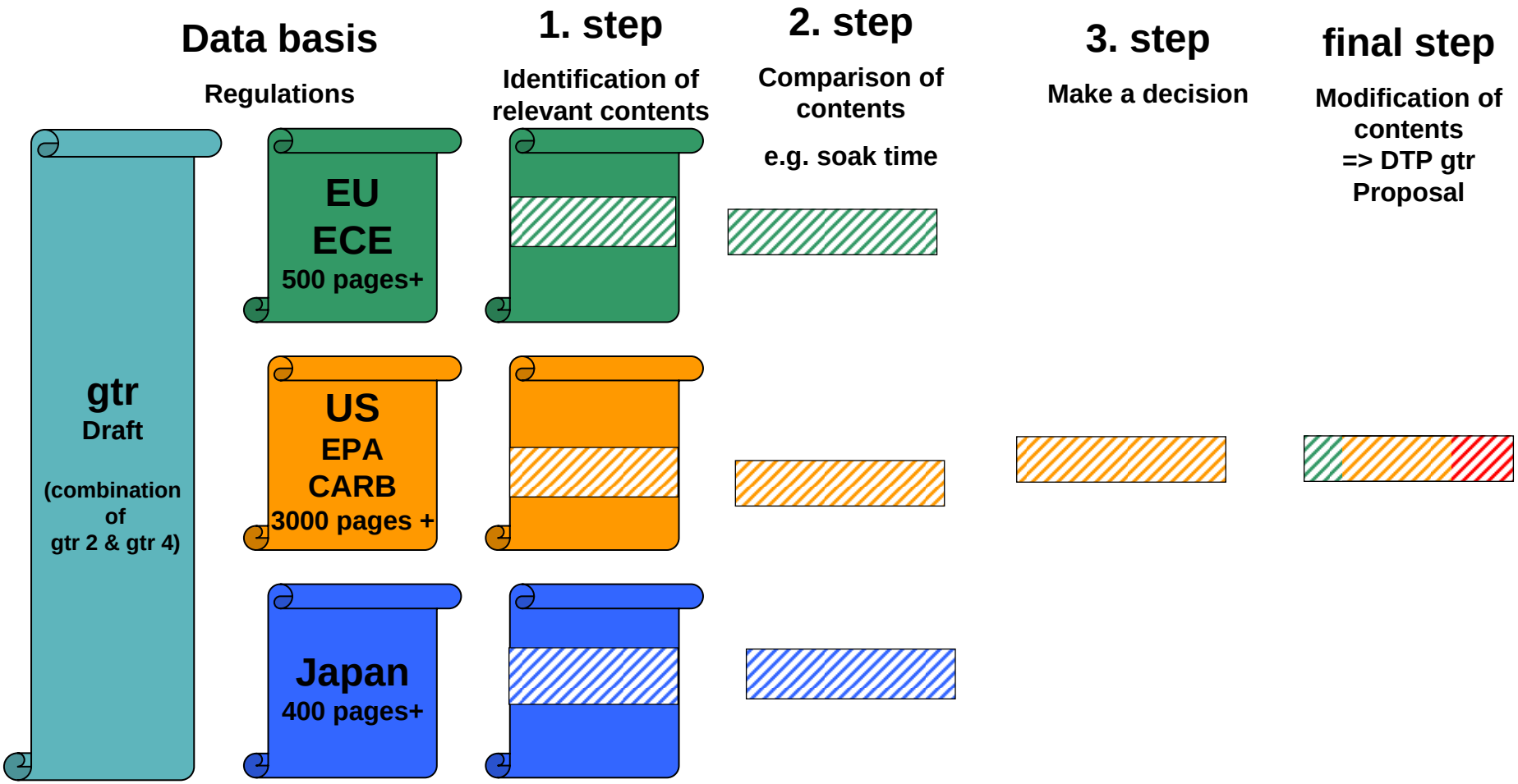
2) List of the open issues

3) Planning of the next steps / Outlook

1.1) Course of action

- **ToR & Plan of Activity** (WLTP-DTP-LabProcICE-002_rev3)
- **Tasks:** Harmonization & improvements
- **Basis documents**:
  - GTR draft
  - US, JP, ECE regional legislations
- **3 experts groups**:
  - Lab Process
  - Measurement / Equipment / Calculations
  - Road Load Determination
- **documentation**:
  - GTR draft (WLTP-DTP-LabProcICE-021)
  - circa website: 3. WLTP-DTP: lab procedures

1.2) Approach to develop the DTP proposal



1.3) Meetings since June GRPE 2010

- 03.-06.08.2010: Ingolstadt workshop
- 15.09.2010: tel/web conference
- 29.09.2010: tel/web conference (reg. systems)
- 5./6.10.2010: Brussels workshop
- 13.10.2010 Vienna DTP meeting
- 22./23.11.2010 Brussels workshop

1.4) Work in progress

• Draft gtr prepared

• Progress report of Vienna WLTP DTP meeting and minutes include the agreed points [WLTP-DTP-LabProcICE-025-Minutes of meeting Vienna; WLTP-DTP-LabProcICE-030-Minutes of meeting Brussels 22./23.11.2010]

•Work in progress including feedback from the last meetings in Vienna and Brussels and open issues (technically and political) are shown in the next slides

•Open issues requires higher lever discussion and decision

1.4) Work in Progress – ”Vehicle Dyno Mode“

The need for safe and proper operation of the car on the dyno was confirmed.

Dyno mode, if any, shall be activated by using a manufacturer's instruction (e.g. using vehicle steering buttons in a special "pressing order", by using the manufacturer work shop tester).

Activation or not of the dyno mode shall be recorded in the test report.

"Dyno mode" shall not activate, modulate, delay or deactivate the operation of any part, that affects the emissions and fuel consumption under the test conditions.

Next Steps:

Rename “dyno-mode” to avoid any confusion.

Improvements of the gtr text are needed to ensure transparency of the mode (no cycle beating, application in ISC programs, use only if needed)

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1.4) Work in Progress – ”Cooling Fan”

Ongoing discussion of the specification of the cooling fan in ECE R83.

LabProc ICE will wait for the results of the GRPE discussion and decision.

ECE/TRANS/WP29/GRPE/2011/5
http://www.unece.org/trans/doc/2011/wp29grpe/ECE-TRANS-WP29-GRPE-2011-05e.pdf

ECE/TRANS/WP29/GRPE/2011/6
http://www.unece.org/trans/doc/2011/wp29grpe/ECE-TRANS-WP29-GRPE-2011-06e.pdf

1.4) Work in Progress – ”Multimode gearbox / mode switch”

How to test a multimode gearbox if no “default mode on” is present?

Common understanding: Compliance of emissions standards in all modes.

CO2 / FE testing proposal:

- No switch / mode: nothing to choose => standard test procedure
- Default mode on – use standard test procedure in the default mode
- Last mode on – use of standard test procedure in the best and worst case mode, the CO2 / FE result is the average of both modes.

Next Steps: Further discussion in the LabProcICE subgroup meetings in close connection with the LabProcEV subgroup

1.4) Work in Progress

Interval of calibration frequency

A summary of harmonized intervals of calibration frequency to be included (WLTP-DTP-LabProcICE-033-calibration_VOLVO).

Experts need to modify the procedure for the check of the linearity of analyzers.

Remote mixing chamber, dilution tunnel still needed?

Discussion with PM/PN sub-group coming next steps

1.4) Work in progress- Inertia classes

After several discussions the “stepless inertia” concept was rejected. The following points summarizes the decision points:

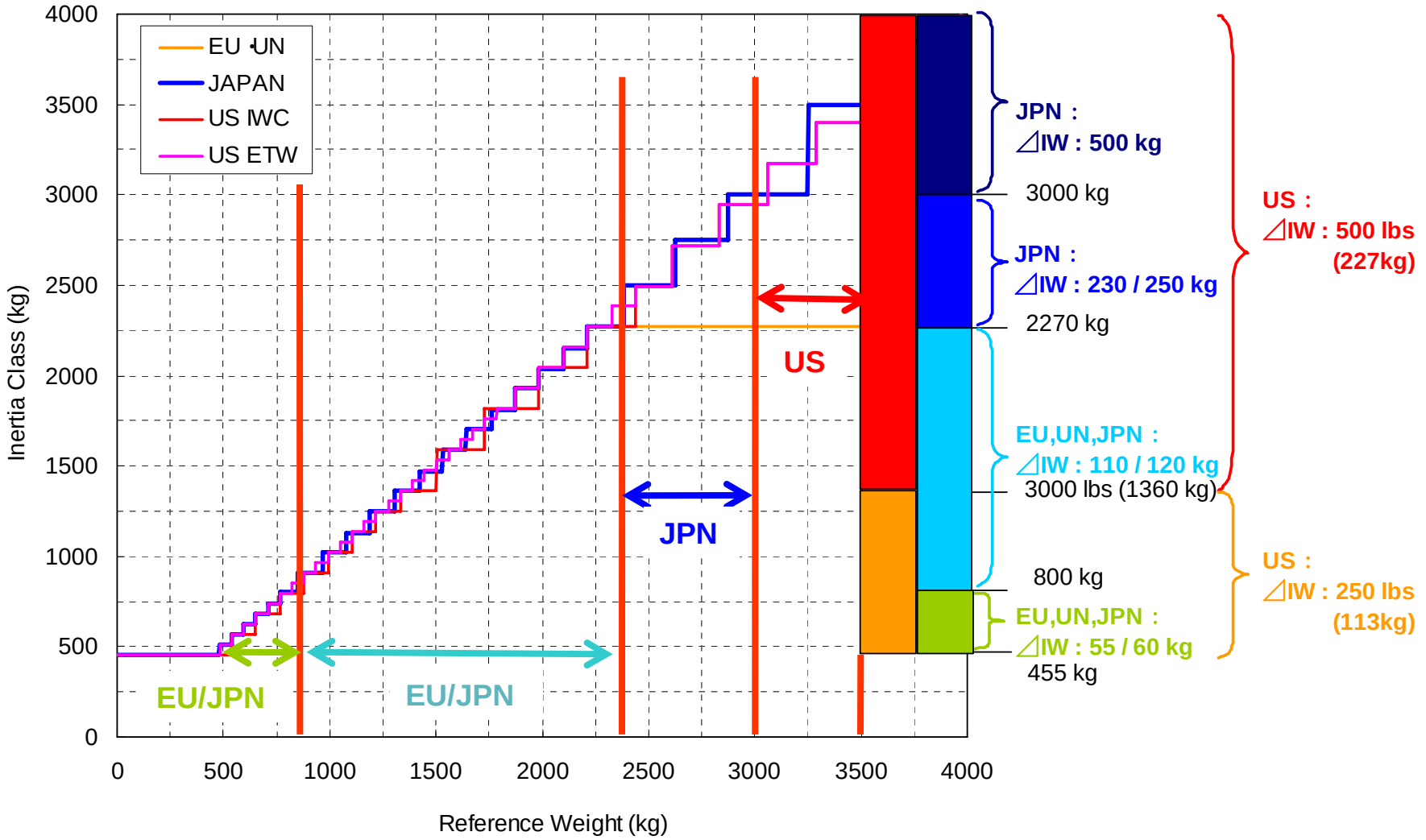
- Refined inertia classes enable more accurate CO2 values. Effect of down-weighting would be better represented
- a stepless function with a tolerance does not fit to the US certification system
- steps that would result in CO2 emission changes of less than 1g/km would be meaningless
- the step function provides an important disincentive to weight increase
- EPA are considering a calculated incentive to weight decrease

A concept with reduced steps in inertia classes is accepted. Steps of 60 kg are in line with 125 lbs of EPA.

Draft proposal: LabProcICE-034 (to be published on circa soon)

Inertia classes proposal overview

(based on WLTP-DTP-LabProcICE-011 by JASIC)



1.4) Work in Progress – road load determination

- Separate Annex [9] incl.:
  - RLD
  - Reproduction on Chassis Dynamometer
  - Table of running resistances

- gtr basis: ISO 10521-1 & 2

Next Steps: take into account the results of the following paper

Road load determination Representative road load test procedure [WLTP-DTP-LabProcICE-029-RLD presentation STA T&E]

1.5) Improvements in CO_2 representativity/ reproducibility:

Already taken into account

- tightening of tolerances
- interval of calibration frequency
- tightening of instrument specifications

Next Steps: take into account the results of the following papers

- Factors influencing NEDC CO2 emissions during type approval of passenger cars By order of the Federal Environment Agency Germany (UBA) [WLTP-DTP-LabProcICE-023-CO2_WLTP_UBA]
- Road load determination Representative road load test procedure [WLTP-DTP-LabProcICE-029-RLD presentation STA T&E]
- Study of JRC on influence of temperature of lab and soak on CO2 announced by EU Comm

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2) List of open issues – Test Room and Soak area temperature (1/2)

There is an ongoing discussion about the test room and soak area temperature during the WLTP DTP ICE workshops.

Current situation: JP, ECE, US: 20-30 °C and GTR 2 & 4: 25 ± 5 °C

LabProcICE proposal: setpoint (25 ± 5) °C

Pros	Cons
harmonization with gtr's	not representative for some regions
technical feasible in the laboratories worldwide	
improved reproducibility by set point	
acceptable labour conditions for operators	

2) List of open issues – Test Room and Soak area temperature (2/2)

Alternative proposal (by European Commission) for lower temperature, e.g. 22°C

Problem: Lack of data to estimate the impact of temperature on measurement result

LabProcICE unable to decide on the issue.

Open issue needs decision before the beginning of the correlation test.

Next steps:

1) Detailed and data supported counterproposal from COM needed.

2) advice by DTP or political decision by GRPE expected before start of the correlation measurements

2) List of open issues – Method for substraction of pollutant mass in intake air

Proposal for advanced CVS-method for measuring low pollutant mass with high accuracy introduced by experts (Method for subtraction of pollutant mass in intake air (WLTP-DTP-LabProcICE-020))

Next steps:

a)Technical evaluation of the advanced method by experts of other dtp subgroups (Is the method applicable for additional pollutant, PM/PN and EV requirements?)

b) political discussion of the definition of exhaust emission necessary:
standard CVS method: determination of gross tailpipe emissions (molecules generated / transformed in combustion processes + ambient background aspirated by the engine)
vs.
advanced CVS method: net amount of pollutants added to the atmosphere by the vehicle (molecules generated / transformed in combustion processes)
and improved precision for all non-stochiometric engine concepts through determination of real dilution ratio (DR)

Different meanings of the word „background“ as a contribution to mass

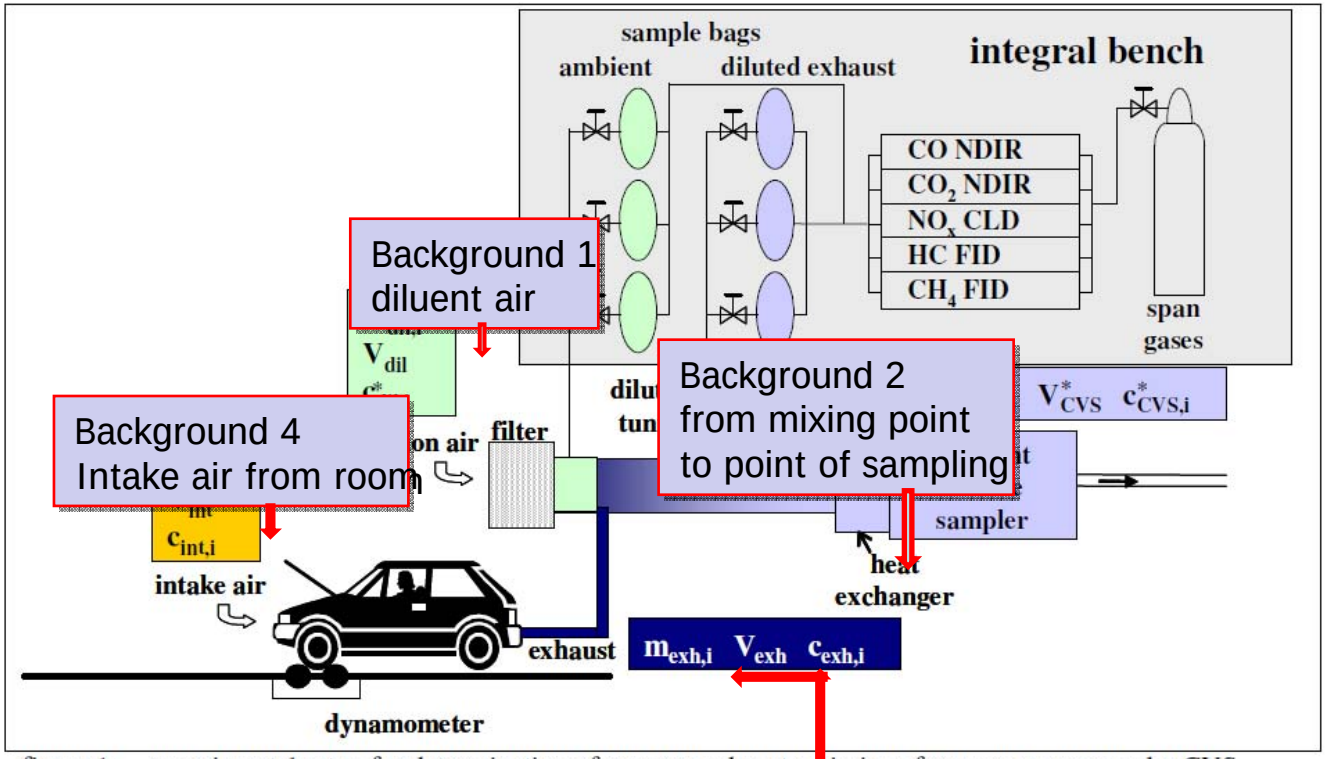

figure 1: experimental setup for determination of gaseous exhaust emissions from passenger cars by CVS
m: mass, V: Volume, c: concentration/mixing ratio
subscripts: int=intake air, dil=dilution, exh=exhaust, i=
superscript: *=measured quantity

Different meanings of the word „background“ as a contribution to mass

Background 1 Diluent air	All constituents are important including CH4, N2O for the near future
Background 2 from mixing point to point of sampling	at point of sampling means there are some left overs, contaminations of THC, PM, PN inside the surface of tubes an pipes
Background 3 inside transfer tube	Left overs, contamination of PM, PN, H2O and THC are important, with the option - Cap end of tube
Background 4 Intake air from room	All constituents are important including CH4, N2O for the near future
Background 5 Artifacts on Filter	Filter material gains weight from something unknown called artifacts, just in air or other gases

2) List of open issues – certification issues

No	Item	Description	Note	gtr task
1	Family criteria (Emission)	Criteria which the representative data cover the group.		Ideally yes, if time permits (DTP top level responsibility)
2	Family criteria (Fuel Economy / CO2)			Ideally yes, if time permits (DTP top level responsibility)
3	Family criteria (Road Load)			Ideally yes, if time permits (DTP top level responsibility)
4	Test Vehicle Selection (Emission)	Vehicle condition of representative data.	aim: worst case, connected with family criteria	Ideally yes, if time permits (DTP top level responsibility)
5	Test Vehicle Selection (Fuel Economy / CO2)		aim: worst/best/representative?, connected with family criteria	Ideally yes, if time permits (DTP top level responsibility)
6	Test Vehicle Selection (Road Load)	e.g. aerodynamic bodywork type	aim: worst/best/representative?, connected with family criteria	Ideally yes, if time permits (DTP top level responsibility)

2) List of open issues – certification issues

No	Item	Description	Note	gtr task
7	Vehicle Test / Reference Weight (Emission / Fuel Economy / CO2 / Road Load)	Definition of calculated part(s) & weight for testing.	test weight needs to be defined for validation test in 4th quarter of 2011	test weight: yes; reference weight (short term): no, (long term): to be decided
8	Tire Selection		Already discussed in ICE sub-Gr, and will make draft proposal…(may combine with item #4-6?)	Ideally yes, but final decision depends on available technical proposals and acceptance by other parties
9	Tire Condition	Criteria for valid tire condition. (e.g. Tred depth→ 0 to 50%)	Already discussed in ICE sub-Gr, Sweden/T&E and will make draft proposal…	yes (labProcICE)
10	Test Fuel		Already considered in RF sub-Gr.	yes (RF)
11	Number of tests		Already discussed in ICE sub-Gr.	yes (LabProcICE)

2) List of open issues – Definitions

It is necessary that the definitions and the procedures fit together?

Who will take care of this topic?

3) Planning of the next steps / Outlook

Next Informal meeting of WLTP DPT ICE lab proc

Feb 2011

March 2011

May 2011

exact date and Location t.b.d.

3rd quarter of 2011: begin validations tests with new test procedure

Thanks for your attention.

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