WLTP-DTP Subgroup Additional Pollutants

Progress report

GENEVA UN EC

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- Terms of reference and scope of the work of this sub-group
- Pollutants addressed and General guidelines
- Meetings schedule
- Table of candidate methods

- **Definitions/ Abbreviations**

- **Open questions in the GTR Draft document**

- **Conclusions and next steps; documents loaded in CIRCA Database**

Additional pollutants subgroup – Terms of reference

The Additional Pollutants subgroup received a **mandate for the development of test procedures for pollutants not currently regulated** such as **NO_2, NH_3, N_2O** including **measurement equipment** and **formulae for the measurement** for light duty vehicles.

Scope of Activity

The subgroup **undertakes the following** tasks on the **basis of procedures in existing legislation** and **expert knowledge within the group:**

1. **Agree** on additional pollutants to be addressed. ✓ ℹ
2. **Identify** appropriate **measurement methods** for each pollutant. ✓
3. **Describe measurement**, **calibration** procedures as well as calculations based on existing legislation and on output from lab procedure subgroup. in progress
4. **Drafting** of GTR legislation text. in progress

Meeting schedule

First Meeting:	Telephone/Web Conference Date: 20th July 2010 16 participants
2nd Meeting:	Telephone/Web Conference Date: 20th July 2010 20 participants
3rd Meeting:	Face to face meeting at JRC/Ispra Date: 9/10 Dec. 2010 14 participants
4th Meeting:	Face to face meeting at BMW/Munich Date: 7/8 March 2011 18 participants
5th Meeting:	**Face to face meeting at JRC/Ispra 10/11 May 2011**

5 meetings (2 phone conferences and 3 face to face meetings in December 2010, March and May 2011)

for the time being, no further face to face meeting planned

Pollutants to be addressed:

NO_2

NH_3

N_2O

Ethanol (EtOH)

Aldehydes: Formaldehyde, Acetaldehyde (RCHO, R = H or Me)

NOTE: Any other pollutants not included in this list should be supported by an assessment on negative effects to health or to the environment.

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WLTP DTP Additional Pollutants subgroup	
Title	Open issues
Working Paper Number	WLTP-DTP-AP-07-02 Open Issues May 2011

OIL – resolved 11.05.2011

- Possible reference methods have been identified. Possible source of text has been added where possible.

- **Performance criteria**
- Gathering of performance data for **candidate methods** has been tasked within group.
- Based on the Range of emission level to be measured performance criteria (LoD, LoQ, rise time and max. interference) have been derived.

- A **table of candidate methods** to be evaluated has been set up.

Table of candidate methods for additional pollutants

Pollutant	Method	bag	diluted	raw	online	off line	LoD [ppm]	LoQ [ppm]	transformation time [s]	rise time [s]	interference	Base
NO2	CLD differential		x		x		0.3	0.9		1	< 2% H2O+CO2	ECE Reg. 83/EPA 1065.272
	NDUV-RAS direct		x		x		0.04	0.12		3	none	ECE Reg. 83/EPA 1065.272
	QCL direct		x		x		0.1	0.3	1	1	none	
	FTIR direct		x		x		0,9 (0,2 possi	2.7		1	managed	
N2O	GC-ECD	x				x	0.01	0.03	na	na	none	EPA 1065.275
	NDIR	x			x		0.1	0.3		5	multiple	EPA 1065.275
	QCL	x			x		0.01	0.03			none	
	FTIR	x			x		0,9 (0,2 possi	2.7		1	managed	EPA 1065.275
	ring down cavity	x			x		0.0003	0.001	2.5	1	none	in research
	Photo Acoustic	x			x						multiple	EPA 1065.275
NH3 (SCR systems)	LDS (in situ)			x	x						H2O, p, T, managed	Commitology EUVI
	LDS (extractive)			x	x		0.2	0.6	definition neccessary		H2O, managed	Commitology EUVI
	FTIR			x	x		0,3 (0,06 poss	0.9	definition neccessary		managed	Commitology EUVI
	QCL			x	x		0.1	0.3	definition neccessary		none	
Ethanol (E21+)	Impinger + GC-FID		x			x	0,1 µg/ml -> 0,18?					CARB NMOG Part C METHOD 1001 EPA 1065.805
	Photo Acoustic	x			x		0.06				H2O, CO2, NH3, ROH managed	MSO 2000-08
	GC-FID from bag	x				x	0.18				none	
	QCL	x			x		not yet available					
	FTIR (bag)	x			x		1 (0,2 possible)				managed	
Aldehydes (E21+)	Cartridge + HPLC		x			x	0,0075 µg/ml					CARB NMOG Part F METHOD 1004
	FTIR		x		x		0,3/0,9				managed	
	QCL		?		x		not yet available					
	(reference methods)											

LoD determined by use of traceable cal. gases

General: EPA 1065.205

WLTP-DTP-AP, Ol. Mörsch
C. Astorga

Definitions:

Linearization:
application of a range of concentrations or materials including zero to **establish** the mathematical relationship between concentration and system response

Linearization check:
application of a range of concentrations or materials including zero to **verify** the mathematical relationship between concentration and system response

Calibration:
zero, span adjustment with calibration gases or calibration materials

Verification:
zero, span check with calibration gases or calibration materials, no adjustment

Abbreviations/Definitions:

RCHO	**Formaldehyde plus Acetaldehyde**
HCHO	**Formaldehyde**
CH_3CHO	**Acetaldehyde**
EtOH	**Ethanol**
THC	**Total Hydrocarbons (All compounds measurable by FID)**
NMOG	**Non-methane organic gases (NMHC plus EtOH and RCHO)**
NMHC	**Non-methane hydrocarbons (THC excluding CH_4 and EtOH, response factors are applied)**
NOx	**Oxides of nitrogen**
NO	**Nitric oxide**
NO_2	**Nitrogen dioxide**
N_2O	**Nitrous oxide**
NH_3	**Ammonia**

Open Issues - resolved

- **Handling of lost sample in raw exhaust sample**

  → **Proposal:**

  Limit sample flow (10 l/min) and return sample (no drying, heated or diluted return)

  or (at manufacturers request)

  Additional cycle

- **Linearization of *in situ* instruments** → **According to instrument manufacturer at least once a year**
- **Verification of *in situ* instruments** → **within 24 h at concentration of standard**
- **FTIR: linearization** → **after manufacture and after major analyzer repair**
- **FTIR: Verification** → **within 24 h**

Open Issues - resolved

- **Allow calculation of NOx from NO + NO_2 → no**
- **Allow QCL and other technologies for NO and NO_2 from modal dilute → yes**
- **Calibration/verification of CLD for NO-Mode → to be done separately**
- **linearization of CLD for NO-Mode → can be taken over from NOx**
- **Applicability of ETOH and aldehyde measurement → E21+**

Open Issues

NH_3 sampling during engine off

Temperature for NH_3 sampling (110 – 190?° C)

proposal: → set-point between 110 ° C and 190 ° C with range of +/- 10 K
→ JAMA position: between 110 ° C and 133 ° C due to decomposition of urea

Traceability to national standards of calibration gas for AP
→ DTP → gas industry → difficulties for NH_3, EtOH to be expected, achievable accuracy/stability has to be established

Next Steps

- Continue drafting of GTR [*] in small groups (as well as OIL):

Tasks have been assigned within group and the outcome will be delivered for the next meeting

- Next face-to-face workshop:
  (……)

- Additional Tel/web conferences

[*] Draft GTR proposal: WLTP-DTP-LabProcICE-061

- Additional pollutants contact persons:

Chair: ***Daimler-Stuttgart***
oliver.moersch@daimler.com

Co-chair: ***EC-DG JRC Institute for ENERGY***

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Ref.: CIRCA documents WLTP-DTP-AP

Draft GTR proposal: WLTP-DTP-LabProcICE-061

& open questions:

***WLTP-DTP*-AP-07-02** Open Issues May 2011

THANKS FOR YOUR ATTENCION

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