




The National Approach to QA/QC in France

LCSQA
Laboratoire Central
de Surveillance de la Qualité de l'Air

« Particles and photo-oxidants in Europe »
Prague, Czech Republic, 25 & 26 September, 2007

"Practical measurements & QA/QC issues: The national approach in France"

F. Mathé (LCSQA - Mines de Douai),
O. Le Bihan (LCSQA - INERIS)
T. Macé (LCSQA - LNE)






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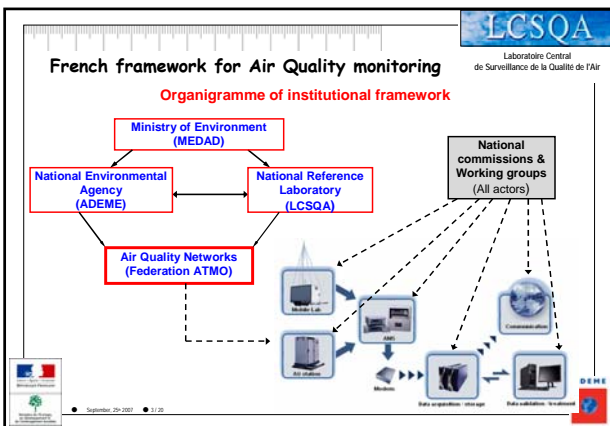
Road map of presentation



- 1 – French framework for Air Quality monitoring
- 2 – QA/QC program for PM
- 3 – Related issues on new instruments
- 4 – Challenges for the future

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The french national Air Quality monitoring system

- ⇒ 36 AQ monitoring networks
- ⇒ 770 fixed monitoring stations located in:
 - 58 agglomerations > 100.000 inhab
 - 23 agglomerations (50.000 / 100.000 inhab.)
 - 18 minor agglomérations
- ☞ AQ index « Atmo » is available



⇒ ~ 2050 AMS on site:

SO ₂	NO _x	O ₃	CO	Benzene	PM
~ 360	~ 535	~ 470	~ 110	~ 45	~ 480 (PM ₁₀) ~ 50 (PM _{2.5})

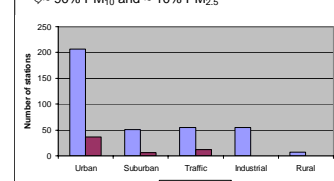
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PM automatic monitoring stations in France

⇒ ~ 480 fixed monitoring stations (~ 530 AMS) with specific siting criteria
☞ ~ 90% PM₁₀ and ~ 10% PM_{2.5}





Which technics?:

- 90% Microbalance TEOM (US)
- 10% Beta gauge (France)
- ≈ 86 % of PM sites, 100 % of PM_{2.5} sites exclusively PM₁₀

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QA/QC tools for PM automatic monitors

1) Flow & Calibration verification / linearity check

Goal:

- Verification on site of performance characteristics of automatic monitors (µbalance TEOM):
- ☞ Respect of sample flow
- ☞ Value of calibration constant
- ☞ Control of linearity

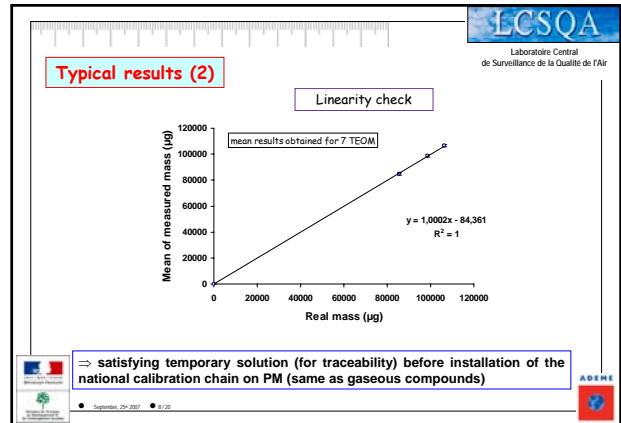
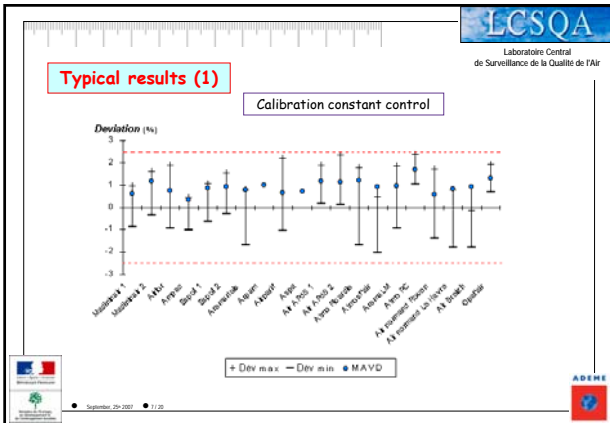
Mean:

- Standard Operating Procedure for flow
- Calibration filter for constant control
- Kit of 3 pre-weighted "filters" for linearity check
- ⇒ traceability assured
- ⇒ voluntary basis

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QA/QC tools for PM automatic monitors

2) Intercomparison exercises in the field

- Objective of the study:
 - to have an estimation of the measurement confidence interval (ISO 5725)
 - to have an evaluation of the on going QA/QC of the networks
 - to optimize the test procedure to be applied (ISO 17025)
- Different options for field intercomparisons:
 - Several analysers within the same station
 - Mobile lab/fixed station
 - Several mobile lab at the same location



Conclusions:

- Analysers carefully checked and calibrated before the tests, but 14% of troubleshooting detected only because corresponding measurements different from the others
- Some modifications to be performed on TEOM (influence of air conditioning system in mobile labs)
- Estimation of the uncertainty difficult because of the low concentrations of some pollutants (SO₂, CO, PM₁₀) and/or of brief peaks occurrence

possible solution: use of "spiked" sample using ambient matrix (LCSQA work in progress)

The ideal QA/QC tool for PM AMS: a calibration standard?

⇒ Aerosol generator (stable in granulometry & [PM])

⇒ Good reproducibility and linearity for generation

⇒ Next step: coupling with PM monitor (LCSQA work in progress)

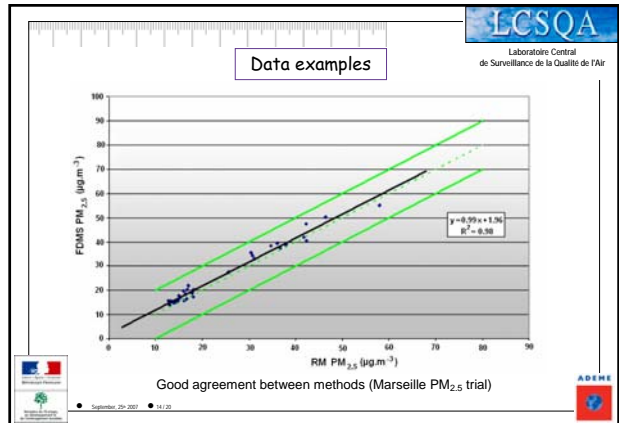
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the issue: under-estimation of PM AMS

⇒ answer: to carry out special "modules" taking into account the semi-volatile particulate compounds [FDMS (TEOM) or RST (beta gauge)]

⇒ Demonstration of equivalence

- Goal: validation of the 2 technical solutions concerning current french disposal
- Limited number of french campaigns ⇒ wish to broaden the scope of equivalence throughout large part of european territory
- Began Jan 05, published Jan 07 (www.lcsqa.org)
- 4 french organisations involved + colleagues from abroad (Belgium, Italy)
- Equipment on national system (NRL, networks)
- Other equipment offered by manufacturers
- Cost: quite a lot ! (time !)



Conclusion of the french experience

Candidate Instrument	Site location & type – time period	Equivalence Criteria Met?	Correction Required ?
PM ₁₀ FDMS series 8500 ver.b (Thermo R&P – 12 min cycle measurement)	Paris suburbs (UB)	Meets criteria	No correction required
PM _{2.5} FDMS series 8500 ver.b (Thermo R&P – 12 min cycle measurement)	Marseille city center (UB)	Meets criteria	No correction required
Beta gauge PM ₁₀ MP101M-RST (Environnement SA – 24h step time measurement)	Paris suburbs (UB) Marseille city center (UB) Aarschot (Belgium - PU) Monterotondo (Italy - PU)	Meets criteria	No correction required

- Implementation of "new way" of PM monitoring?**
- 1) Measuring devices will be fitted gradually, but not every device
 - 2) Adjustment of results provided by measuring instruments without module based on a "step-by-step approach":
 - All beta gauges are upgraded
 - For µbalances, set up of « reference » stations with 2 measuring devices : one without module and the other with module (e.g. TEOM 50°C and TEOM_FDMS)
 - On each reference station, calculation of the difference between the 2 results (e.g. TEOM_FDMS - TEOM50°C)
 - This difference will be added to the results provided by the devices without module located near the reference station
- Assumption: the monitoring of volatile compounds does not have only a "local" signification

- Issues to take into account:**
- Data recorded at the local level and at the national level must be the same (consistency of all databases)
 - Implementation of correction since 01/01/07 (homogeneity in time and space)
 - Correction must not introduce inconsistency between stations fitted with modules (no correction) and the others without module
 - QA/QC of the correction (common data validation SOP) based on field experience ⇒ i.e. troubleshooting inventory
- This method will be improved (second step):**
- The number of reference stations will be optimized over several years (increase? PM_{2.5}?)
 - Use of experience to improve quality of correction

