VPEC-Program / UK
VEHICLE PARTICLE EMISSIONS CLUB - A PARTNERSHIP OF GOVERNMENT & INDUSTRY

John McAughey, Aerosol Science Centre, AEA Technology Environment, Culham, Oxfordshire OX14 3ED, United Kingdom

This paper describes the establishment of a shared-cost research club as a partnership between government and industry as a means of conducting generic research in measurement and calibration issues.

Perceived advantages include the scope to improve the quality and value of measurements, to develop tools which enable laboratories to implement best practice, to work towards national / international comparability of measurements and to avoid duplication of effort on generic issues.

Initial priorities have been established amongst the members and two measurement programmes initiated. In the first, a calibration study to assess the accuracy and precision of the SMPS instruments owned by the member laboratories, with calibration techniques based on a prototype number calibration standard under development at AEA Technology. In the second phase, a round-robin test will be conducted to assess (total) measurement system variability between members CVS facilities. Future priorities likely to remain focused on experimental issues linked with a broader information / ‘know-how’ content.
Vehicle Particle Emissions Club
-a partnership of Government & Industry

4th Nanoparticle Conference, ETH Zürich, 2000

John McAughey, AEA Technology
CLUB OBJECTIVES - Measurement

- To improve the quality and value of measurements
- To develop tools which enable laboratories to implement best practice
- To work towards national / international comparability of measurements
- To avoid duplication of effort on generic issues

50 delegates attended to define and disseminate the priorities for the Launch of a NEW Vehicle Emissions Club (December 1998)
VPEC Objectives

• To address generic measurement & sampling issues by experiment
• Calibration activities
• Information Management / Services to members
• Government / Industry / External Bodies Liaison
• ....?
Vehicle Emissions Club

Services / Products / “Knowhow”
Sampling & Measurement Procedures
Staff Training, Literature, ...etc
Positioning

Drivers

Products  Vehicle Emissions  Air Quality  Health

Club

Industry

Focus - emissions and the environment
**Outcome**

- Existing experience of particle sizing and particle number measurements of vehicle emissions suggest that it is timely that some form of inter-comparison be carried out.

- A shared cost club, directed by its members offers an independent cost-effective route to address issues generic to industry and government.
VPEC Founder members

- AM
- DETR (Department of the Environment, Transport and the Regions)
- NREL (National Renewable Energy Laboratory)
- Shell
- Ford
- Castrol
- Ricardo
- MIRA
- AEATECH
Review of key uncertainty factors

- Dilution Technique
- Dilution Ratio
- Dilution Rate
- Size Range
- Instrument Choice
- Data Processing
- Data Format for Model Input
- Sample Residence Time
- Sample Temperature
- Sample Humidity
- Sampling System Construction
- Sampling for Chemical Analysis
- Sample Ageing
- Pre-Tailpipe Factors
- Post Tailpipe Factors
Size Distribution Affected by Set-up

Comparison of Size Distributions From Two Nominally Identical SMPS Systems Under Different Operating Configurations

- 7nm to ~320nm [10/1]
- ~15nm to ~710nm [3/0.3]

Dp, Electrical Mobility/lnm
Programme 1 - Calibration of SMPS

Prototype Number
Calibration Standard

- Condensation Particle Counter
  - linearity
  - accuracy
  - detection efficiency (< 10 nm)

- Electrostatic Classifier
  - size dependent losses at several flow rates

- Diluter
  - linearity
Programme 2 : Round - robin

- Reference vehicle - IDI
- Reference fuel - ULSD
- Reference SMPS

- 80 nm transient EUDC
- Total particle number

- 5 steady states (x2) at 0, 30, 50, 70, 120 kph
**Commercial Structure**

- Membership by annual subscription
- Members define priorities and experimental programme
- Fee to reflect purchase of sampling time at member sites (Target = £10k, $15k)
- Membership
  - Full: eligible to vote in steering group priorities
  - Associate: participation in individual round-robin programme at cost (fee offset against subscription)
- Calibration Programme: July / August 2000
- SMPS round-robin: August / October 2000
Conclusions

- A shared-cost research club has been established as a partnership between government and industry as a means of conducting generic research in measurement and calibration issues.

- Initial priorities have been established and 2 measurement programmes initiated - accuracy and precision of SMPS (absolute & between facilities).

- Future priorities likely to remain focused on experimental issues linked with broader information / ‘know-how’ content.