Industrial Emission Measurement Proficiency Testing Scheme

Emissions and Atmospheric Metrology Group, National Physical Laboratory, UK
Proficiency Testing

- Industrial emissions are measured by companies that follow approved methods (e.g. EN 14792 for NO; EN 13284-1 for dust; etc.)
- Proficiency testing (PT) schemes check that participants are able to produce results that are precise and accurate enough to meet the requirements of the relevant standards
- Results are published anonymously so companies can compare their results with the rest of the sector
- NPL periodically analyse data from multiple rounds of UK PT schemes to indicate changes in the performance of the UK stack testing sector
NPL PT Schemes

- NPL runs three forms of PT scheme to test different aspects of stack measurement:
  - **Calibration Gas** – Measuring gas concentration from cylinders
    - Tests calibration proficiency
  - **Gas Measurement** – Using NPL Stack Simulator Facility
    - Tests sampling and calibration proficiency
  - **Particulate** – Measuring foil shims and NaCl solutions
    - Tests weighing proficiency
  - All results are expressed as z-scores using performance limits from ISO 13528
  
  *Statistical methods for use in proficiency testing by inter-laboratory comparisons*
NPL Calibration Gas PT Scheme

- Participants measure directly from certified cylinders
- Check of calibration with no interfering species/dust
- Direct measurement from cold, dry cylinder so no sampling line losses and conditioning system effects

- Multiple cylinders are measured covering a range of measurands:
  - SO$_2$
  - NO
  - NO$_2$/NO$_x$
  - CO
  - O$_2$
  - Propane
The NPL Stack Simulator Facility provides a suitable test of participant’s full measurement process, including sampling lines and gas conditioning units.

Species (SO$_2$/NO/NO$_x$/CO/O$_2$/H$_2$O/Propane) are measured simultaneously over thirty minute tests.
NPL Particulate PT Scheme

- Participant laboratories are sent foil shims and NaCl solution to assess their drying and weighing performance.
- Shims are approximately the same sizes and weights as filters used in particulate monitoring.
- The NaCl solution simulates a probe washing solution which should be evaporated following standard procedures, allowing the NaCl to be weighed in accordance with EN 13284-1.
- Test does not cover sampling proficiency, just laboratory weighing competence.
- NPL is developing a particulate stack simulator that would allow sampling proficiency to be included in future PT schemes.
IMPRESS European PT Scheme Inter-Comparison

- Other European countries run their own similar PT schemes as part of regulation of the stack emission testing sector.
- Under IMPRESS NPL are putting together a database of the anonymised results for PT testing in Germany, the Netherlands and the UK.
- Larger sample sizes will allow greater statistical analysis of trends in the results.
- Results should indicate the impact on performance of tightening emission limits in the European Industrial Emissions Directive.