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MCERTS

THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Extension of the Agency's Monitoring Certification Scheme MCERTS to include Continuous Ambient Air Quality Monitoring Instruments

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ABSTRACT

The Environment Agency launched its Monitoring Certification Scheme MCERTS for continuous emission monitoring systems (CEMs) for industrial stacks at CEM98. At the time the Agency referred to its plans to broaden the Scheme later to include other monitoring activities. This paper presents details of the proposed extension of MCERTS to cover continuous ambient air quality monitoring instruments.

INTRODUCTION

The Agency launched its Monitoring Certification Scheme MCERTS at CEM98 to promote quality monitoring data based on international standards. MCERTS initially focused on continuous emission monitoring systems for industrial stacks. Performance standards for instruments have been specified for a common range of pollutants and temperature, pressure, moisture and mass flow[(1)]. The Agency has appointed Sira Certification Service as the certification body to operate MCERTS on its behalf.

This paper presents the details of the Agency's proposed extension of MCERTS to continuous ambient monitoring instruments. The paper covers:

- the background;
- the benefits of MCERTS as applied to ambient instruments;
- the scope of the extension to the Scheme;
- the performance standards;
- the procedure to follow to apply for and acquire instrument certification;
- future MCERTS developments.

BACKGROUND

Ambient air quality (AQ) monitoring instruments have found wide application in the UK in the Department of the Environment, Transport and the Region's Automatic Urban and Rural Air Quality Networks as well as in a number of Local Authority Networks. A limited number of permanent air quality monitoring facilities also exists around some industrial sources or source complexes.

Continuous ambient AQ monitoring instruments are also used by the Agency during site specific investigations aimed at establishing the environmental impact of industrial sites or processes.

Reliable information on ambient air quality is essential for:

- quantification of environmental loads;
- reporting on the state of the environment.
- providing the public with rapid information on the levels of air pollution;
- assessment of sustainable development;
- monitoring compliance with EC Directives for ambient AQ;
- assessment of current AQ policies and help develop new policies.

BENEFITS

The provision of MCERTS certification for ambient monitoring instruments will have significant benefits for instrument users, manufacturers and regulatory authorities including:

- making available performance standards for ambient monitors having formal recognition within the UK and wide international acceptance;
- give confidence to regulatory authorities and other users of ambient monitoring instruments that the results produced are of the required quality;
- provide an independent endorsement of the instruments to facilitate sales in UK and overseas markets.

SCOPE OF THE EXTENSION

The proposed extension to MCERTS covers continuous ambient monitoring systems (CAMs) which either:

- continuously monitor ambient air quality characteristics and automatically produce results; or
- sample the ambient air over an extended period (eg days or weeks) with off-line laboratory analysis of a sample eg for metals, PAH content. Such samplers may be used to obtain a longer-term average value of the air quality characteristic by sequential sampling over time.

The proposals do not cover open-path instruments at the present time.

THE PERFORMANCE STANDARDS

The proposed extension includes performance standards for the measurement of the following substances: nitrogen monoxide (NO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), other metals (cadmium, arsenic, nickel and mercury) benzene, and poly-aromatic-hydrocarbons (PAHs).

CAMs would be assessed against performance standards appropriate for their intended applications. Two categories are proposed:

- Category 1 - rural and remote sites;
- Category 2 - urban background/centre, suburban, kerbside, roadside and industrial sites.

The intended application category of a CAM will have implications on the required performance, particularly regarding potential interferents, the likely temporal variability of the air quality, the certification range and the detection limit. CAMs would be assessed in the most stringent conditions under which they will be subsequently used. For example, in rural and remote sites very low concentration levels may be encountered, and CAMs should have lower detection limits as a consequence. In urban locations, including kerbside sites, instruments will be expected to monitor rapidly varying concentrations, over a wide dynamic range.

The main instrument performance characteristics of a CAM which would be assessed, using a combination of laboratory and field tests, would be:

- response time, consisting of lag rise time, rise time, lag fall time and fall time;
- repeatability standard deviation (in the laboratory);
- zero and span drift;
- accuracy of measurement of the air quality characteristic (or accuracy of sample collection in the case of metals and PAH monitoring systems);
- detection limit and quantification limit;
- averaging of short term fluctuations in determinand concentration;
- linear fit;
- cross sensitivity to interfering substances;
- NOx converter inefficiency test;
- influence of atmospheric sample pressure and temperature;
- susceptibility to physical disturbances;
- performance of the CAM against a reference method, or against another CAM, under field conditions;
- reproducibility under field conditions;
- availability and maintenance interval under field conditions;
- time-dependent zero and span drift under field conditions.

The proposed standards have been defined so that an instrument which meets the MCERTS requirements would be capable of meeting the requirements both of the EC Framework Directive 96/62 EC “Ambient Air Quality Assessment and Management” and its associated Air Quality Daughter Directives, and the UK National Air Quality Strategy. For example, the performance requirements for instruments monitoring sulphur dioxide, oxides of nitrogen and PM_{10} particulates are based on the limit values and required uncertainties of the new EC Air Quality Daughter Directive[(2)]. Similarly, for carbon monoxide and benzene the requirements are based on the draft Daughter Directive[(3)]. Appropriate CEN Standards are currently being developed to meet the objectives of these Daughter Directives. The key aim in defining the MCERTS performance standards is that they should be compatible with the developing CEN standards. Close liaisons will be maintained with the appropriate CEN Committees and their Working Groups to ensure that this compatibility is maintained.

PROCEDURE FOR SUBMISSION OF INSTRUMENTS

The instrument certification procedure has been designed to be as simple and straightforward as possible. It would consist of the following stages:

General requirements

Complete CAMs would be submitted for certification. For a CAM designed to operate using a common sampling manifold, the supplied system should include all the components required up to the connection to that sampling manifold. Where the CAM is designed to sample directly the ambient atmosphere - for example particulate monitoring systems (in which the sampling head is integral to the performance of the system), then the whole system including the sampling system would be tested. Where the CAM provides a sample that is subsequently analysed, for example systems designed to sample for metals and PAHs, then the complete sample collection, sampling conditioning and sample handling system would be submitted.

Application

The instrument manufacturer submits an application to Sira together with unambiguous identification of the instrument, two sets of drawings, control copy of any software and evidence of quality control procedures eg ISO 9002, ISO 9001.

Selection of the certification committee

Sira appoints a certification committee (normally three people) who have knowledge and experience of the instrumentation. They would have to be impartial eg not involved with the specific manufacturer for the previous two years.

Review of application

The certification committee reviews the application and agrees the relevant performance standards and appropriate laboratory and field tests for the instrument's intended applications.

Quotation for testing

Sira, in conjunction with the applicant, would ask qualified test laboratories to quote. The client confirms the test programme, test schedule, and quotation, usually in a preliminary meeting with Sira and the test laboratories. The client places a contract with Sira to cover all testing and certification. Sira place a contract with the chosen laboratories.

Laboratory and field tests

The manufacturer sends the instrument(s) directly to the test laboratory. At the conclusion of testing the reports are sent to Sira and the manufacturer. The testing laboratory immediately informs Sira of any failures during testing to allow the applicant to take corrective action.

Review of test results

The certification committee reviews all test results and decides to issue or refuse a certificate. The reasons for refusal will be reported, as will any special conditions applying to the certificate. The certificate will list the valid range of applications. A complaints and appeals procedure may be invoked in the event of any disagreement.

FUTURE MCERTS DEVELOPMENTS

The Agency plans to expand MCERTS progressively to cover other regulatory monitoring activities including:

- manual stack emissions monitoring;
- portable stack monitoring instruments;
- water monitoring;
- data acquisition and handling.

An update on the Agency's proposals to extend MCERTS to manual stack emissions monitoring is included in Session 1 at CEM99.

FURTHER INFORMATION

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2. Proposal for a Council Directive relating to limit values for sulphur dioxide, oxides of nitrogen, particulate matter and lead in ambient air. (OJ 1998 C 9/5)

3. Proposal for a Council Directive relating to limit values for benzene and carbon monoxide in ambient air.

BIOGRAPHICAL DETAILS

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Following the award of a BSc and PhD in Chemistry from Leeds University John spent a couple of years carrying out post doctoral research before joining Royal Ordnance plc as a production manager. After 7 years in a variety of posts he moved to the Environment Agency, first as a site inspector, and then to his current job as Team Manager in the National Compliance Assessment Service, responsible for Integrated Monitoring Strategies.