

LEHDER Environmental Services

Are Your Facility CEMs in Compliance?

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Introduction

With the recent initiatives for cleaner sources of energy in Ontario, a large number of natural gas fired power plants have been built or are being built as you read this. Although these state of the art facilities are renowned for their "low level emissions" when compared to the traditional coal fired plants, these plants are still targeted for emission monitoring. Many of these facilities utilize Continuous Emission Monitors (CEMs) to measure the emissions from the main exhaust stacks of the plants.

Oxygen, Carbon Monoxide and Nitric Oxide CEMs are typically installed as a condition in the facility Ministry of Environment Certificate of Approval (C of A) outlining the types of analyzers and ranges to be used. The Certificate of Approval usually refers to the Environment Canada Report EPS 1/PG/7 December 2005 document entitled "*Protocol and Performance Specifications for Continuous Monitoring of Gaseous Emissions from Thermal Power Generation.*" In order to be in compliance the CEMs should be operated in accordance with this protocol.

There are a number of items that must be completed to ensure the CEMs are installed correctly and output valid data. This is imperative if using the data for reporting or trading purposes. The results of the various tests and audits are compared to either the facility C of A Criteria or the EPS 1/PG/7 criteria.

Some of the major items are:

- CEM Certification
- Semi-Annual RATA and Bias Tests
- Annual Availability
- Quarterly Tests
- Quarterly QA Reporting
- Daily Calibration Drift Tests
- Quality Assurance and Quality Control Manual (QA/QC Manual)
- Annual Independent Inspection
- Emissions Reporting
- Future Forecasts

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CEM Certification

Once the CEMs have been installed, their operation must be verified by completing a CEM Certification. During the certification the CEMs should operate normally for seven days – this is called the Operational Test Period (OTP). A Seven Day Drift Test must be performed where a low, mid and high gas is introduced to each analyzer (3 times) at 24 hour intervals. A Response Time Test must also be performed by introducing a low and high level gas (3 times) and determining the time for a 90% response to the gas.

After the OTP a Relative Accuracy (RATA) and Bias Test are performed. This is essentially a comparison of the facility CEM system data (concentrations and emissions) to an acceptable Reference Method. A minimum of nine 30 minute tests or maximum of twelve 30 minute tests are conducted. The results of the CEM Certification tests are compared to either the facility C of A criteria or the EPS 1/PG/7 criteria to determine if the CEM system passes.

Semi-Annual RATA and Bias Tests

At six month intervals after the initial CEM Certification, the first RATA and Bias tests are conducted to verify that the CEM System is still operating in accordance with the facility C of A or the EPS 1/PG/7 Protocol. After the first year of operation the semi annual tests may be waived if the exemption criteria of the EPS 1/PG/7 Protocol are met.

Annual Availability

CEM availability is determined by comparing the number of hours that valid data was generated (while the facility burned fuel) to the total number of hours that fuel was burned during the year. For the first year it must be >90% and thereafter it must be 95%. Peaking units only need to achieve 80%.

Quarterly Tests

Cylinder Gas Audits (CGAs) which check the linearity of the analyzers are a major component of the Quarterly Performance Tests. The test involves introducing a low, mid and high gas to each gas analyzer (3 times) or a stack gas flow test (if using flow monitors). Systems that use F-Factors (factors used to calculate pollutant emission rates) and fuel flow rates must also be audited quarterly by evaluating heat to output quarterly data, performance of abbreviated heat to output data or evaluation of hourly heat input to billing.

Quarterly QA Reporting

Each quarter the facility must prepare a report describing the results of all the applicable performance evaluations carried out in that quarter.

Daily Calibration Drift Tests

Daily automated calibration drift tests are conducted on each analyzer to ensure quality data is being generated at all times. At 24 hr intervals, low and high level gases are introduced to the CEM system. The results of the daily drift tests are compared to the C of A or EPS 1/PG/7 criteria to determine if the CEM system passes.

Quality Assurance and Quality Control Manual (QA/QC Manual)

The facility must have a CEM QA/QC Manual which covers the operation of each CEM at the facility. In general the document must contain all policies and procedures to ensure quality information is being generated and reported from the CEMs.

Annual Independent Inspection

The facility CEM System and the CEM QA/QC program must be audited once per year by an independent inspector. The auditor will determine if the QA/QC policies and procedures are being followed and determine if any major changes were made to the CEMs. A report containing the findings is typically submitted to facility management.

Emissions Reporting

In order to use your CEMs data for Canada’s National Pollutant Release Inventory (NPRI), the facility CEMs must be operated in compliance with the EPS 1/PG/7 Protocol. Many state of the art CEM data acquisition systems are set up to create simple reports which contain the information required for NPRI reporting.

Future Forecasts

With all of the recent media exposure of Greenhouse Gases, the need for accurate emissions monitoring has never been more important. It is likely that in the near future many facilities will require Carbon Dioxide (CO₂) analyzers if they do not already have them installed. Real time on-line emissions data that would be accessible to regulatory authorities is also a realistic possibility.

How can LEHDER assist?

LEHDER currently assists numerous natural gas fired cogeneration facilities throughout Ontario with CEM related issues. Our expertise includes supplying the following services:

- CEM Certification RATA and Bias tests
- Semi-Annual CEM Certifications RATA and Bias tests
- Performance and Guarantee Testing for facility start ups
- Emissions monitoring tests during turbine tuning programs
- Compliance emissions testing
- Annual CEMS QA/QC Manual Audits
- Assisting with NPRI Reporting
- Greenhouse Gases Reporting (Federal and O.Reg. 452)
- Emissions Trading Reporting (O. Reg. 397)

Helpful Web Link:

[EPS 1/PG/7 Protocol to follow for CEMS](#)

Questions?

For further information or questions please contact:

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About LEHDER

LEHDER is one of the largest Air Quality Management consulting companies in Canada. Our team of consulting professionals is built around our core strength in industrial environmental, health and safety management. LEHDER recognizes our client's need to make decisions that provide for operational flexibility while meeting regulatory, economic and social requirements.

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