



INC 2 BRIEFING PAPER SERIES

Continuous Emission Monitoring Systems for Mercury



Continuous emission monitoring systems for mercury (Hg CEMS) are now available and have been required under recent regulations to measure mercury levels in stack gases where emission limits or control technologies requirements apply. For example, Hg CEMS have been installed at more than 600 power-plants in the US, several cement kilns in the US, and 34 cement kilns in Germany. They will soon be installed at many more cement kilns in the US as a result of new Hg emission regulations requiring their use (or equivalent methods).

The advent of continuous emissions monitoring is an important technical advancement since it provides the most direct means of monitoring compliance, and a superior method in terms of accuracy. Hg CEMS provide real time measurements of mercury (by the minute) compared to other monitoring techniques, such as sorbent traps that accumulate mercury over longer time periods, or snapshot stack tests measuring compliance at one point in time under certain conditions.

Mercury emissions from a process can change over time. Various operational factors, such changes in fuel or other feedstocks, could impact performance of mercury controls. Devising a test plan to clearly establish the performance of a mercury control under all operating parameters is difficult. Therefore, Hg CEMS are essential in demonstrating continuous compliance with emissions limits. They also provide the opportunity for the real-time transmission of data electronically to company and/or regulatory officials as needed to facilitate compliance.

How it Works

Hg CEMS rely on a special probe (shown on the left) that samples gas directly from the stack. The sample is sent to an analyzer through a heated line; there samples are measured continuously through atomic fluorescence. The analyzer is combined with a digital monitor, a calibration system and other hardware on a single rack shown below. The monitor also serves as the system controller. Control systems include standard internet connections and protocols which support remote operation and the transmission of monitoring data. The equipment rack requires a climate controlled environment.

Costs

The one-time Installation costs of Hg CEMS is roughly \$ 0.5 million per site in the US. That cost includes about \$200,000 for the Hg CEMS equipment including startup and training, and \$200,000 to \$300,000 for site preparation when retrofitting existing facilities. Costs would be lower for new facilities, and in other countries where labor and other expenses are reduced.

In the US, EPA estimates typical CEMS operations costs are roughly \$20,000 per year for labor and \$65,000 in annual QA/QC, reporting, parts and materials such as gas cylinders. Labor costs may be initially higher reflecting a learning curve for operating the system. Again, these are based upon US labor costs.

Implementation

Monitoring equipment should be included in the BAT guidance to be developed under the treaty, and CEMS should be included among the Best Available Techniques (BAT). By doing so, Parties can be better assured the emission reductions sought by the control measures will be achieved and applied consistently throughout the world.

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