Deploying a Mini-CEM System at the Hampton/NASA Steam Plant

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Abstract

The Hampton/NASA Steam Plant embarked on a project to replace the 16 year old emission monitors for the facility's two refuse fired boiler units. The challenge was to install monitors that could fully meet the current EPA requirements while providing continuous monitoring with less than a one minute response time. The facility installed two Land FGA 930e analyzers close coupled to the outlet duct of the economizer. The sample conditioning system installed has enabled reliable operation while protecting the analyzers. The analyzers passed the initial RATA at the first try, and have been performing well over six months of operation. The total costs for the project was $75,800. Among other improvements, in-situ carbon monoxide emission monitors were installed just after the air pollution control devices. Operator awareness and response to the continuous thirty second in-situ data resulted in reductions of carbon monoxide baseline levels below 25 ppm, and great reductions in sudden spiking. The facility became the first to have dioxin permit emission limits, and within two years emissions of dioxins and other compounds were reduced by 99%.

Background

During the early 1980's the Hampton/NASA Steam Plant served as a stack testing site for the EPA and its contractors. Development for the current EPA Method 23 for dioxin and furans were done at the Hampton/NASA facility. Few test results were initially shared with the facility, for the scope testing was beyond most validated EPA test methods.

Then in 1983 the Washington post reported findings that the Hampton/NASA facility was emitting high amounts of various dioxin and furans. The project actually included test methods for over 300 compounds & elements. NASA Langley engineers observed a nonlinear relationship between carbon monoxide and most of the organic compounds of concern. Reducing the baseline carbon monoxide levels in itself could reduce emission levels significantly. Reducing the spiking of carbon monoxide could have more dramatic results.

The Dynatron carbon monoxide and opacity monitors were 16 years old, and expensive to keep operating. Emission guidelines required more stringent monitoring, but continuous near in-situ monitoring would still be needed for operators to maintain good combustion.

Selection Criteria

The challenge was to get this near in-situ response from an industrial grade monitor that would be fully certifiable to current EPA criteria. The units would have to utilize EPA protocol gas for calibration. The monitors would have to measure carbon monoxide and oxygen on a dry basis, so that the appropriate correction can be made. The monitors would need to send the continuous outputs to the current data acquisition system for processing of averages and standard condition correction.

Choosing a fully extractive system would give maintenance personnel an opportunity to learn the skills needed for a future CEM system. To get quick indications the sample would have to be drawn through a short umbilical run from the economizer outlet, with a dust load of about 1 gr/dscf. The sample would also have