CleanAir

CASE STUDY

Determination of Particle Size Distribution in a Saturated Flue Gas Stream

Background

A large, pulverized coal power plant was experiencing increasing particulate matter emissions from their scrubbed stacks. The client was concerned that a major and costly air pollution control (APC) equipment upgrade was needed to maintain compliance. A particle size analysis was needed solve the problem. One of the test locations, however, was downstream of a venturi scrubber resulting in a saturated gas stream with liquid droplets. The challenge for CleanAir was how to conduct a particle size analysis under these conditions.

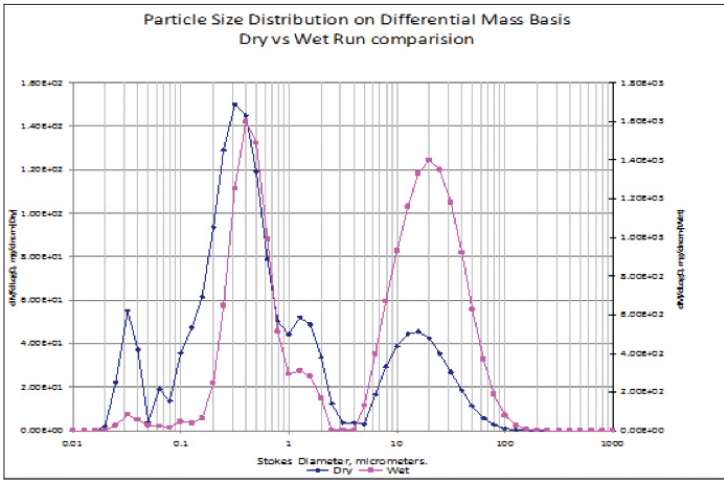
CleanAir's Approach

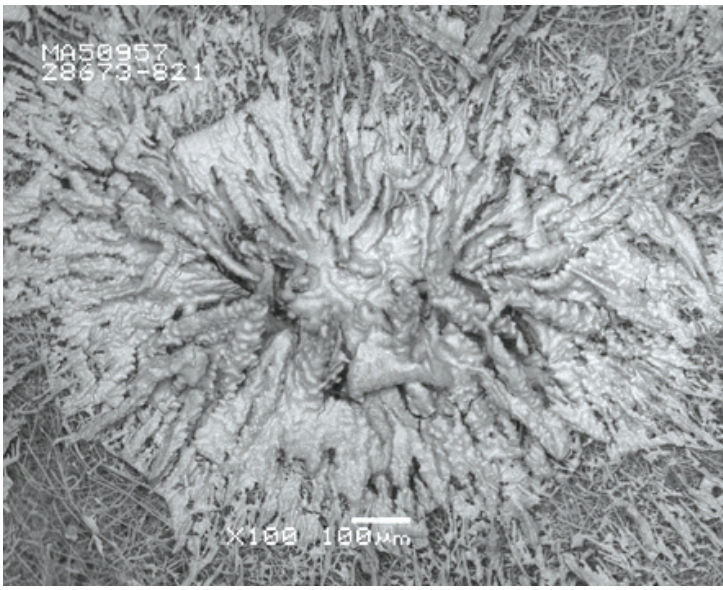
The testing utilized a particle-sizing technique pioneered by CleanAir whereby the size distribution of both the water droplets and particulate matter are determined in the wet gas stream using a Mark V (11 Stage) impactor. To further diagnose the problem, individual impactor stages were analyzed by scanning electron microscopy to determine the morphology, and energy dispersive x-ray spectroscopy to identify the elemental composition for the various particle size ranges.

Results

The test results showed that the demisters downstream of the venturi scrubbers allowed water droplets with entrained particulate matter to pass through which contributed to the increase in stack particulate matter emissions observed from EPA Method 5 testing. Based on CleanAir's data, the facility could focus on the root-cause and repaired and upgraded their demisters at a fraction of the cost of a complete APC upgrade.

Follow-up EPA Method 5 testing conducted after the repairs showed that the previous fraction of particulate laden water drops was no longer emanating from demisters and hence the stack emissions were considerably lower.





Summary

An air pollution control (APC) equipment evaluation was conducted to determine particle size distribution in a saturated flue gas stream with water droplets present. A particle-sizing technique pioneered by CleanAir was used whereby the size distribution of both the water droplets and particulate matter were determined in the wet gas.