The Role of Particulates in Mercury Emission Measurements

Philip J. Dufresne

President ALL BLUE LLC

Hot Topic Hour

Particulates in Emissions can Complicate the Accurate Measurement of Mercury

Understanding how Particulates Affect Mercury Readings can Lead to Improved Accuracy and Help in Making Educated Decisions when Evaluating Data from Engineering Studies of Mercury Reduction Systems

Hot Topic Hour

ALL BLUE

Particulates Contain Mercury and can also Filter Mercury from the Sample Stream

Hot Topic Hour

When Measuring with Sorbent Traps, Particulates will be Collected as Part of the Sample

The Additional Mercury Contained in the Particulates will be Added to the Sample Values

The Particulates Positioned at the Front of the Trap will Also Filter Vapor Phase Mercury from the Gas Stream

When Measuring with Continuous Monitors, Particulates are Excluded and not Collected as Part of the Sample

Additionally, The Interaction of the Particulates and the Gas Stream in the Filtering Process may Remove Some of the Mercury from the Vapor Based Portion of the Sample

For Compliance Monitoring Measurements Downstream from Effective Particulate Removal, Sorbent Traps and Continuous Monitors Should Produce Similar Values

The Effects of Particulates should be Minimal

When Particulate Levels are Significant, Understanding how Measurements are Affected with each Analytical System can Reduce Confusion

It can be useful to collect a sample of the particulates present at the sampling site and determine the mercury concentration

Pre-Filter and Particulates Collected from Sorbent Traps can be Analyzed Separately

Using a Balance, Concentration of Mercury in Particulates Collected on Trap can be Compared to Baseline Levels to Indicate Amount of Vapor Phase Mercury that has been Filtered

When trouble-shooting inconsistent results, it can also be useful to obtain some particulates collected on the CEMM filters and test for mercury concentration comparing the results to baseline values.

Is vapor-phase mercury being scrubbed by these particulates?

Hot Topic Hour

With Low LOI Conditions, Particulates Seem to Scrub Only Oxidized Mercury from the Vapor Phase

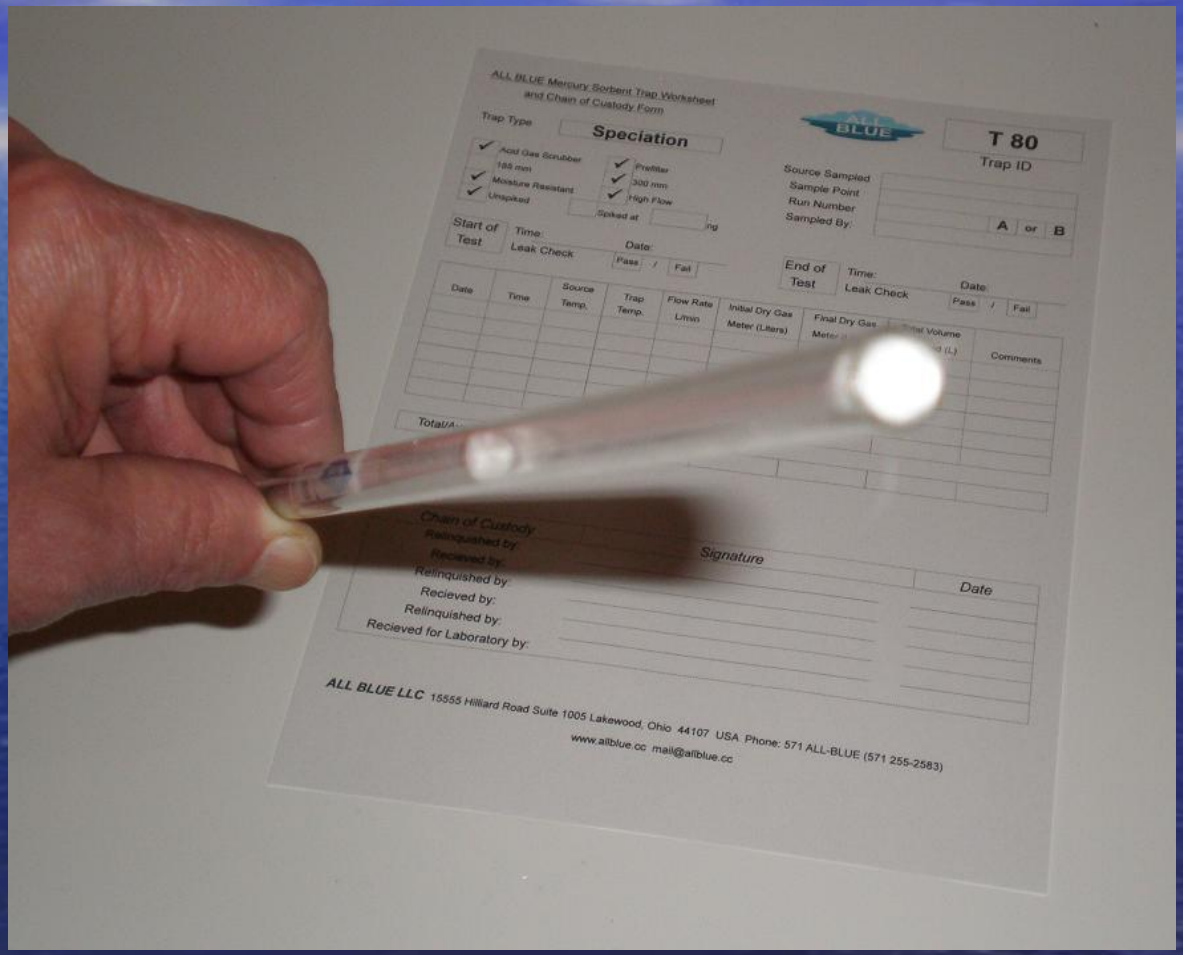
Elemental Mercury Vapor was Introduced to a Series of Blank Sorbent Traps with an Additional Section Added Containing Particulates from a Test Source. All the Mercury Passed through the Particulates and was Recovered on the First Charcoal Section of the Traps.

ALL BLUE

With Higher LOI Conditions, Particulates Should Scrub Elemental Mercury as Well

Unburned Carbon Should Trap Elemental Mercury Vapor

Traps with Pre-Filters at the Very Tip Can be Useful for Preventing Particulate Build-up



Hot Topic Hour

Comparison of Speciation Traps with *Pre-Filter at Tip* and Speciation Traps with *Regular Recessed Pre-Filters*

Speciation Results are Similar on Each Trap in the Pair

Sample I.D.	Trap Type	Pre-Filter ng Mercury	Section 1 ng Mercury	PreFilter & Sec.1 ng Mercury	Section 3 ng Mercury
A	Reg. PreFilter	14.4	19.4	***33.8***	**5.9**
B	Tip PreFilter	0.6	34.3	***34.9***	**7**
C	Reg. PreFilter	15	20.5	***35.5***	**6.1**
D	Tip PreFilter	ND	31.7	***31.7***	**6**
E	Reg. PreFilter	7.9	6.5	***14.4***	**3.9**
F	Tip PreFilter	ND	13.6	***13.6***	**3**

Pre-Filter at Tip Traps Less Oxidized Mercury Which is Instead Trapped on Section-1

Some Issues to be Considered

Should Particulate-Bound Mercury be Included in Total Mercury Emissions?

There are 2 Standard Mercury Emission Testing Methods

<u>Sorbent Traps</u> Include Particulates and Results may be Biased High.

<u>Continuous Monitors</u> Filter Particulates and may Additionally Scrub Some Vapor-Phase Mercury and Results may be Biased Low

To Get Greater Agreement Between the 2

Should Inertial Filters or Remote Sampling be Allowed with Sorbent Traps?

Should Particulate-Bound Mercury be Added to CEMM Results?

Hot Topic Hour

Inertial Filters

It Would be Interesting to Test Whether Inertial Filters Scrub Vapor-Phase Mercury and to what Degree

These Complications from Particulates Together with Lower-and Lower Mercury Emission Levels make Performing a Successful RATA Difficult

Should RATAs be Allowed with Fewer, Longer Runs?

Should Breakthrough Limits be Relaxed for Testing at Low-Level Sources When the Limit is Close to the Detection Limits?

Hot Topic Hour

ALL BLUE

The Role of Particulates in Mercury Emission Measurements

Questions?

Philip J. Dufresne

President ALL BLUE LLC

phil@allblue.cc 571-ALL-BLUE (571-255-2583) www.allblue.cc

Hot Topic Hour