Frequently Asked Questions (FAQs) for Method 1

8/24/16

1. Regarding your answer to another question about the CEMS cross-stack slotted tube partially blocking the stack cross section, you recommended that a person calculate the effective cross sectional area of the slotted tube, that is, the area of the stack blocked by the tube, and from that calculate an equivalent diameter. You noted that the pitot sampling location can be two or more of those equivalent diameter. You noted that the pitot sampling location can be two or more of those equivalent diameters downstream of the tube and still meet the Method 1 location criteria. After I calculate the effective area of the blockage, do I add or subtract that area from the stack area?

The equivalent diameter calculated from the effective area of the CEMS slotted tube becomes the distance of consequence. For example, if the tube is 1 foot in diameter and 20 feet long, the area blocked by the tube is 20 ft^2. The equivalent diameter for this area is 5 feet. Using the two or more equivalent diameter distance guideline, the pitot sampling location could be located as close as 10 feet downstream of the slotted tube.

2. We have an awkward situation sampling for gas emission rate in a duct to certify an in-situ CEMS with a cross-stack pipe (I.e., slotted tube). We have to measure the stack flow rate at a location downstream of the CEMS, but we don't want to go higher up the stack than necessary. That begs the question "is the CEMS pipe a flow disturbance and how far downstream of the disturbance must be the pitot measurement location?

I expect many of us will run into situations like this one now that EPA is writing more mass emission rate and emission trading rules. In this case, I think the answer lies in another method dealing with troublesome locations for flow measurements and that is Method 5D. Section 4.1.2 of this method describes the use of flow straighteners for short stacks which are, in a way, flow disturbances much like the slotted tube for the CEMS. In this section, the pitot sampling location is defined in terms of the equivalent diameter of the area of vane opening in meeting the two-diameter criteria as in Method 1.

For your situation, I recommend that you calculate the effective cross sectional area of the slotted tube, that is, the area of the stack blocked by the tube. Then, calculate from that an equivalent diameter. Your pitot sampling location can be two or more of those equivalent diameters of the tube and still meet the Method 1 location criteria. Note that this advice applies only if the CEMS location meets the two equivalent stack diameter upstream disturbance criterion