NC DAQ Source Test Observers Checklist - Reference Method CEM Testing

Facility Name / Location :

Facility Contact / Phone #:

Testing Firm / Contact:

Permit # / Source Tested:

Applicable Regulation / Pollutant:

Process Data / Production Rate (see reverse side):

Sample Date / Time: Run 1 _____ /_____-_____ Run 2 _____/_____-_____ Run 3 _____/_____-_____

Ask for an explanation to any question answered "No" and attach comments to this form.

Method 1 - Sample and Velocity Traverses for Stationary Sources	**YES**	**NO**
1.1) Method 1 calculated correctly (**see reverse side**)?		
1.2) Cyclonic flow check completed? (Average of absolute value of all angles <20 degrees?)		
Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate	**YES**	**NO**
2.1) Pitot tube leak check completed after each run?		
2.2) Visual check of pitot tube heads - good condition?		
2.3) Manometer level and zeroed correctly?		
2.4) Static pressure measured during the test day?		
2.5) Barometric pressure recorded and adjusted for elevation? (**see reverse side**)		
2.6) Pitot tube heads oriented to axis of flue? / Pitot tube perpendicular to axis of stack?		
2.7) Temperature recorded at each sampling point?		
Method 3 - Gas Analysis for O_2, CO_2, and Dry Molecular Weight	**YES**	**NO**
Skip this section if O_2 & CO_2 concentrations are determined via analyzers.		
3.1) Orsat or Fyrites used? (circle)		
3.2) Orsat performed in triplicate? Analysis consistent?		
Method 4 - Determination of Moisture Content in Stack Gases	**YES**	**NO**
4.1) Impingers used or some other type of condenser? Multi point sample?		
4.2) H_2O in first 2 impingers, 3rd impinger empty, silica gel in 4th impinger?		
4.3) Temperature at the exit of impingers / condenser <68F? (**see reverse side**)		
4.4) Silica gel in good condition? - Blue-new, Pink-spent (unable to absorb more H_2O)		
CEM Methods: Method 3A-O_2/CO_2, M6C-SO_2, M7E-NO_x, M10-CO	**YES**	**NO**
5.1) System leak check performed during test day? (not required per method but good Q.A.)		
5.2) Sample point w/in centroid of stack (compliance test)?		
5.3) Sample conditioner / dryer used?		
5.4) Heated sample line used prior to sample conditioner?		
5.5) Moisture visible in the sample line? (Do not explain a "No")		
5.6) Filter used: "In stack" or "heated out of stack"		
5.7) Sample system flow rates within 10% of calibration flowrates?		
5.8) All concentration measurements below the span value for that pollutant?		
5.9) Data Recorder: Digital / Strip chart / Manual / other_____ (circle one)		
5.10) NO_x monitoring: NO_2 to NO convertor operating? Total NO_x being analyzed?		
5.11) Calibration Error Check performed for all analyzers and within specifications (2% of span)?		
5.12) System Bias Check performed for each analyzer before the first run, between each run, and after the last run?		
5.13) Test team monitoring analyzer zero drift and calibration drift between each run?		

The following page (front/back) should be completed to the extent possible. The data may be transferred from print outs provided by the tester. Preferably, the calibrations should be viewed at the time they are performed to assure monitor stability and correct flowrates for each calibration gas.

Process Data: It is absolutely imperative for the facility to record the pertinent data <u>during</u> the test so that the measured emissions can be correlated to a production rate and compared to the permit limit. The test will be unacceptable without production data.

Method 1: If stack is between 4" - 12" then Method 1a must be employed. If duct is <4" then alternative methods must be used. (Contact SSCB with any test questions)

Stack Diameter?_____ Measured on site?

Port distance from upstream disturbance (A)_____ Upstream Diameters (A)_____

Port distance from downstream disturbance (B)_____ Downstream Diameters(B)____

# of Sampling Points?_____ (Draw a line vertically from the "Distance A" axis down to the step chart, and from the "Distance B" axis up to the step chart. The maximum # of points marked on the chart yields the minimum # of points to be sampled.)

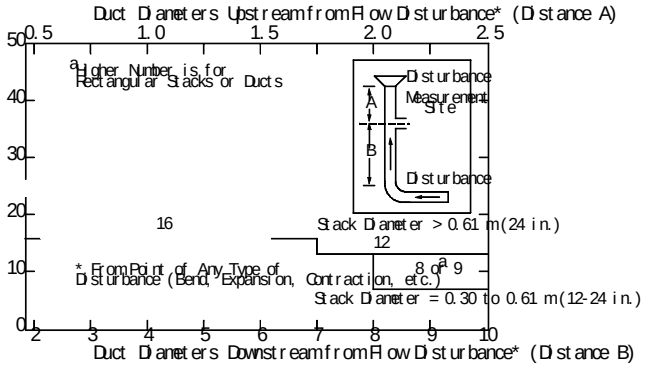

Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

Points correctly marked on the pitot tube?____ Port length accounted for in calculations?____

Remarks:_____

Barometric Pressure: Barometric pressure must be adjusted minus 0.1" per 100ft elevation increase or vice versa for elevation decrease. (Elevation at which barometric pressure is measured compared to the elevation at the test platform.)

Exit Temperature: The temperature of the dry gas leaving the impingers/condenser must be below 68F. When the ambient temperature is above 68F it may take approximately 5 minutes for the thermal effects of the ice bath to cool the exit thermometer below 68F.

CEM Methods:

There shall be no adjustments made to the analyzers after the start of the Calibration Error test. If an adjustment is made, reject all data since the last completed system calibration. The Calibration Error test shall be re-performed and any subsequent system calibrations that are necessary. The calibration and sample gas flow rates can and should be adjusted to within 10% of the flowrate during the calibration error test. The mid range or high range gas can be used for the system bias test; however, it is preferred to use the upscale calibration gas closest to the effluent concentration. It is also possible to use more than the required number of gases as long as the minimum gases were used. Single point gas sampling is acceptable for compliance testing. The gas sample should be extracted from the center of the stack. The span of the analyzers shall be selected such that the gas concentration equivalent to the emission standard is not less than 30% of the span. If at any time during a run the measured gas concentration exceeds the span, the run shall be considered invalid.

Remarks:_____

CEM Page 2/2	Cal. Gas Values (A)	Direct Cal. Response (B)	Cal. Error % [(A-B)/C]*100 (<2%)	System Cal. Response Pre-Run 1 (R1)	System Bias % Pre -Run 1 [(R1-B)/C]*100 (<5%)	System Cal. Response Pre-Run 2 (R2)	System Bias % Pre-Run 2 [(R2-B)/C]*100 (<5%)	System Cal. Response Pre-Run 3 (R3)	System Bias % Pre-Run 3 [(R3-B)/C]*100 (<5%)	System Cal. Response Post-Run 3 (R4)	System Bias % Post-Run 3 [(R4-B)/C]*100 (<5%)
O_2	0										
Span: (C)											
CO_2	0										
Span: (C)											
SO_2	0										
Span: (C)											
NO_x	0										
Span: (C)											
CO	0										
Span: (C)											

Calibration Error value shall be equal to or less than 2%. System Calibration Bias shall be equal to or less than 5%. The sampling team shall calculate and report the calibration drift for each analyzer between each calibration. The zero drift and calibration drift are limited to 3% of the span over the period of each run. The calculation for drift is:
(Final system cal. - Initial system cal) / span *100. All calibration gases shall be used for the calibration error test. Only the zero and one span gas are required for the system calibrations.

CEM	**Span**	**Run 1 Maximum Conc.**	**Run 1 Average Conc.**	**Run 2 Maximum Conc.**	**Run 2 Average Conc.**	**Run 3 Maximum Conc.**	**Run 3 Average Conc.**
O_2							
CO_2							
SO_2							
NO_x							
CO							

CEM Page 1/2	%	Calibration Gas Ranges	Calibration Gas Values	Gas Manufacturer & Cylinder #	Protocol 1 gas?	Expiration Date OK?
O_2	0-10%	0-10%	N_2 or other non - O_2 gas			
Span:	40-60%					
	80-100%					
CO_2	0	0	N_2 or other non - CO_2 gas			
Span:	40-60%					
	80-100%					
SO_2	0	0	N_2 or other non - SO_2 gas			
Span:	40-60%					
	80-100%					
NO_x	0	0	N_2 or other non - NO_x gas			
Span:	40-60%					
	80-100%					
CO	0	0	N_2 or other non - CO gas			
Span:	~30%					
	~60%					
	~Span					

To calculate cylinder gas range, multiply span by corresponding percentage (0.4* span, 0.6* span). The calibration gas to be used shall fall within these values. CO gases do not need to be exactly 30%, 60%, and span, but should approximate the percentages. For CO testing, the "Span" gas value can be considered 80-100% of the calibrated span. Method 10 for carbon monoxide has slight variations from method 6c, but most test companies perform CO testing to method 6c requirements.