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DURHAM-YORK ENERGY CENTRE

Air Emission Monitoring Plan

Submitted to:
Ontario Ministry of the Environment
Director - CENTRAL REGION OFFICE
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REPORT

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Acronyms

AEMP	Air Emission Monitoring Plan
APC	Air Pollution Control
CEM	Continuous Emission Monitor
DAHS	Data Acquisition and Handling System
DYEC	Durham York Energy Centre
MCR	Maximum Continuous Rating
RATA	Relative Accuracy Test Audit

1.0 INTRODUCTION

Under the Environmental Assessment Act – Notice to Proceed with Undertaking EA File No. 04-EA-02-08 (Section 12 and 13), an Air Emission Monitoring Plan (AEMP) has been prepared in accordance with the requirements set forth by the EA Notice of Approval to Proceed, Section 12: Emission Monitoring and Section 13: Air Emissions Operation Requirements. This AEMP includes the following:

1) Identification of all sources of air emissions at the site to be monitored;

2) Identification of which contaminants will be monitored by continuous emissions monitoring and which by stack testing;

3) The proposed start date for and frequency of air emissions monitoring and stack testing;

4) The frequency of and format for reporting the results of air emissions monitoring and stack testing;

5) The contaminants that shall be monitored and/or stack tested, which shall include, at a minimum, those contaminants set out in Schedule 1 to the EA Notice of Approval to Proceed with the Undertaking and the Environmental Compliance Approval (ECA) **7306-8FDKNX** as summarized by Appendix A and B to this AEMP; and

6) A notification, investigation and reporting protocol to be used in the event that the concentration(s) of one or more of the contaminants released from an emission source that requires approval under Section 9 of the Environmental Protection Act exceed the relevant limits.

In addition, odour has been addressed separately in the "Odour Management and Mitigation Plan", April 2012 (Rev) which responds to Section 18 of EA Notice of Approval to Proceed as well as the ECA:

- Sections 6(1)(a) & Schedule B - undertaking initial testing to document the maximum 10-minute odour unit level at sensitive receptors;
- Section 8 – Odour Management; and
- Section 10 – Complaints/Odour Contaminant Emissions Response Procedure.

Implementation of the AEMP will be initiated such that monitoring commences when the first discharges are emitted from the Durham York Energy Centre (DYEC) to the air and shall continue until such time as the Director makes notification that the AEMP is no longer required.

The AEMP is a live document, to be updated based on revisions to the DYEC operations. Where such changes may occur, a process must be followed to consider them within the context of the Minister approved EA, the approved ECA and the approved Source Testing Protocol to determine if an amendment to the EA and/or ECA is required. Therefore, any potentially material changes to DYEC operations need to consider potential impacts on the EA and ECA prior to them being carried out. Consultation undertaken in support of amendments will be determined in consultation with the MOE - EAB.

2.0 FACILITY DESCRIPTION

The Facility will accept Solid Waste from the Regions of Durham and York. The sources of waste are post-diversion residual waste collected at curbside as well as any residual waste materials collected at public drop-off centers and transfer stations. The only institutional, commercial, and industrial (IC&I) waste to be managed at the Facility will be residual waste where the Regions will have waste management procedures in place.

The maximum thermal treatment rate for the facility established by the Environmental Compliance Approval (ECA) is 140,000 tonnes/year of waste. The Facility will operate on a continuous basis; 24 hours/day, seven (7) days/weeks, 365 days/year. Waste may be delivered six (6) days per week between 7:00 am to 7:00 pm. The proposed operating schedule may be adjusted depending on demand and facility needs within the established setup indicated in the ECA (i.e., waste can only be received from Monday to Saturday – excluding statutory holidays, and between 7:00 am and 7:00 pm – ECA's Condition 4(1)(b)).

The Facility consists of two (2) thermal treatment trains, each equipped with independently operated boilers/furnaces and air pollution control equipment. The treated exhaust gases are vented to a common 87.6 m stack and released into the atmosphere.

Waste will only be accepted from approved haulers that have a valid waste licence except for municipal or exempt vehicles as per Section 16(2)(a) of Regulation 347 General – Waste Management, made under the Environmental Protection Act, R.S.O. 1990. All incoming waste vehicles must proceed to a weigh scale to allow the vehicle weight, waste type and source to be recorded by the scale operator. A maximum of 7,350 cubic metres of waste storage will be provided in the storage pit with waste stored above and below the tipping floor level.

Table 1 presents general information about the Facility relevant to this AEMP.

Table 1: Facility Description

Facility:	**Durham-York Energy Centre**
Location:	72 Osbourne Road, Courtice, Ontario, L1E 2R2 Clarington Energy Business Park, Clarington, Ontario
Main activities/equipment used:	Thermal Treatment of Solid Waste
Production:	140,000 tonnes per year @ MCR 218 tonne/day @ 13 MJ/kg per train.

The location of the Facility is presented on Figure 1.

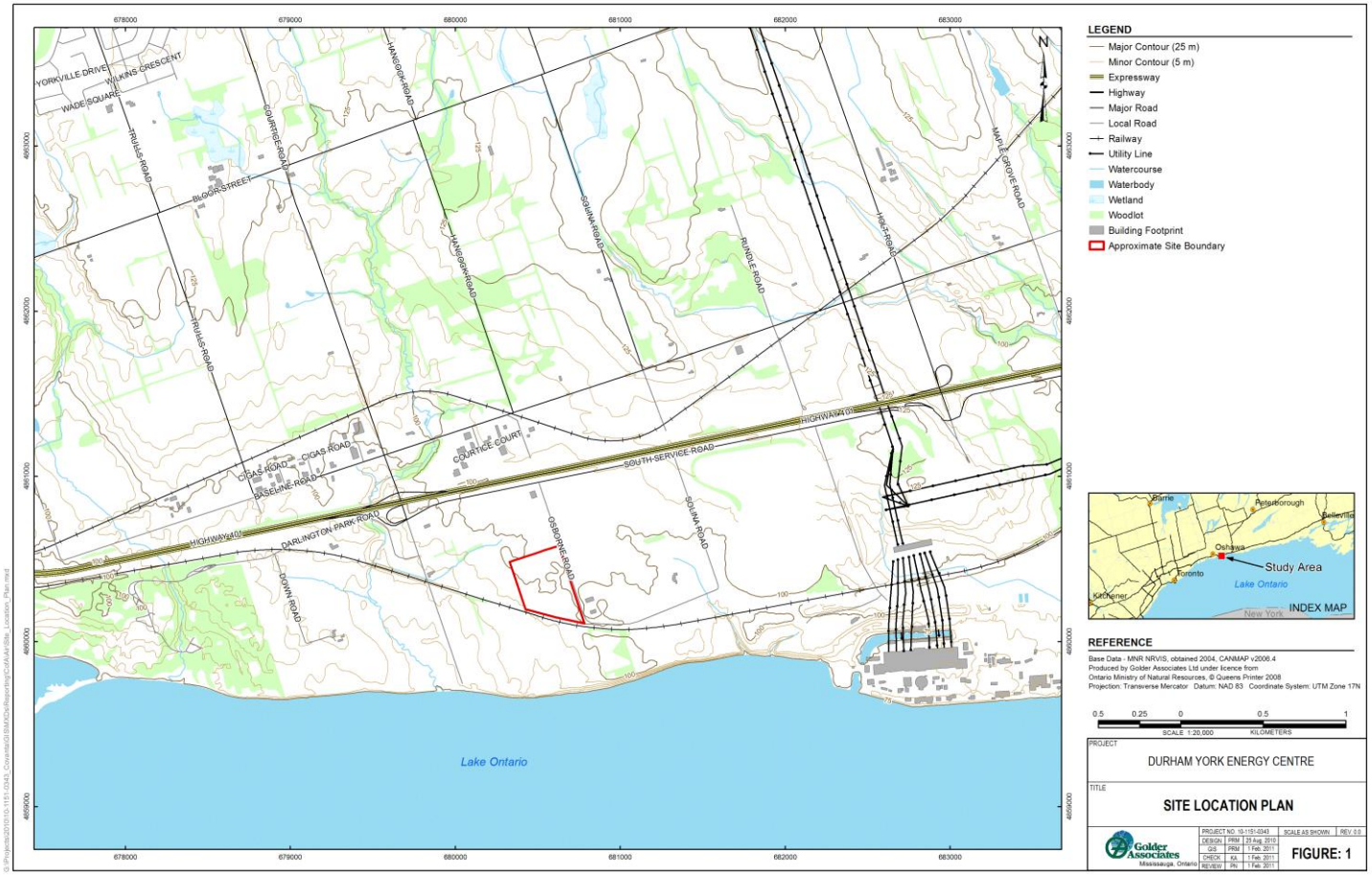

Figure 1: Location of Durham York Energy Centre

3.0 RESPONSIBILITIES

The following identifies the responsibilities held by each of the employment levels at the Facility as they pertain to this AEMP.

3.1 Facility Manager or Designated Official:

The Facility Manager, or designate, is responsible for:

- reviewing the effectiveness of the emission monitoring program at the Facility; and
- ensuring the required resources are in place to execute the AEMP.

3.2 Facility Environmental Specialist or Designated Official:

The Facility Environmental Specialist, or designate, is responsible for:

- setting in motion source testing procedures for the initial and subsequent annual testing programs, as required by the ECA's Condition 7(1), and in accordance with the procedures and timelines outlined in the ECA's Schedule "E"
- scheduling and coordinating the maintenance and operation of the emission monitoring equipment;
- preparation and submittal of the data to be reported to the regulator and public in accordance with this AEMP and the ECA;
- Coordinating the initial CEMs Relative Accuracy Test Audit (RATA), subsequent annual CEMs relative accuracy recertification, and ECA's CEMs minimum performance specifications validation, as listed in the ECA's Schedule "F".
- data validation;
- daily data review;
- daily CEM system inspection;
- procurement of CEM system equipment/materials; and
- operation, maintenance and reporting of the Continuous Dioxin sampling system.

Staff responsible for operating and maintaining the CEM system and for interpreting CEM data by the Data Acquisition and Handling System (DAHS) will be trained by Covanta and/or the CEM manufacturer. Ongoing training will be conducted on an as-needed basis.

4.0 STATIONARY EMISSION SOURCES

This section identifies the sources and emissions from each source.

- Section 4.1 Identification of all sources of air emissions at the Facility to be monitored.
- Section 4.2 Identification of contaminants which will be quantified by continuous emission monitoring and/or stack testing.
- Section 4.3 Start and frequency of emission monitoring program.
- Section 4.3 Reporting of Emission Monitoring Results.

4.1 Identification of Emission Sources

The primary stationary emission source at the DYEC is the Main stack which releases contaminants from each of the two combustion trains. In addition, there are additional minor process sources including vents from dry material silos and tank storage and auxiliary diesel generators. The emissions from these minor sources have been assessed as part of the DYEC Emission Summary and Dispersion Modelling (ESDM) report and are not required to be tested or monitored.

The physical characteristics of the Main stack are presented in Table 2. The stack is common between the two combustion trains meaning the flues are mixed prior to release into the atmosphere. The flue gas from each train will be independently ducted to the bottom of the stack.

Table 2: Physical Characteristics of the Main Stack

Stack Id	Location (Northing, Easting)	Stack Height Above Grade [m]	Stack Inner Diameter [m]	Flue Id	Stack Exit Gas Temperature [°C]	Stack Volumetric Flow Rate [Am³/s] (1)	Stack Volumetric Flow Rate [Rm³/s] (2)
Main	(680538, 4860346)	87.6	1.7	Train 1	132.2	23.76	19.37
				Train 2	132.2	23.76	19.37
				Total	132.2	45.52	38.74

Notes: 1) Based on processing 218 tonnes/day of waste with 13 MJ/kg heating value (100% maximum continuous rating or MCR).

2) Reference conditions of 0% Moisture, 11% Oxygen and 298.15K temperature.

The measurement location of the CEM system will be constant with *40 CFR 60*, Appendix F or *EPS 1/PG/7 - Protocols And Performance Specifications For Continuous Monitoring Of Gaseous Emissions From Thermal Power Generation (December 2005).*

4.2 Identification of Contaminants

The ESDM report provides a list of potential contaminants that maybe released into the atmosphere. Of these contaminants, some will be monitored continuously with the aid of the CEM system while others will be measured on an annual basis during stack testing. Table 3 presents the list of contaminants to be continuously monitored after the economizer (prior to the APC equipment) or after baghouse, as required by Schedule 1 to the EA Approval ECA prior to release into the airshed.

Organic Matter or total hydrocarbons (THC) will be monitored at the economizer outlet which is an additional indicator to monitor the combustion efficiency of the DYEC but is not used for compliance. Source testing will be used to determine compliance for this parameter as per Schedule "C" of the ECA. Similarly for dioxin/furans which will be monitored with the aid of a state of the art long-term sampling system (Section 7(3)), compliance with the respective ECA limitation will only be determined using source testing as per Schedule "C" of the ECA.

Table 3: Combustion Train Monitoring Scope

Parameter	Baghouse Outlet	Economizer Outlet
NOx (as NO_2)	✓	
SO_2	✓	
HCl	✓	
HF	✓	
NH_3	✓	
CO		✓
THC (as CH4) (1)		✓
Opacity	✓	
Moisture	✓	
O_2	✓	✓
Dioxin/Furan (2)	✓	

Note: (1) CEM for THC installed as a separate component that is not part of the CEM system used for compliance determination.

(2) Dioxin/Furan will be monitored using long-term integrated sampling and not used for compliance determination.

The dedicated CEM system will be based upon separate flue gas sample and transport systems for the economizer and ID fan inlet or outlet sample points, each of which will transport the sample to a free-standing CEM system enclosure. The CEM system will be configured to provide all necessary reports that document emissions from the Facility. The system installation and calibration will follow the requirements of *40 CFR 60*, Appendix F or *EPS 1/PG/7 - Protocols And Performance Specifications For Continuous Monitoring Of Gaseous Emissions From Thermal Power Generation (December 2005) as appropriate.* Results from the long term dioxin/furan sampling system will be evaluated during the annual Source Testing program in accordance with the principles outlined by 40 CFR 60, Appendix B, Specification 4 and as approved by the Director.

As shown in Table 3, there will be an O_2 CEM before and after the APC equipment. The oxygen monitor is required to correct actual contaminant concentrations to 11% O_2. Information from the SO_2 and HCl monitors after the APC equipment may also be used by the process control system.

In addition, Source Testing will be carried out for contaminants listed in Table 4 and Table 5 with their respective test methods identified. This list is derived from contaminants set out in Schedule 1 to the EA Approval and the

ECA as summarized by Appendix A to this AEMP. Source Testing will follow the Ontario Source Testing Code or USEPA standard protocols and the Source Testing procedures detailed in Schedule "F" of the ECA. Source Testing will be carried out on an annual basis and DYEC will submit a detailed Source Testing Protocol to the Manager, Technology Standards Section, Standards Development Branch, which must be approved prior to Source Testing.

Table 4: List of Contaminants for Compliance Source Testing

Parameter	Test Method
Particulate Matter (Filterable only)	Ontario Source Testing Code, Method ON-5
Cadmium	EPA Method 29
Lead	EPA Method 29
Mercury	EPA Method 29
Dioxin/Furans	Environment Canada EPS 1/RM/2, EPS 1/RM/23 and Method EPS 1/RM/3
Hydrogen Chloride	EPA Method 26 or 26A, Modified
Sulphur Dioxide	EPA Method 6C
Nitrogen Dioxide	EPA Method 7E
Organic Matter	EPA Method 25A
Carbon Monoxide	EPA Method 10

Table 5: Additional ECA List of Contaminants for Source Testing

Parameter	Test Method
Hydrogen Fluoride	EPA Method 13B
Total Hydrocarbons	EPA Method 25A
Carbon Dioxide	EPA Method 3A
Total PM-10 including condensables	EPA Methods 201A/202
Total PM-2.5 Including condensables	EPA Methods 201A/202
Antimony	EPA Method 29
Arsenic	EPA Method 29
Barium	EPA Method 29
Beryllium	EPA Method 29
Total Chromium and Hexavalent Chromium	EPA Method 29 & EPA SW-846 Method 0061
Cobalt	EPA Method 29
Copper	EPA Method 29
Manganese	EPA Method 29
Molybdenum	EPA Method 29
Nickel	EPA Method 29
Selenium	EPA Method 29
Silver	EPA Method 29
Thallium	EPA Method 29
Vanadium	EPA Method 29
Zinc	EPA Method 29
Chlorobenzenes	Environment Canada Method EPS 1/RM/2
Chlorophenols	Environment Canada EPS 1/RM/2

Parameter	Test Method
PCB	Environment Canada EPS 1/RM/2
Volatile Organic Matter (1)	EPA SW-846 Method 0030 & CARB 430
Polycyclic Organic Matter (1)	EPA Method 23 & CARB 429

Note: 1) VOC and POC will be speciated as per the ECA, or Appendix A herein.

4.3 Start and Frequency of Continuous Emissions Monitoring

The CEM system shall be installed and operational prior to the receipt of waste by the DYEC. Emissions monitoring will begin with the Commencement Date of Operation in accordance with manufacturer's specifications of the CEM systems. The CEM system will be tested in accordance with the requirements set forth by the ECA, no later than six (6) months from the Commencement Date of Operation to verify monitor specification detailed in Schedule "F" of the ECA as required under EPS 1/PG/7 or 40 CFR Appendix B.

4.4 Emission Monitoring Recordkeeping and Reporting

Emission data acquisition and handling will be carried out with the aid of a dedicated DAHS. The raw data from the CEM system will enter the DAHS computer which will:

1) Continuously store data;
2) Record calibration events;
3) Generate final averages for each contaminant;
4) Create reports; and
5) Transfer data to the website after data has been compiled into appropriate compliance standard and reporting period.

Data from the CEM system will be used to generate time-averaged values for comparison to prescribed emission limits (Table 6) under normal operating conditions of the facility when operating under steady state but does not include start-up, shut-down or malfunctions. Table 7 presents the non-continuously monitored emission limits, which will be compared to the results of Source Testing on an annual basis under normal operating conditions of the DYEC when operating under steady state but does not include periods of start-up, shut-down or malfunctions.

Table 6: Emission Limits for Continuous Emissions Monitoring.

Parameter	Limit mg/Rm^3	Averaging Period
NOx (as NO_2)	121	Rolling 24-hr
SO_2	35	Rolling 24 hr
HCl	9	Rolling 24 hr
CO	40	Rolling 4 hr
Opacity	10%	Rolling 6 minute
	5%	Rolling 2 hour

NOTE: Reference (R) conditions are 25°C, 101.3 kilopascals, dry basis, 11% O_2

Limits set for normal operating conditions of the facility when operating under steady state and does not include start-up, shut-down or malfunctions.

Table 7: Emission Limits for Non-Continuous Emissions Monitoring (Source Testing)

Parameter	Units	Limit
Particulate Mater	mg/Rm^3	9
THC (as CH4)	mg/Rm^3	33
Cadmium	$\mu g/Rm^3$	7
Lead	$\mu g/Rm^3$	50
Mercury	$\mu g/Rm^3$	15
Dioxin/Furans	pg/Rm^3	60

NOTE: Reference (R) conditions are 25°C, 101.3 kilopascals, dry basis, 11% O_2

Limits set for normal operating conditions of the facility when operating under steady state and does not include start-up, shut-down or malfunctions.

4.4.1 Annual Reports

Electronic reports of monitoring data and related operating information will be submitted to MOE by March 31 of each operating year. Each annual report will be prepared in accordance with the ECA reporting requirements, including the required Third Party Audit of the report. The initial annual report will contain data beginning with the day of the initial approved source testing program.

All related measurement data will be recorded, reduced and validated in accordance with the Condition 15 of the ECA. Data review will include comparisons with QA/QC acceptance criteria and ECA limits. Hard copy and electronic quarterly monitoring data reports will be produced for review.

Annual reports will be prepared for the MOE based on the continuous emission data including daily calibration (zero and span), time averaged concentrations, number of exceedences, and reliability (percent availability of CEM). In addition, Relative Accuracy Test Audits (RATA) reports as well as Source Testing results will be included.

Table 8 presents a summary of emission in stack data to be presented in the annual reports. These reports shall be posted to the DYEC website, including data from the CEM system and latest stack test results.

Table 8: List of Compliance CEM Reporting and Performance Requirements

Parameter	Daily 6-Min	Daily 1-hr Max/Min	Daily 4 hr Max/Min	24-hr Max/Min	Number of Exceedences	Total Duration
NOx (as NO_2)				✓	✓	✓
SO_2				✓	✓	✓
HCL				✓	✓	✓
CO (1)			✓		✓	✓
O_2		✓				
Baghouse Inlet Temperature		✓			✓	✓
Combustion Zone Temperature		✓			✓	✓
Opacity	✓	✓(2 hr)			✓	✓

Notes: (1) the CO limit represents an operational target for the period from and including initial commissioning of the facility to twelve months following the completion of the first Source Testing program. After that period it becomes a compliance standard.

In addition, operational information will also be provided in the annual reports as shown in Table 9.

Table 9: List of Operational Parameter Report and Performance

Parameter	Daily 10-Min Max/Min	Daily 4 hr Max/Min	Daily 24-hr Max/Min
HF			✓
NH_3			✓
CO		✓	
THC	✓		✓
Moisture			✓

Notes: (1) the CO limit represents an operational target for the period from and including initial commissioning of the facility to twelve months following the completion of the first Source Testing program.

4.5 Reporting on Excursions of Performance Requirements

In accordance with Section 13 of the ECA, the District Manager and the Spills Action Centre shall be notified by telephone of incidents that may result in a discharge into the natural environment of any contaminant in an amount, concentration or level in excess of that prescribed by the Regulations and/or imposed by the ECA, failure of the Boiler APC equipment, or power failure resulting in the use of the emergency diesel generator or Total Power Failure. Any such incident will be investigated and a written report submitted to the District Manager within five (5) calendar days of the occurrence. The report will be formatted to include:

i) date of the occurrence;

ii) general description of the occurrence;

iii) duration of the occurrence;

iv) effect of the occurrence on the emissions from the Facility;

v) measures taken to alleviate the effect of the occurrence on the emissions from the Facility; and

vi) measures taken to prevent the occurrence of the same or similar occurrence in the future.

All steps required to bring the facility back into compliance with the operational requirements of the EA Notice of Approval to Proceed and the ECA will be undertaken.

5.0 QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

This section summarizes the overall approach to QA and QC that will be implemented during operation of the continuous emissions monitoring program at the DYEC including QA/QC checks and tests that are required to be performed on a routine and periodic basis, along with the corresponding acceptance criteria, to demonstrate that the CEM system are producing valid measurement data.

5.1 Review of Continuous Emission Monitoring Data

Hard copy or electronic CEM system data reports generated on a daily basis by the DAHS include calibration error reports and data summary reports. In addition, the DAHS output that will be inspected regularly includes: monitor downtime reports, unit downtime reports, and linearity check reports. All CEM data will be reviewed by the Accountable Site Representative.

5.2 Continuous Emission Monitor Maintenance Documentation

DYEC personnel will document when CEM maintenance is performed and describe the problem and any corrective actions taken. For problems not able to be resolved the same day, DYEC will perform an assessment as to the effect on data validity that will be made along with an estimate of the length of time required to resolve the issue. In the case of an instrument being or having to be taken out of service, DYEC personnel will evaluate the potential effects on data recovery, data substitution, monitor uptime/downtime statistics, and whether it is necessary to request and mobilize backup measurement equipment in accordance with the applicable regulations. Maintenance documentation will be maintained electronically or in hardcopy. Any hardcopy documentation generated will be retained in the plant central file.

5.3 Periodic QA/QC Requirements

Under EPS 1/PG/7 and 40 CFR Appendix B acceptable operation of CEM system is first established through initial certification within six (6) months of the Commencement Date of Operation. Initial CEMS certification comprises a series of tests, including a 7-day zero- and high-level calibration error test, a linearity test, and a cycle (or response) time test, followed by a RATA and bias test. Following successful completion of these initial tests, routine operation and maintenance of the CEM system are governed by the QA/QC requirements of EPS 1/PG/7 or 40 CFR Appendix B. Appendix B of this AEMP identifies the CEM equipment and required QA/QC checks to be performed.

5.4 Calibration Error/Calibration Drift Checks/Interference Checks

This section identifies the acceptance criteria for calibration error for the CEM system applicable to initial certification or performance evaluations of CEM system under EPS 1/PG/7 and on a daily basis during routine operation. For gaseous pollutant analyzers, calibration error and calibration drift are synonymous terms.

During routine CEM system operation, calibration error, calibration drift, and interference checks are used to evaluate the stability of analyzer response on a day-to-day basis and to determine whether the instrument is producing valid, quality-assured data or is out of control. The CEMs requirement for daily calibration error checks is established EPS 1/PG/7. For the opacity analyzer, the requirement for daily calibration drift checks is established at 40 CFR 60, Appendix B, PS 1.

Zero and span gas calibration error and drift responses are considered acceptable on a daily basis, and the measurement data are considered to be valid, if the CEMs performance specifications listed in the ECA's Schedule "F" are met. Measurements are still considered to be valid if the calibration error and drift responses are less than or equal to twice these specifications. However, when an analyzer has a zero or span gas calibration response between the respective performance specification and is twice that value, the monitor must be inspected and re-calibrated.

When a zero or span gas calibration response exceeds twice the corresponding performance specification for an analyzer, the instrument is considered to be out of control, corrective action must be taken, and the measurement data are considered to be invalid until the successful completion of another calibration error test.

5.5 Relative Accuracy Test Audits

RATAs are used to establish the ability of a CEMS to accurately measure and report a given pollutant concentration or emissions rate from an affected source and to determine any bias in those measurements. The RATA is required for initial CEMS certification and must be performed annually thereafter during routine operation of the source. These relative accuracy and bias tests will be conducted in accordance with the procedures in 40 CFR Appendix B or EPS 1/PG/7 as appropriate, to validate that the CEM system meets the minimum performance specifications listed in Schedule "F" of the ECA.

5.6 Linearity Checks

Linearity checks are used for the quarterly evaluation of data validity by confirming the linearity of instrument response in accordance with EPS 1/PG/7. They are also required for initial CEM system certification. On a routine operating basis, the analyzer is considered to be out of control if these limits are exceeded.

The calibration error test for the opacity monitor involves inserting three certified calibration attenuators (low, mid, and high range) in the transmissometer path at or as near the midpoint of the path as feasible. Five non-consecutive readings are recorded for each attenuator. The arithmetic difference between the observed readings and the certified attenuator actual values is calculated for each of the 15 readings. The arithmetic difference of the 15 readings is then used to calculate the arithmetic mean, confidence coefficient, and calibration error value for each range. The system calibration error for each range must be less than or equal to 3% opacity in order to pass this part of the performance specification.

5.7 Long Term Dioxin and Furan Sampling System

The ECA, Section 7 Testing, Monitoring and Auditing include evaluation requirements for the Long-Term Sampling for Dioxins and Furans which are more typically applied to a continuous emission monitor.

ECA Requirement specifically states in Section 7.3.a:

> *"The Owner shall develop, install, maintain and update as necessary a long term sampling system, with a minimum monthly sampling frequency, to measure the concentration of Dioxins and Furans in the Undiluted Gases leaving the APC Equipment associated with each Boiler. The performance of this sampling system will be evaluated during the annual Source Testing programs in accordance with the principles outlined by 40 CFR 60, Appendix B, Specification 4."*

This annual evaluation of the dioxin sample system according to the "principles of performance Specification 4" is interpreted to mean that as a minimum, flow to the long term sampling system will be subject to audit testing to ensure that the sampling system is receiving flue gas consistently with flue gas being emitted by the Main stack. The quantity and type of testing to evaluate this monitor will be established as a separate protocol that will be presented to the MOE six (6) months before Commencement Date of Operation. This approach will enable the final protocol to reflect developments in this topic over the period of time between now and Commencement Date of Operation

REFERENCES

Ontario Ministry of the Environment. Procedure for Preparing an Emission Summary and Dispersion Modelling Report – Version 3.0. March 2009.

EPS 1/PG/7 - Protocols And Performance Specifications For Continuous Monitoring Of Gaseous Emissions From Thermal Power Generation (December 2005).

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APPENDIX A

List of Contaminants To Be Tested For During Manual Source Testing

TEST CONTAMINANTS

Hydrogen Chloride

Hydrogen Fluoride

Oxides of Nitrogen expressed as Nitrogen Dioxide

Sulphur Dioxide

Total Hydrocarbons, expressed as methane on wet basis

Carbon Monoxide

Total Suspended Particulate Matter (< 44 microns)

Total PM-10 including condensables

Total PM-2.5 including condensables

Metals

Antimony	**Lead**
Arsenic	Mercury
Barium	Molybdenum
Beryllium	Nickel
Cadmium	Selenium
Chromium	Silver
Cobalt	Thallium
Copper	Vanadium
	Zinc

Chlorobenzenes	Chlorophenols
Monochlorobenzene (MCB) 1,2-Dichlorobenzene (1,2-DCB) 1,3-Dichlorobenzene (1,3-DCB) 1,4-Dichlorobenzene (1,4-DCB) 1,2,3-Trichlorobenzene (1,2,3-TCB) 1,2,4-Trichlorobenzene (1,2,4-TCB) 1,3,5-Trichlorobenzene (1,3,5-TCB) 1,2,3,4-Tetrachlorobenzene (1,2,3,4-TeCB) 1,2,3,5-Tetrachlorobenzene (1,2,3,5-TeCB) 1,2,4,5-Tetrachlorobenzene (1,2,4,5-TeCB) Pentachlorobenzene (PeCB) Hexachlorobenzene (HxCB)	2-monochlorophenol (2-MCP) 3-monochlorophenol (3-MCP) 4-monochlorophenol (4-MCP) 2,3-dichlorophenol (2,3-DCP) 2,4-dichlorophenol (2,4-DCP) 2,5-dichlorophenol (2,5-DCP) 2,6-dichlorophenol (2,6-DCP) 3,4-dichlorophenol (3,4-DCP) 3,5-dichlorophenol (3,5-DCP) 2,3,4-trichlorophenol (2,3,4-T3CP) 2,3,5-trichlorophenol (2,3,5-T3CP) 2,3,6-trichlorophenol (2,3,6-T3CP) 2,4,5-trichlorophenol (2,4,5-T3CP) 2,4,6-trichlorophenol (2,4,6-T3CP) 3,4,5-trichlorophenol (3,4,5-T3CP) 2,3,4,5-tetrachlorophenol (2,3,4,5-T4CP) 2,3,4,6-tetrachlorophenol (2,3,4,6-T4CP) 2,3,5,6-tetrachlorophenol (2,3,5,6-T4CP) Pentachlorophenol (PeCP)

Co-Planar PCBs (Dioxin-like PCBs)	Volatile Organic Matter
PCB-077 (3,3',4,4'-TCB)	Acetaldehyde
PCB-081 (3,4,4',5-TCB)	Acetone
PCB-105 (2,3,3',4,4'-PeCB)	Acrolein
PCB-114 (2,3,4,4',5-PeCB)	Benzene
PCB-118 (2,3',4,4',5-PeCB)	Bromodichloromethane
PCB-123 (2',3,4,4',5-PeCB)	Bromoform
PCB-126 (3,3',4,4',5-PeCB)	Bromomethane
PCB-156 (2,3,3',4,4',5-HxCB)	Butadiene, 1,3 -
PCB-157 (2,3,3',4,4',5'-HxCB)	Butanone, 2 -
PCB-167 (2,3',4,4',5,5'-HxCB)	Carbon Tetrachloride
PCB-169 (3,3',4,4',5,5'-HxCB)	Chloroform
PCB-189 (2,3,3',4,4',5,5'-HpCB)	Cumene
	Dibromochloromethane
	Dichlorodifluoromethane
	Dichloroethane, 1,2 -
	Dichloroethene, Trans - 1,2
	Dichloroethene, 1,1 -
	Dichloropropane, 1,2 -
	Ethylbenzene
	Ethylene Dibromide
	Formaldehyde
	Mesitylene
	Methylene Chloride
	Styrene
	Tetrachloroethene
	Toluene
	Trichloroethane, 1,1,1 -
	Trichloroethene
	Trichloroethylene, 1,1,2 -
	Trichlorotrifluoroethane
	Trichlorofluoromethane
	Xylenes, M-, P- and O-
	Vinyl Chloride

Polycyclic Organic Matter	Dioxin/Furan Isomers
Acenaphthylene	2,3,7,8-Tetrachlorodibenzo-p-dioxin
Acenaphthene	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
Anthracene	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
Benzo(a)anthracene	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
Benzo(b)fluoranthene	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
Benzo(k)fluoranthene	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
Benzo(a)fluorene	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin
Benzo(b)fluorene	
Benzo(ghi)perylene	
Benzo(a)pyrene	2,3,7,8-Tetrachlorodibenzofuran
Benzo(e)pyrene	2,3,4,7,8-Pentachlorodibenzofuran
Biphenyl	1,2,3,7,8-Pentachlorodibenzofuran
2-Chloronaphthalene	1,2,3,4,7,8-Hexachlorodibenzofuran
Chrysene	1,2,3,6,7,8-Hexachlorodibenzofuran
Coronene	1,2,3,7,8,9-Hexachlorodibenzofuran
Dibenzo(a,c)anthracene	2,3,4,6,7,8-Hexachlorodibenzofuran
Dibenzo(a,h)anthracene	1,2,3,4,6,7,8-Heptachlorodibenzofuran
Dibenzo(a,e)pyrene	1,2,3,4,7,8,9-Heptachlorodibenzofuran
9,10-Dimethylanthracene	1,2,3,4,6,7,8,9-Octachlorodibenzofuran
7,12-Dimethylbenzo(a)anthracene	
Fluoranthene	
Fluorene	
Indeno(1,2,3-cd)pyrene	
2-Methylanthracene	
3-Methylcholanthrene	
1-Methylnaphthalene	
2-Methylnaphthalene	
1-Methylphenanthrene	
9-Methylphenanthrene	
Naphthalene	
Perylene	
Phenanthrene	
Picene	
Pyrene	
Tetralin	
M-terphenyl	
O-terphenyl	
P-terphenyl	
Triphenylene	

APPENDIX B

Continuous Emission Monitoring System

PARAMETER:

Temperature.

LOCATION:

The sample point for the Continuous Temperature Monitor shall be located at a point where the temperature in the combustion zone of the Boilers has reached at least 1000^{o}C for a period of not less than one second. Compliance shall be proven by direct measurement or/and a correlation between the measured temperature and the intended target proven by a method acceptable to the Director.

PERFORMANCE:

The Continuous Temperature Monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1)	Type:	"K", "J" or other type or alternative measurement device with equivalent measurement accuracy and suitable to the temperature range being measured
2)	Accuracy:	± 1.5 percent of the minimum gas temperature

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor without a significant loss of accuracy and with a time resolution of 1 minutes or better. Temperature readings for record keeping and reporting purposes shall be kept as one-hour average values.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 95 percent of the time for each calendar quarter.

PARAMETER:

Carbon Monoxide.

INSTALLATION:

The Continuous Carbon Monoxide Monitor shall be installed at an accessible location where the measurements are representative of the actual concentration of carbon monoxide in the Undiluted Gases leaving the combustion zone via the economizer outlet of each Boiler, and shall meet the following installation specifications.

	PARAMETERS	SPECIFICATION
1)	Range (parts per million, ppm)	0 to ≥100 ppm.
2)	Calibration Gas Ports	close to the sample point.

PERFORMANCE:

The Continuous Carbon Monoxide Monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1)	Span Value (nearest ppm equivalent):	2 times the average normal concentration of the source
2)	Relative Accuracy:	≤10 percent of the mean value of the reference method test data or ± 5 ppm whichever is greater.
3)	Calibration Error:	≤ 2.5 percent of actual concentration
4)	System Bias:	≤ 4 percent of the mean value of the reference method test data
5)	Procedure for Zero and Span Calibration Check:	all system components checked
6)	Zero Calibration Drift (24-hour):	≤ 5 percent of span value
7)	Span Calibration Drift (24-hour):	≤5 percent of span value
8)	Response Time (90 percent response to a step change):	≤180 seconds
9)	Operational Test Period:	≥168 hours without corrective maintenance

CALIBRATION:

Daily calibration drift checks on the monitor shall be performed and recorded in accordance with the requirements of Report EPS 1/PG/7.

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 2 minutes or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent, thereafter.

PARAMETER:

Oxygen.

INSTALLATION:

The Continuous Oxygen Monitor shall be installed at an accessible location where the measurements are representative of the actual concentration of oxygen in the Undiluted Gases leaving the combustion zone via the economizer outlet of each Boiler and in the Undiluted Gases leaving the APC Equipment associated with each Boiler, and shall meet the following installation specifications.

	PARAMETERS	SPECIFICATION
1)	Range (percentage)	0 - 20 or 0 - 25
2)	Calibration Gas Ports	close to the sample point.

PERFORMANCE:

The Continuous Oxygen Monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1)	Span Value (percentage):	2 times the average normal concentration of the source
2)	Relative Accuracy:	≤10 percent of the mean value of the reference method test data
3)	Calibration Error:	0.25 percent O_2
4)	System Bias:	≤ 4 percent of the mean value of the reference method test data
5)	Procedure for Zero and Span Calibration Check:	all system components checked
6)	Zero Calibration Drift (24-hour):	≤ 0.5 percent O_2
7)	Span Calibration Drift (24-hour):	≤ 0.5 percent O_2
8)	Response Time (90 percent response to a step change):	≤90 seconds
9)	Operational Test Period:	≥168 hours without corrective maintenance

CALIBRATION:

Daily calibration drift checks on the monitor shall be performed and recorded in accordance with the requirements of Report EPS 1/PG/7.

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 2 minutes or better. Oxygen concentration readings for record keeping and reporting purposes shall be kept as one-hour average values.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent thereafter.

PARAMETER:

Hydrogen Chloride.

INSTALLATION:

The Continuous Hydrogen Chloride Monitor shall be installed at an accessible location where the measurements are representative of the actual concentration of hydrogen chloride in the Undiluted Gases leaving the APC Equipment associated with each Boiler, and shall meet the following installation specifications.

	PARAMETERS	SPECIFICATION
1)	Range (parts per million, ppm)	0 to ≥100 ppm
2)	Calibration Gas Ports	close to the sample point.

PERFORMANCE:

The Continuous Hydrogen Chloride Monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1)	Span Value (nearest ppm equivalent):	2 times the average normal concentration of the source
2)	Relative Accuracy:	≤20 percent of the mean value of the reference method test data or ± 5 ppm whichever is greater
3)	Calibration Error:	≤ 2 percent of actual concentration
4)	System Bias:	≤ 4 percent of the mean value of the reference method test data
5)	Procedure for Zero and Span Calibration Check:	all system components checked
6)	Zero Calibration Drift (24-hour):	≤ 5 percent of span value
7)	Span Calibration Drift (24-hour):	≤ 5 percent of span value
8)	Response Time (90 percent response to a step change):	≤ 240 seconds
9)	Operational Test Period:	≥168 hours without corrective maintenance

CALIBRATION:

The monitor shall be calibrated daily at the sample point, to ensure that it meets the drift limits specified above, during the periods of the operation of the . The results of all calibrations shall be recorded at the time of calibration.

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 5 minutes or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent thereafter.

PARAMETER:

Nitrogen Oxides.

INSTALLATION:

The Continuous Nitrogen Oxide Monitor shall be installed at an accessible location where the measurements are representative of the actual concentration of nitrogen oxides in the Undiluted Gases leaving the APC Equipment associated with each Boiler, and shall meet the following installation specifications.

	PARAMETERS	SPECIFICATION
1)	Analyzer Operating Range (parts per million, ppm):	0 to ≥200 ppm
2)	Calibration Gas Ports	close to the sample point.

PERFORMANCE:

The Continuous Nitrogen Oxides Monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1)	Span Value (nearest ppm equivalent):	2 times the average normal concentration of the source
2)	Relative Accuracy:	≤10 percent of the mean value of the reference method test data
3)	Calibration Error:	≤ 2 percent of actual concentration
4)	System Bias:	≤ 4 percent of the mean value of the reference method test data
5)	Procedure for Zero and Span Calibration Check:	all system components checked
6)	Zero Calibration Drift (24-hour):	≤ 2.5 percent of span value
7)	Span Calibration Drift (24-hour):	≤ 2.5 percent of span value
8)	Response Time (90 percent response to a step change):	≤ 240 seconds
9)	Operational Test Period:	≥168 hours without corrective maintenance

CALIBRATION:

Daily calibration drift checks on the monitor shall be performed and recorded in accordance with the requirements of Report EPS 1/PG/7.

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 2 minutes or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent thereafter.

PARAMETER:

Sulphur Dioxide

INSTALLATION:

The Continuous Sulphur Dioxide Monitor shall be installed at an accessible location where the measurements are representative of the actual concentration of sulphur dioxide in the Undiluted Gases leaving the APC Equipment associated with each Boiler, and shall meet the following installation specifications.

	PARAMETERS	SPECIFICATION
1)	Range (parts per million, ppm):	0 to ≥100 ppm
2)	Calibration Gas Ports	close to the sample point.

PERFORMANCE:

The Continuous Sulphur Dioxide Monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1)	Span Value (nearest ppm equivalent):	2 times the average normal concentration of the source
2)	Relative Accuracy:	≤10 percent of the mean value of the reference method test data
3)	Calibration Error:	≤ 2 percent of actual concentration
4)	System Bias:	≤ 4 percent of the mean value of the reference method test data
5)	Procedure for Zero and Span Calibration Check:	all system components checked
6)	Zero Calibration Drift (24-hour):	≤ 2.5 percent of span value
7)	Span Calibration Drift (24-hour):	≤ 2.5 percent of span value
8)	Response Time (90 percent response to a step change):	≤ 200 seconds
9)	Operational Test Period:	≥168 hours without corrective maintenance

CALIBRATION:

Daily calibration drift checks on the monitor shall be performed and recorded in accordance with the requirements of Report EPS 1/PG/7.

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 2 minutes or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent, thereafter.

PARAMETER:

Total Hydrocarbons.

INSTALLATION:

The Total Hydrocarbons Monitor shall be installed at an accessible location where the measurements are representative of the concentrations of Organic Matter (as methane) in the Undiluted Gases leaving the combustion zone via the economizer outlet of each Boiler and shall meet the following installation specifications.

	PARAMETERS	SPECIFICATION
1)	Detector Type:	Flame Ionization
2)	Oven Temperature:	160°C minimum
3)	Flame Temperature:	1800°C minimum at the corona of the hydrogen flame
4)	Range (parts per million, ppm)	0 to ≥200 ppm
5)	Calibration Gas:	Propane in air or nitrogen
6)	Calibration Gas Ports:	Close to the sample point

PERFORMANCE:

The Continuous Total Hydrocarbons Monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1)	Span Value (nearest ppm equivalent):	2 times the average normal concentration of the source
2)	Relative Accuracy:	≤10 percent of the mean value of the reference method test data
3)	System Bias::	≤ 4 percent of the mean value of the reference method test data
4)	Noise	≤ 1 percent of span value on most sensitive range
5)	Repeatability:	≤ 1 percent of span value
6)	Linearity (response with propane in air):	≤ 3 percent of span value over all ranges
7)	Calibration Error:	≤ 2 percent of actual concentration
8)	Procedure for Zero and Span Calibration Check:	all system components checked on all ranges
9)	Zero Calibration Drift (24-hours):	≤ 2.5 percent of span value on all ranges
10)	Span Calibration Drift (24-hours):	≤ 2.5 percent of span value

	PARAMETERS	SPECIFICATION
11)	Response Time (90 percent response to a step change):	≤ 60 seconds
12)	Operational Test Period:	≥ 168 hours without corrective

CALIBRATION:

Daily calibration drift checks on the monitor shall be performed and recorded in accordance with the requirements of Report EPS 1/PG/7.

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 2 minutes or better. Measurements of concentrations of organic matter (as methane) shall be kept as 10 minute average values for record keeping and reporting purposes.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent thereafter.

PARAMETER:

Opacity.

INSTALLATION:

The Continuous Opacity Monitor shall be installed at an accessible location where the measurements are representative of the actual opacity of the Undiluted Gases leaving the APC Equipment associated with each Boiler and shall meet the following design and installation specifications.

	PARAMETERS	SPECIFICATION
1)	Wavelength at Peak Spectral Response (nanometres, nm)	500-600
2)	Wavelength at Mean Spectral Response (nm):	500-600
3)	Detector Angle of View	≤ 5 degrees
4)	Angle of Projection	≤ 5 degrees
5)	Range (percent of opacity):	Propane in air or nitrogen

PERFORMANCE:

The Continuous Opacity Monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1)	Span Value (percent opacity):	2 times the average normal opacity of the source
2)	Calibration Error:	≤3 percent opacity
3)	Attenuator Calibration:	≤2 percent opacity
4)	Response Time (95 percent response to a step change):	≤ 10 seconds
5)	Schedule for Zero and Calibration Checks:	daily minimum
6)	Procedure for Zero and Calibration Checks:	all system components checked
7)	Zero Calibration Drift (24-hours):	≤ 2 percent opacity
8)	Span Calibration Drift (24-hours):	≤ 2 percent opacity

	PARAMETERS	SPECIFICATION
9)	Conditioning Test Period: maintenance	≥ 168 hours without corrective
10)	Operational Test Period: maintenance	≥ 168 hours without corrective

CALIBRATION:

The monitor shall be calibrated, to ensure that it meets the drift limits specified above, during the periods of the operation of the Equipment. The results of all calibrations shall be recorded at the time of calibration.

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 30 seconds or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time for each calendar quarter during the first full year of operation, and 95 percent, thereafter.

PARAMETER:

Moisture, Hydrogen Fluoride and Ammonia

SELECTION AND INSTALLATION

The Owner shall select and install a CEM System, to measure moisture content of the stack gases, the concentration of hydrogen fluoride and ammonia in the Undiluted Gases leaving the APC Equipment associated with each Boiler, as follows:

a) Design and Performance Specifications shall be in accordance with 40 CFR 60, Appendix B, Specification 4.

b) The Owner shall select the probe locations in compliance with 40 CFR 60, Appendix B, Specification 2.

TEST PROCEDURES

The Owner shall verify compliance with the Design and Performance Specifications in accordance with 40 CFR 60, Appendix B, Specification 4, with the reference method for the relative accuracy test being Method 4. of the Source Testing Code.

In furtherance of, but without limiting the generality of the foregoing, the mean difference between the calibration gas value and the analyzer response value at each of the four test concentrations shall be less than 5 percent of the measurement range.

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