

*Covanta Durham York Renewable Energy L.P.*

## ***Durham-York Energy Centre***

***Protocol for the***

***Measurement of Combustion Temperature***

***And the***

***Development of Time and Temperature Correlations***



June 2014

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## **1 INTRODUCTION & OBJECTIVE**

On June 28, 2011, the Durham York Energy Centre (DYEC) obtained a multimedia Certificate of Approval from the Ministry of the Environment (MOE) which is now referenced as Environmental Compliance Approval (ECA) No. **7306-8FDKNX**. This ECA requires that combustion gases be maintained at a minimum temperature of 1000°C for a residence time of one (1) second starting from the point where most of the combustion has been completed and the combustion temperature has been fully developed<sup>1</sup> and ending at the Target Location.<sup>2</sup> Subsequent to the issuance of the ECA, documentation was provided to the MOE which proposed to install and use Infraview™ brand infrared pyrometer (IP) temperature measurement instruments near (~ 2-3 m) the Target Location in lieu of roof top thermocouples which are ~ 11m above the Target Location. IP's are not only more reliable than thermocouples, but allow installation in the harsh environment very near the Target Location. Utilizing a nearby, reliable IP temperature provides an essentially direct measurement of 1-second temperature which is inherently more accurate than the relatively distant, unreliable roof top thermocouples. The MOE, following consultation with the Standards Development Branch, determined that this temperature monitoring approach and the IP system proposed by Covanta were acceptable and considered equivalent to thermocouple(s) as required in Schedule F of the ECA.<sup>3</sup>

Thus, the objective of this test protocol is to provide the detailed procedures for utilizing IP instruments to directly measure combustion gas temperatures and to develop a correlation<sup>2</sup> between the gas temperature at the one (1) second Target Location and the nearby temperature measured by the permanent plant IP. The plant IP located approximately 2-3 meters downstream of the one (1) second Target Location will be used to continuously demonstrate compliance with the ECA.

## **2 BACKGROUND**

### **2.1 ECA No. 7306-8FDKNX, Section 6 - Performance Requirements**

Paragraph 2 (a) requires:

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<sup>1</sup> ECA condition 7. (2) (a)

<sup>2</sup> ECA condition 6. (2) (a) (ii)

<sup>3</sup> Email dated January 14, 2014 from Quynh Nguyen, P.Eng. Senior Review Engineer of the Air Approval Services Unit, Environmental Approvals Branch.

- i. The temperature in the combustion zone of each Boiler shall reach a minimum of 1000 degrees Celsius (°C) for one second, prior to introduction of the Waste into the combustion chamber of the Boiler during start-up, and thereafter maintained during the entire thermal treatment cycle and subsequent shutdown until all Waste combustion is completed.*
- ii. Compliance with the minimum temperature requirement shall be demonstrated by direct measurement at the location where the combustion gases have achieved the residence time of one second at a minimum temperature of 1000°C (the Target Location) or by correlation of the required temperature of 1000 °C for one second to the temperature measured downstream of the Target Location as proven by a method acceptable to the Director.*

## **2.2 Residence Time & Temperature**

Direct, continuous measurement of the temperature at the one (1) second Target Location using thermocouples on a long term basis is not practical for several reasons:

- Thermocouple Maintenance

Many years of experience at other Covanta facilities have proven that thermocouples in the high temperatures and harsh environment in and above the combustion zone are extremely difficult to maintain and cannot meet reliability requirements. Numerous materials have been used including ceramic coated steels, Inconel and other exotic alloys. None have been effective in consistently surviving between outages due to the high temperatures and corrosive gases to which they are exposed.

- Thermal Radiation Error

Thermal radiation to the cooler furnace water-walls will also affect thermocouple temperature measurements. Heat radiates from the well of the thermo-couple, i.e. the thermo-well, to the surrounding furnace water-wall surfaces, causing the temperature of the thermocouple to be lower than the true gas temperature. The magnitude of the temperature error observed in water-cooled furnaces at 1,000°C is approximately 28-55°C as shown in Attachment 2.

- Impractical Test Measurements

One way to overcome the radiation effect is to measure the true combustion gas temperature in the furnace with a high velocity temperature thermocouple (HVT). This approach provides accurate gas temperatures because it essentially eliminates the radiation effect by shielding the thermocouple with a metallic or ceramic shield, while drawing a large quantity of furnace gases

directly across the thermocouple. A detailed description of measuring flue gas temperatures in furnaces using HVT probes is included in Attachment 2.

Although the HVT is an accurate measurement device, it is only practical for short-term use. The probe must be water cooled to prevent damage, and can become plugged with particulate from the flue gas and it measures temperature in a single point in the plant.

- Combustion System Design

Use of thermocouples located at the roof of the furnace (a lower temperature zone with less corrosion potential) is not practical at Durham York Energy Centre due to the changes in furnace thermal characteristics between the one (1) second Target Location and the roof stemming from the combustion system design.

### **3 APPROACH**

#### **3.1 Method**

To overcome these difficulties, DYEC will use an infrared pyrometer (IP) to continuously measure the temperature of the flue gas at a point only 2-3 m **downstream** of the Target Location and develop and use a correlation to demonstrate compliance **at** the Target Location. Due to the closeness of the IP to the Target Location, this methodology essentially represents the direct measurement of the 1-second temperature, i.e. the temperature where combustion gases have been at a minimum temperature of 1000<sup>0</sup>C for at least 1 second.

The starting point for the residence time is where most of the combustion has been completed and temperature fully developed. Based on process design and operating experience, DYEC has identified that the starting location is at the elevation of the overfire air nozzles, i.e. after the overfire air injection.

#### **3.2 Infra-red Pyrometer (IP)**

An IP is a non-contact, non-intrusive temperature sensor which passively monitors the amount of thermal energy emitted from the CO<sub>2</sub> gas formed by the combustion process. The thermal energy emitted is used to calculate the bulk average gas temperature as described in Attachment 3. The IP has proven to be accurate and reliable for continuous use in the high temperature areas where thermocouples fail and where HVT traversing can only be implemented for relatively short periods.

The infrared spectral response of the IP sensor is designed to specifically detect thermal radiation from CO<sub>2</sub>. It measures a partial average temperature of the gas within its 30:1 field of view, throughout the instrument's operating range of 121°C to 1,649°C.

The IP has an accuracy of +/- 1%, and will be provided with a Calibration Certification traceable to the U.S. National Institute of Standards and Technology (NIST).

The correlation will be developed during a test program at the facility using the permanently installed upper Continuous Temperature IP and a second test IP at a lower elevation as described in the following section.

## **4 TIME AND TEMPERATURE MONITORING TEST PLAN**

### **4.1 Overview**

For compliance monitoring purposes, Covanta will utilize the Continuous Temperature IP at elevation 19.25 m which is approximately two (2) to three (3) meters above the one (1) second Target Location.

To develop the correlation, a second, test IP close to the Target Location will be used at an available viewport at elevation 16.59 m which is 2-3 m lower in the furnace.

Using the difference in temperature between these points and process data collected during the test period, a minimum temperature required at the Continuous Temperature IP will be established corresponding to the one (1) second temperature required by the ECA.

The duration of the measurement periods will be assessed on-site based on the dynamic conditions of the combustion process. It is expected that a minimum of three (3) data collection periods at full load (100% steam flow) and three at part load (80% steam flow) or a total of six data collection periods will be performed.

### **4.2 Analytical Methodology**

#### **4.2.1 Testing with Waste Firing Only**

Section 7(2)(a) of the ECA describes the Target Location as:

*“the temperature at one (1) second downstream of the combustion zone of each Boiler where most of the combustion has been completed and the combustion temperature is fully developed”;*

The one (1) second Target Location is approximately two (2) to three (3) meters above that point, around the centerline of the auxiliary burner. This location will be confirmed through the implementation of this testing program.

Test measurements will be taken with the test IP in a view port near the auxiliary burner, which is approximately at the elevation of the one (1) second Target Location.

At a given operating load, combustion gas time and temperature is governed by:

- a) the heat absorption of the furnace water-walls,
- b) air flow into the furnace, and
- c) IGR gas flow out of the lower furnace

The methodology for establishing the absorption rate is based on temperature measurements at two points, one near the one (1) second Target Location and the second about two (2) to three (3) meters above the Target Location. The difference between these two temperatures is used to calculate the absorption rate in this part of the boiler and then extrapolated to determine temperatures at the OFA and  $T_{1-sec}$  elevations.

Furnace flue gas velocity will be calculated based on the measured total air, seal air and IGR flows. For the smaller, less significant flows going through the combustion zone, (i.e. seal air and “false” or “tramp” air), it will be assumed that 50% of the seal air enters the combustion zone with the other 50% bypassing it. Furthermore, an amount of “false” air will be assumed to also enter the combustion zone equal to 5% of the total air flow.

A calculated gas-to-air ratio constant,  $K_c$ , based on design values will be applied to account for the products of combustion, see attachment 4. The ratio is calculated as 1.152 as shown below.

$$K_c(\%) = \frac{\text{Furnace flue gas flow}}{\text{Total Air Flow}} = \frac{48,430}{42,010} = 1.152$$

$$\text{Total Air Flow (Nm}^3\text{/h)} = \text{UFA} + \text{OFA} = 36,610 + 5400 = 42,010$$

The furnace flue gas velocity and corresponding residence time will be calculated based on the average temperature and furnace volume between the front overfire air nozzles and the 1 second point.

There will be no combustion of auxiliary fuel using the burners during the MSW test runs and the IGR fresh air damper will be closed.

#### **4.2.2 Testing Prior to Waste Introduction**

To demonstrate the ECA requirement for reaching a minimum of 1000°C combustion zone temperature prior to the introduction of waste, the test IP will read the auxiliary burner flame temperature with no waste on the grate and that reading will be directly correlated to the Continuous Temperature IP. For example, if the lower test IP read 1100°C with the auxiliary burner in service prior to charging waste and the upper Continuous Temperature IP read 950°C, waste could not be introduced into the furnace until the upper Continuous Temperature IP met or exceeded 850°C, i.e.  $950 - (1100 - 1000) = 850$ .



### 4.3 Nomenclature

#### 4.3.1 Constants

Design Steam Flow (Max Cont. Rating)	$Q_{mcr}$	34.3 kg/h
Products of Combustion Coefficient	$K_c$	1.152 (calculated)
Area of Furnace	$A$	18.207 m <sup>2</sup> (4.267m x 4.267m)
Grate Reference Point Elevation,	$E_{grate}$	8.687m
Overfire Air Elevation,	$E_{OFA}$	13.80m
Elevation of Test Infrared Pyrometer,	$E_{LwriP}$	16.589m
Elevation of Continuous Temperature Monitor IP,	$E_{UprIP}$	19.25m
Reference Air temperature	$T_{air\ ref}$	27°C

#### 4.3.2 Measured Values

Main Steam Flow	$W_{STM}$	Kg/h
Continuous Temperature Monitor	$T_{UprIP}$	°C
Test Infrared Pyrometer Temperature	$T_{LwriP}$	°C
Total Air Flow Rate	$Q_{Tot}$	Nm <sup>3</sup> /h
Seal Air Flow Rate	$Q_{seal}$	Nm <sup>3</sup> /h
IGR Flow Rate	$Q_{IGR}$	Nm <sup>3</sup> /h

#### 4.3.3 Calculated Values

Furnace Absorption Rate	$\nabla T$	°C/m
Gas temperature at OFA elev.	$T_{OFA}$	°C
Average 1-Second Zone Gas Temperature (between OFA Nozzles and the 1-Second elevs.)	$T_C$	°C
Average 1-Second Zone Gas Flow	$Q_C$	m <sup>3</sup> /h
Average 1-Second Zone Gas Velocity	$V_C$	m/s
Elevation at 1-Second Residence Time	$E_{1SEC}$	m
Gas Temp. at 1-Second Residence Time	$T_{1SEC}$	°C

#### 4.4 Test Diagram

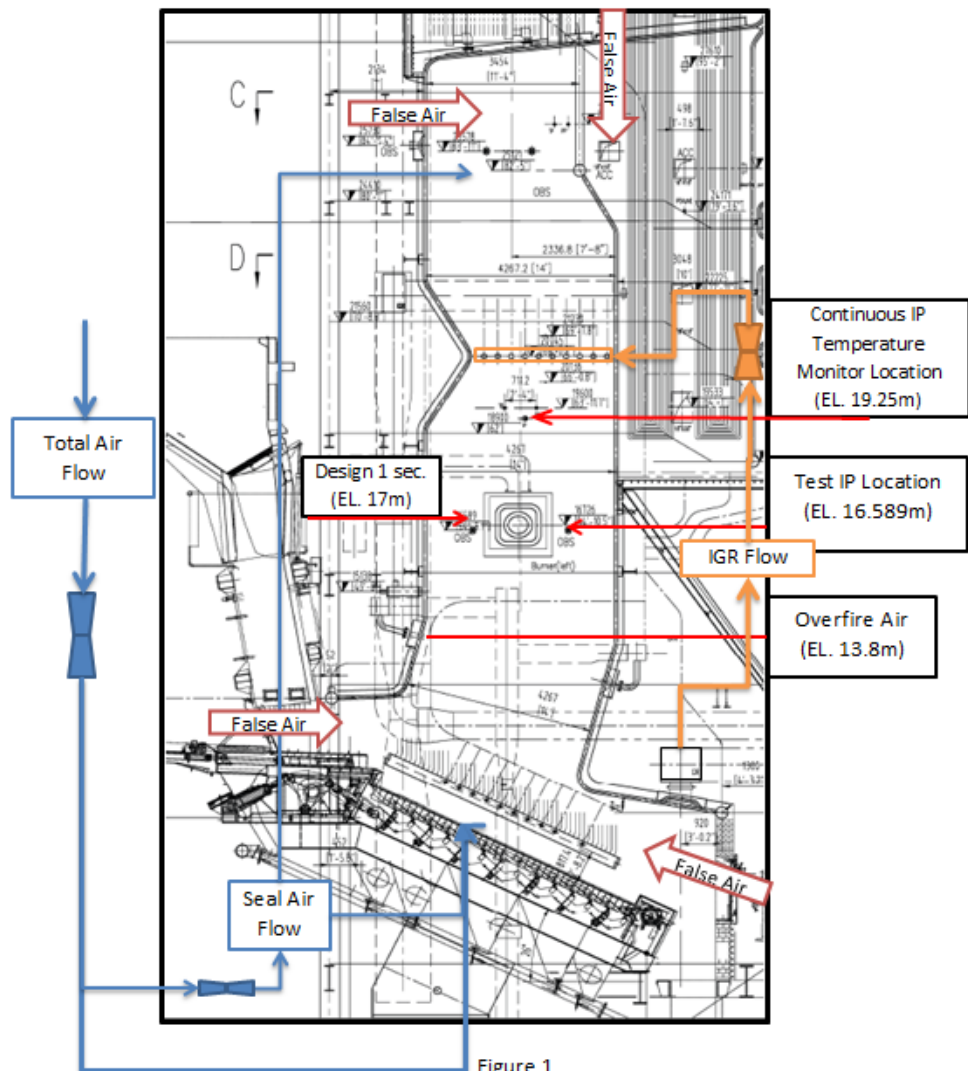


Figure 1.  
Boiler Profile and Measuring Locations

## **4.5 Calculations**

### **4.5.1 Furnace Absorption Rate - (°C/m)**

Calculate the furnace temperature absorption rate from the Test IP elevation to the Continuous Temperature Monitor IP elevation.

$$\nabla T = \frac{(T_{LwrIP} - T_{UprIP})}{(E_{UprIP} - E_{LwrIP})}$$

### **4.5.2 Temperature at OFA Nozzles Elevation - (°C)**

Calculate the temperature at the OFA nozzles.

$$T_{OFA} = T_{UprIP} + \nabla T * (E_{UprIP} - E_{OFA})$$

Note: The following equations are included for illustration purposes, but as an alternative, one can simultaneously solve these following equations to directly calculate  $T_{1sec}$ .

### **4.5.3 Average 1-Second Zone Temperature - (°C)**

Calculate average temperature, from the OFA nozzle elevation to the 1-sec point.

$$T_C = \frac{T_{OFA} + T_{1sec\text{assumed}}}{2}$$

Start by assuming that the value of  $T_{1SEC}$  is 1,000 C in the formula above. Use the result and the equations in the sections that follow to calculate the value of  $T_{1SEC}$  according to the formula in Section 4.5.7. Iterate until the difference between the assumed value of  $T_{1SEC}$  in this section and the calculated value in Section 4.5.7 is less than 1 degree Celsius.

### **4.5.4 1-Second Zone Flue Gas Flow Rate - (actual m<sup>3</sup>/h)**

Calculate the average volumetric flow rate between the OFA nozzles and the 1 second point.

$$Q_C = (1.05 \times Q_{TOT} - Q_{IGR} - 0.5 \times Q_{Seal}) * K_C * \frac{(273.16 + T_C)}{(273.16 + T_{Air-Ref})}$$

### **4.5.5 1-Second Zone Flue Gas Velocity - (actual m/s)**

Calculate the actual average combustion gas velocity between the OFA nozzles and the 1 second point.

$$V_C = \frac{Q_C}{(\text{furn depth} \times \text{width})m^2} * \frac{1h}{3600sec}$$

#### **4.5.6 1-Second Elevation - (m)**

Calculate elevation of the one (1) second point.

$$E_{1SEC} = E_{OFA} + V_C * 1sec$$

#### **4.5.7 1-Second Elevation Temperature - (°C)**

Calculate the actual temperature at the one (1) second elevation.

$$T_{1SEC} = T_{OFA} - \nabla T * (E_{1SEC} - E_{OFA})$$

#### **4.5.8 Minimum Temperature of Continuous IP - (°C)**

Calculate the minimum Continuous Temperature Monitor temperature required for compliance.

$$T_{UprIP\ min} = T_{UprIP} - (T_{1SEC} - 1000^{\circ}C)$$

A sample calculation is shown in Attachment 5.

### **4.6 Instrumentation**

#### **4.6.1 Plant Process Data**

The required process data will be collected via the plant's existing data acquisition system. The parameters will be recorded at minimum intervals of one (1) minute during the temperature test runs. The process data points to be logged are listed below in Table 1.

#### **4.6.2 Special Test Data**

Special test instrumentation will consist of one infrared pyrometer (IP), temporarily installed on the side wall in an observation port near the auxiliary burner.

The temporary IP temperature will either be recorded by the plant's data acquisition or with a computer/data logger at a maximum of fifteen (15) second intervals.

<b><u>Process Parameter</u></b>	<b><u>Units</u></b>
*Total Air Flow	Nm <sup>3</sup> /h
*Seal Air Flow	Nm <sup>3</sup> /h
*IGR Flow	Nm <sup>3</sup> /h

Roof Temperature 1	°C
Roof Temperature 2	°C
Roof Temperature 3	°C
Roof Temperature Average	°C
Heated Combustion Air Temperature	°C
Ambient Air Temperature	°C
Tertiary Gas Temperature	°C
*Main Steam Flow	kg/h
Main Steam Temperature	°C
Main Steam Pressure	bar
Economizer Exit Gas Temperature	°C
Furnace Sidewall Temperature Left	°C
Furnace Sidewall Temperature Right	°C
Economizer Exit O <sub>2</sub> , wet	%
* Continuous Temperature Monitor IP (permanent)	°C
* Test Gas Temperature IP	°C

\*Used in calculations and boiler steam load reference

**Table 1: Plant Boiler Data and Special Instrumentation List**

## **4.7 Test Procedures**

### **4.7.1 Test Duration, Steam Load**

Testing on the combustion unit will be conducted over approximately a one (1) week or longer period once stable full load boiler operating conditions are established and normal commercial fouling of furnace heat transfer surfaces has occurred. The program consists of a series of tests performed at various loads. Test runs will be performed at full load MSW firing rate (100% steam flow) and part load MSW firing rate (80% steam flow). The load points will be determined as the percentage of MCR design steam flow.

### **4.7.2 Test Runs/Boiler Stability**

Each test run will last a minimum of one (1) hour. Prior to the start of each test run, stable boiler operation will be sustained at the test load point for a minimum of one (1) hour.

**4.7.3 Sootblowing**

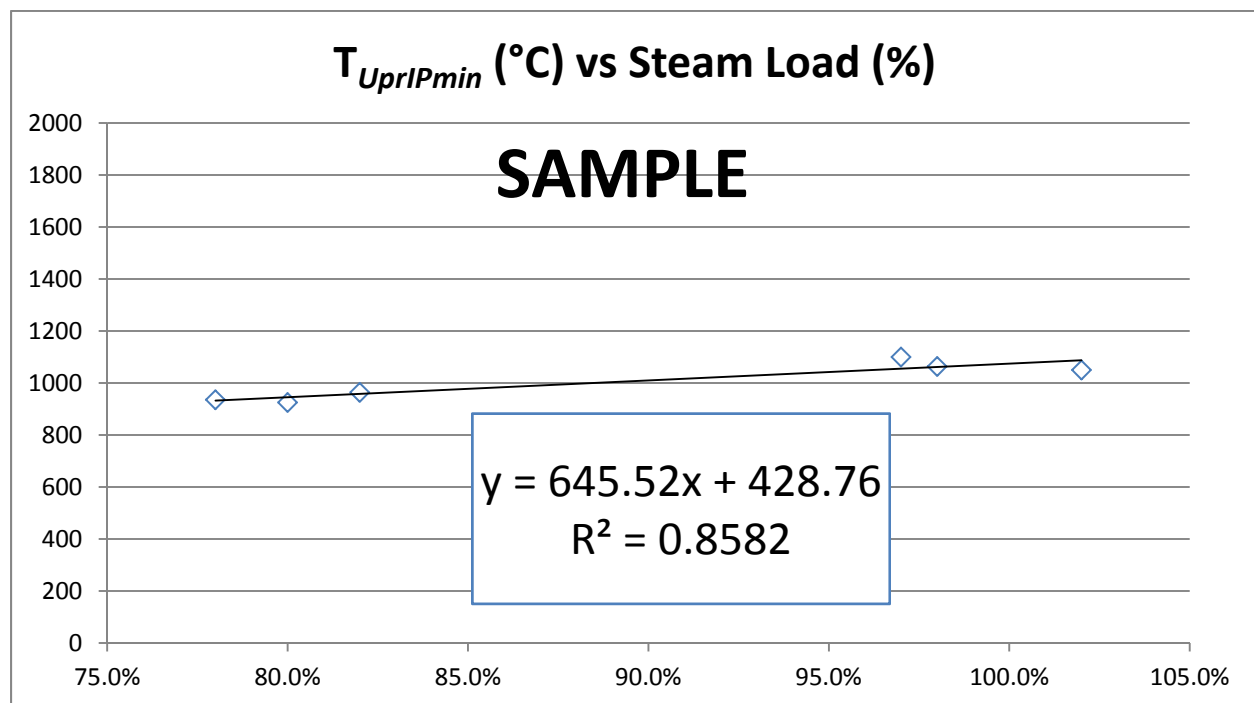
Sootblowing will be completed at least two (2) hours prior to any test start to ensure the boiler has stabilized. Sootblowing will not be performed during any test period.

**4.7.4 Results/Reporting**

The results reported will include analysis of the above measurements and calculations of the required flue gas temperature at the Continuous Temperature Monitor location (Elev. 19.25m) for both waste firing and prior to the introduction of waste.

**4.7.5 Correlation**

The correlation will use % steam load to provide the minimum temperature required at the continuous, upper IP,  $T_{UprIPmin}$ .



The continuous, upper IP measurement and the minimum temperature from the correlation, ( $T_{UprIPmin}$ ), will be used to calculate  $T_{1sec}$  for monitoring and recording in the DCS and Continuous Emissions Monitoring System (CEMS).

$$T_{1sec} = T_{UprIP} - T_{UprIPmin} + 1000^{\circ}\text{C}$$

The correlation and calculations will be programmed into each combustion units' CEMS to demonstrate on-going continuous compliance.

$$T_{1sec} = T_{UprIP} - (630.6 \times \%SteamLoad + 435.5) + 1000^{\circ}\text{C}$$

## **5 ATTACHMENTS**

### **5.1 Environmental Certificate of Approval**

### **5.2 B & W Gas Temp Measurement and HVT**

### **5.3 Infra-View IR Pyrometer (IP)**

### **5.4 MARTIN Design Air & Flue gas flows**

### **5.5 Sample Calculations**

#### **5.5.1 MARTIN Temperature Curve First Pass, LP1**

**CERTIFICATE OF APPROVAL**  
**MULTI-MEDIA**  
**Number 7306-8FDKNX**  
**Issue Date: June 28, 2011**

The Regional Municipality of Durham  
605 Rossland Rd E 5th Floor  
Whitby, Ontario  
L1N 6A3

and

The Regional Municipality of York  
17250 Yonge Street  
Newmarket, Ontario  
L3Y 6Z1

and

Covanta Durham York Renewable Energy Limited Partnership  
445 South Street  
Morristown, New Jersey  
United States of America  
07960

Site Location: Durham York Energy Centre  
72 Osbourne Road  
Lot 27, Concession Broken Front, Part 1  
Clarington Municipality, Regional Municipality of Durham

*You have applied in accordance with Sections 9 and 27 of the Environmental Protection Act and Section 53 of the Ontario Water Resources Act for approval of:*

A thermal treatment facility to be used for the receipt and manual and/or mechanical sorting of solid non-hazardous post-diversion municipal waste (Waste), temporary storage and thermal treatment of the Waste, abatement of the emissions from the processes and activities undertaken at the Site, handling, screening, sorting and/or conditioning of the residual wastes and management of the wastewater and the non-contact stormwater generated at the Site. The Facility's maximum Waste thermal treatment rate is 140,000 tonnes per year of Waste, the nominal electricity generation rate is 20 Megawatts and the nominal steam generation rate 72,000 kilograms per hour of steam.



The facility consists of the following major processes and support units:

- (1) two (2) identical combustion trains, each having a nominal capacity of 218 tonnes of Waste per day venting into the atmosphere via a common exhaust stack, having an exit diameter of 1.71 metres, extending 87.6 metres above grade.

Each combustion train is an independent process train and it consists of the following main components:

- (a) a stoker grate steam Boiler, having a design heat input of 118 Gigajoules per hour, equipped with a natural gas fired auxiliary Low NOx burner, having a nominal heat input of 59.5 Gigajoules per hour; and
- (b) the following air pollution control equipment:
  - (i) a Selective Non Catalytic Reduction System (SNCR System) with ammonia injection for NOx control;
  - (ii) an activated carbon injection system, to reduce mercury and dioxins in flue gas;
  - (iii) a dry recirculation lime injection scrubber to control acid gases;
  - (iv) a pulse jet type baghouse to control particulate emissions;
- (2) one (1) steam turbine generator set having a rated capacity of 20 Megawatts;
- (3) waste and reagent storage as described in Condition 2.:
- (4) fly ash conditioning system including two (2) surge bins, two (2) pugmills and seven (7) curing/storage bunkers;
- (5) bottom ash sorting system including conveyors, screens, a rotary drum magnet and an eddy separator;
- (6) one (1) emergency diesel generator, rated at 250 Kilowatts;
- (7) natural gas-fired combustion equipment for comfort heating;
- (8) a wastewater management system for collection, recirculation and reuse of the process water; and
- (9) a stormwater management facility for collection, transmission and discharge of non-contact runoff at the Site, as described in the attached Schedule "G",

Note: Use of the site for any other type of waste is not approved under this Certificate, and requires obtaining a separate approval amending this Certificate.

*For the purpose of this Provisional Certificate of Approval and the terms and conditions specified below, the following definitions apply:*

**"Acoustic Assessment Report"** means the report, prepared in accordance with *Publication NPC-233* by Paul Niejadlik / Golder Associates Ltd. and dated March 2011 submitted in support of the application, that documents all sources of noise emissions and Noise Control Measures present at the Facility;

**"Acoustic Assessment Summary Table"** means a table summarizing the results of the Acoustic Assessment Report;

**"Acoustic Audit"** means an investigative procedure consisting of measurements of all noise emissions due to the operation of the Facility, assessed in comparison to the Performance Limits for the Facility regarding noise emissions, completed in accordance with the procedures set in the Ministry's *Publication NPC-103* and reported in accordance with the Ministry's *Publication NPC-233*;

**"Acoustic Audit Report"** means a report presenting the results of an Acoustic Audit, prepared in accordance with the Ministry's *Publication NPC-233*;

**"Acoustical Consultant"** means a person currently active in the field of environmental acoustics and noise/vibration control, who is familiar with Ministry noise guidelines and procedures and has a combination of formal university education, training and experience necessary to assess noise emissions from a Facility;

**"Air Standards Manager"** means the Manager, Human Toxicology and Air Standards Section, Standards Development Branch, or any other person who represents and carries out the duties of the Manager, Human Toxicology and Air Standards Section, Standards Development Branch, as those duties relate to the conditions of this Certificate;

**"APC Building"** means the building at the Site where the APC Equipment and the reagent indoor storage tanks are located;

**"APC Equipment"** means all the air pollution control equipment at the Facility, including the SNCR System, the activated carbon injection system, the dry recirculation lime injection scrubber and the pulse jet type baghouse to control emissions from the combustion chamber of the Boilers, the dust collectors to control emissions from the Residue Building and the dust collectors to control emissions from the reagent storage silos;

**"Boiler Building"** means the building at the Site where the Boilers, turbine generator and the air cooled condenser(s) are located;

**"Boilers"** means the two (2) steam boilers firing the approved Waste described in this Certificate;

**"Bulky Unprocessable Items"** means the incoming Waste received at the Site that cannot be processed in the Equipment;

"**CEM Systems**" means the continuous monitoring and recording systems used to measure and record the temperature and the emissions from the Boilers as specified in the attached Schedule "F";

"**Certificate**" means this entire provisional Certificate of Approval, issued in accordance with Sections 39 and 9 of the *EPA* and Section 53 of the *OWRA*, and includes any schedules attached to it, the application and the supporting documentation listed in the attached Schedule "A";

"**40 CFR 60**" means title 40, part 60 under the Code of Federal Regulations (Air Programs, U.S. Environmental Protection Agency), revised as of July 1, 1990, published by the Office of the Federal Register, National Archives and Records, Administration in the United States of America;

"**Complaint**" means a complaint received either by the Owner or the District Manager that has been confirmed by staff of the Ministry and the cause of which is attributed to the Owner's activities at the Facility;

"**Commencement Date of Operation**" means the date when the approved Waste is first received at the Site;

"**Compound of Concern**" means a contaminant that, based on generally available information, may be emitted to the atmosphere in a quantity from any source at the Facility that is significant either in comparison to the relevant Ministry Point of Impingement Limit or if a Ministry Point of Impingement Limit is not available for the compound then, based on generally available toxicological information, the compound has the potential to cause an adverse effect as defined by the *EPA* at a Point of Impingement;

"**Controlled Shutdown**" means an immediate cut-off of all waste into the Boilers, while maintaining the operation of the combustion chamber and the APC Equipment within the Performance Requirements;

"**Description Section**" means the section on page one of the Certificate describing the Owner's operations and the Equipment located at the Facility and specifying the Facility Production Limit for the Facility;

"**Dioxins and Furans**" means polychlorinated dibenzo-dioxins and polychlorinated dibenzofurans;

"**Director**" means any person appointed in writing by the Minister of the Environment pursuant to section 5 of the *EPA* and pursuant to section 5 of the *OWRA* as a Director for the purposes of Part V of the *EPA*, section 9 of the *EPA* and section 53 of the *OWRA*;

"**District Manager**" means the District Manager of the York Durham District Office of the Ministry;

"**Emergency Shutdown**" means an immediate cut-off of all waste feed into the Boilers, followed by an accelerated extinction of all combustion in the Boilers, while maintaining the combustion temperature within the Performance Requirements, except when unreasonable;

"**Emission Summary Table**" means the table prepared in accordance with *O. Reg. 419/05* and the Procedure Document listing the appropriate Point of Impingement concentrations of each Compound of Concern from the Facility and providing comparison to the corresponding Ministry Point of Impingement Limit;

"**EAA**" means the Environmental Assessment Act, R.S.O. 1990, c. E.18, as amended;

"**EA Approval**" means the Notice of Approval to Proceed with the Undertaking signed by the Minister of the Environment on November 3, 2010, EA File No. 04-EA-02-08;

"**EPA**" means the Environmental Protection Act, R.S.O. 1990, c. E.19, as amended;

"**Equipment**" means equipment or processes associated with the thermal treatment of the approved Waste described in this Certificate and in the Supporting Documentation referred to herein and any other equipment or processes handling wastes and reagents;

"**ESDM Report**" means the Emission Summary and Dispersion Modelling Report prepared in accordance with the Procedure Document by Golder Associates and dated March 2011 submitted in support of the application, and includes any amendments to the ESDM Report listed in the attached Schedule "A" and all subsequent up-dated ESDM Reports as applicable;

"**Facility**" means the entire operation associated with thermal treatment of Waste located on the property where the Equipment is located;

"**Facility Production Limit**" means the production limit placed on the main product(s) or raw materials used by the Facility that represents the design capacity of the Facility and assists in the definition of the operations approved by the Director;

"**Grizzly Building**" means the building at the Site where the bottom ash is screened and where the oversized constituents of the bottom ash (grizzly overs) are temporarily stored prior to transport for subsequent storage in the Residue Building;

"**Independent Acoustical Consultant**" means an Acoustical Consultant who is not representing the Owner and was not involved in preparing the Acoustic Assessment Report or the design/implementation of Noise Control Measures for the Facility and/or Equipment. The Independent Acoustical Consultant shall not be retained by the Acoustical Consultant involved in the noise impact assessment or the design/implementation of Noise Control Measures for the Facility and/or Equipment;

"**I-TEF**" means International Toxic Equivalency Factor derived for each dioxin and furan congener by comparing its toxicity to the toxicity of 2,3,7,8 tetrachloro dibenzo-p-dioxin, as recommended by the North Atlantic Treaty Organization Committee on Challenges to Modern Society (NATO CCMS) in 1989 and adopted by Canada in 1990;

"**I-TEQ**" means International Toxic Equivalent of dioxins and furans calculated using the I-TEFs, as recommended by the NATO CCMS in 1989 and adopted by Canada in 1990;

"**Manager**" means the Manager, Technology Standards Section, Standards Development Branch, who has been appointed under Section 5 of the *EPA* for the purposes of Section 11(1)2 of the *O. Reg. 419/05*, or any other person who represents and carries out the duties of the Manager,

Technology Standards Section, Standards Development Branch, as those duties relate to the conditions of this Certificate;

"**Ministry**" means the ministry of the government of Ontario responsible for the *EPA* and the *OWRA* and includes all officials, employees or other persons acting on its behalf or the Ontario Ministry of the Environment;

"**Municipality**" means the Municipality of Clarington;

"**NMA**" means the *Nutrient Management Act, 2002*, S.O. 2002, c. 4, as amended;

"**Noise Control Measures**" means measures to reduce the noise emission from the Facility and/or Equipment including, but not limited to silencers, acoustic louvers, enclosures, absorptive treatment, plenums and barriers;

"**LDR**" means the Lands Disposal Restrictions referred to in sections 74 through 85 of the *O. Reg. 347*, which prohibit the disposal of hazardous wastes on land until they have been treated to meet the treatment standards under the *O. Reg. 347*;

"**Leachate Toxicity Criteria**" means the concentrations of any of the contaminants listed in Schedule 4 at a concentration equal to or in excess of the concentration specified for that contaminant in Schedule 4 using the Toxicity Characteristic Leaching Procedure, defined in the *O. Reg. 347*;

"**O. Reg. 419/05**" means the *Ontario Regulation 419/05, Air Pollution – Local Air Quality* enacted under the *EPA*, as amended;

"**O. Reg. 347**" means the *Ontario Regulation 347, R.R.O 1990 (General –Waste Management)* enacted under the *EPA*, as amended;

"**OWRA**" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40*, as amended;

"**Owner**" means any person that is responsible for the establishment and operation of the Site being approved by this Certificate, and it includes The Regional Municipality of Durham, The Regional Municipality of York, and Covanta Durham York Renewable Energy Limited Partnership (operator), their successors and assignees;

"**PA**" means the *Pesticides Act, R.S.O. 1990, c.P. 11*, as amended;

"**Performance Requirements**" means the performance requirements and emission limits specified in the section of this Certificate entitled "Performance Requirements";

"**Point of Impingement**" means any point outside the Facility in the natural environment and as defined by s.2 of the *O. Reg. 419/05*;

"**Point of Reception**" means the Point of Reception as defined by *Publication NPC-205* and/or *Publication NPC-232*, as applicable;

"**Pre-test Information**" means the information outlined in Section 1.1 of the Source Testing Code;

**"Procedure Document"** means the Ministry's document entitled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated July 2005, as amended;

**"Professional Engineer"** means a Professional Engineer as defined within the *Professional Engineers Act*, R.S.O. 1990, c. P.28, as amended;

**"Provincial Officer"** means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the *OWRA* or Section 5 of the *EPA* or Section 17 of the *PA* or Section 4 of the *NMA* or Section 8 of the *SDWA*;

**"Publication NPC-103"** means the Ministry's Publication NPC-103 of the Model Municipal Noise Control By-Law, Final Report, dated August 1978, published by the Ministry, as amended;

**"Publication NPC-205"** means the Ministry's Publication NPC-205, entitled "Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)", dated October, 1995, as amended;

**"Publication NPC-207"** means the Ministry's draft technical publication entitled "Impulse Vibration in Residential Buildings", dated November 1983, supplementing the Model Municipal Noise Control By-Law, Final Report, dated August 1978, published by the Ministry, as amended;

**"Publication NPC-232"** means the Ministry's Publication NPC-232, entitled "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)", dated October, 1995, as amended;

**"Publication NPC-233"** means the Ministry's Publication NPC-233, entitled "Information to be Submitted for Approval of Stationary Sources of Sound", dated October, 1995, as amended;

**"Rejected Waste"** means either municipal waste which cannot be processed at the Facility or waste which the Site is not approved to accept. Rejected Waste includes but is not limited to the Bulky Unprocessable Items and the Unacceptable Waste;

**"Regional Director"** means the Regional Director of the Central Region of the Ministry;

**"Regions"** means The Regional Municipality of Durham and The Regional Municipality of York;

**"Report EPS 1/PG/7"** means the Environment Canada Report EPS 1/PG/7, entitled "Protocols and Performance Specifications for Continuous Monitoring of Gaseous Emissions from Thermal Generation", dated September, 1993, as amended;

**"Residual Waste"** means waste resulting from the Waste processing activities at the Site. Residual Waste is limited to the recovered ferrous metals, the recovered non-ferrous metals, the bottom ash (consisting of the ash fines and the grizzly overs) and the fly ash (untreated and following conditioning);

**"Residue Building"** means the building at the Site where the bottom ash and the fly ash are processed, temporarily stored and loaded in transport vehicles for off-site disposal;

"**Schedules**" means the following schedules "A", "B", "C", "D", "F" and "G", attached to the Certificate and forming part of the Certificate;

"**SDWA**" means the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32, as amended;

"**Sensitive Receptor**" means any location where routine or normal activities occurring at reasonably expected times would experience adverse effect(s) from odour discharges from the Facility, including one or a combination of:

- (a) private residences or public facilities where people sleep (e.g.: single and multi-unit dwellings, nursing homes, hospitals, trailer parks, camping grounds, etc.);
- (b) institutional facilities (e.g.: schools, churches, community centres, day care centres, recreational centres, etc.);
- (c) outdoor public recreational areas (e.g.: trailer parks, play grounds, picnic areas, etc.); and
- (d) other outdoor public areas where there are continuous human activities (e.g.: commercial plazas and office buildings);

"**Site**" means the property where the Owner has located and operates the Facility and the Works and located at 72 Osbourne Road, 27, Concession Broken Front, Part 1 in the Municipality of Clarington, Regional Municipality of Durham;

"**Source Testing**" means monitoring, sampling and testing to measure emissions resulting from operating the Facility under conditions which yield the worst case emissions within the approved operating range of the Facility;

"**Source Testing Code**" means the Ministry's document entitled "Source Testing Code, Version 2, Report No. ARB-66-80", dated November 1980, as amended;

"**Stack**" means the stack that discharges emissions from the Boilers after those emissions have been controlled by the associated APC Equipment;

"**Substantial Completion**" has the same meaning as "substantial performance" in the *Construction Lien Act* R.S.O. 1990, c.C-30, as amended;

"**Supporting Documentation**" means the documents listed in the attached Schedule "A" of this Certificate which forms part of this Certificate;

"**Test Contaminants**" means the contaminants set out in the attached Schedule "D";

"**Tipping Building**" means the building at the Site where the incoming Waste is received, sorted and temporarily stored;

"**Total Power Failure**" means the loss of the external power supply and concurrent loss of all in-plant power generation;

**"Trained Personnel"** means one or more Site personnel trained in accordance with the requirements of Condition 9.;

**"Waste"** means municipal solid waste as defined in the *O. Reg. 347* and limited to the approved waste set out in Condition No. 2.(2);

**"Waste Processing Rate"** means the mass of Waste fed into one of the Boilers;

**"Works"** means the sewage works described in the Owner's application, this Certificate and in the Supporting Documentation referred to herein, to the extent approved by this Certificate;

**"Unacceptable Waste"** means the incoming Waste received at the Site that does not meet the incoming Waste quality criteria set out in this Certificate, is of hazardous nature and requires caution when handling; and

**"Undiluted Gases"** means the flue gas stream which contains oxygen, carbon monoxide, total hydrocarbons and all contaminants in the same concentrations as they exist in the flue gas stream emerging from an individual piece of equipment, such as the combustion chamber of one Boiler or one baghouse, and into which gas stream no ambient air and/or no other gas stream originating from another piece of equipment, except for dilution air introduced within the CEM Systems, has been introduced.

*You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:*

## **GENERAL PROVISIONS**

### **1. GENERAL**

#### **Compliance**

- (1) The Owner shall ensure compliance with all the conditions of this Certificate and shall ensure that any person authorized to carry out work on or operate any aspect of the Site, including the Works, is notified of this Certificate and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
- (2) Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this Certificate.

#### **Build in Accordance**

- (3) (a) Except as otherwise provided by this Certificate, the Site shall be designed, developed, built, operated, monitored, inspected and maintained in accordance with the following applications:
  - (i) Applications for a Certificate of Approval (Air) dated March 2, 2011, each signed by Cliff Curtis, Commissioner of Works, The Regional Municipality of Durham, by Erin Mahoney, Commissioner of



Environmental Services, The Regional Municipality of York and by Matthew R. Mulcahy, Senior Vice President, Business Development, Covanta Durham York Renewable Energy Limited Partnership, and the Supporting Documentation listed in the attached Schedule "A".

- (ii) Applications for a Provisional Certificate of Approval (Waste Disposal Site) dated March 2, 2011, each signed by Cliff Curtis, Commissioner of Works, The Regional Municipality of Durham, by Erin Mahoney, Commissioner of Environmental Services, The Regional Municipality of York and by Matthew R. Mulcahy, Senior Vice President, Business Development, Covanta Durham York Renewable Energy Limited Partnership, and the Supporting Documentation listed in the attached Schedule "A".
  - (iii) Applications for a Certificate of Approval of Municipal and Private Sewage Works dated March 2, 2011, each signed by Cliff Curtis, Commissioner of Works, The Regional Municipality of Durham, by Erin Mahoney, Commissioner of Environmental Services, The Regional Municipality of York and by Matthew R. Mulcahy, Senior Vice President, Business Development, Covanta Durham York Renewable Energy Limited Partnership, and the Supporting Documentation listed in the attached Schedule "A".
- (b) (i) Any design optimization or modification that is inconsistent with the conceptual design set out in the Supporting Documentation in Schedule "A" shall be clearly identified, along with an explanation of the reasons for the change and submitted to the Director for approval.
  - (ii) If a change to the conceptual design is submitted to the Director for approval, no construction of the Site shall commence prior to the Director approving, in writing, the final conceptual design of the Site.

#### **As-built Drawings**

- (4) (a) Within ninety (90) days of the completion of the initial successful Source Testing program, a set of as-built drawings showing the Facility and the Works and bearing the stamp of a Professional Engineer, shall be prepared and retained at the Site.
- (b) These drawings shall be kept up-to-date through revisions undertaken from time to time and a copy shall be retained at the location of the Site or at the operational office of the Owner for the operational life of the Site.
- (c) Notwithstanding provisions of Condition 1.(4)(b), an amendment to this Certificate shall be sought for changes to the as-built drawings, requiring approval.
- (d) The as-built drawings shall be made available to Ministry staff upon request.

## **Interpretation**

- (5) Where there is a conflict between a provision of any document, including the application referred to in this Certificate and the conditions of this Certificate, the conditions in this Certificate shall take precedence.
- (6) Where there is a conflict between the applications and a provision in any documents listed in Schedule "A", the applications shall take precedence, unless it is clear that the purpose of the document was to amend the applications and that the Ministry approved the amendment.
- (7) Where there is a conflict between any two documents listed in Schedule "A", other than the applications, the document bearing the most recent date shall take precedence.
- (8) The requirements of this Certificate are severable. If any requirement of this Certificate, or the application of any requirement of this Certificate to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Certificate shall not be affected thereby.

## **Other Legal Obligations**

- (9) The issuance of, and compliance with the conditions of this Certificate does not:
  - (a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or
  - (b) limit in any way the authority of the Ministry to require certain steps be taken or to require the Owner to furnish any further information related to compliance with this Certificate.

## **Adverse Effects**

- (10) The Site shall be constructed, operated and maintained in a manner which ensures the health and safety of all persons and prevents adverse effects on the natural environment or on any persons.
- (11) The Owner shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the approved operations at the Site, including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.
- (12) Despite the Owner or any other person fulfilling any obligations imposed by this Certificate, the person remains responsible for any contravention of any other condition of this Certificate or any applicable statute, regulation, or other legal requirement resulting from any act or emission that caused the adverse effect to the natural environment or impairment of water quality.

- (13) If at any time odours, pests, litter, dust, noise or other such negative effects are generated at this Site and cause an adverse effect, the Owner shall take immediate appropriate remedial action that may be necessary to alleviate the adverse effect, including suspension of all waste management activities if necessary.

### **Change of Ownership**

- (14) The Owner shall notify the Director in writing, and forward a copy of the notification to the District Manager, within thirty (30) days of the occurrence of any changes:
- (a) the ownership of the Site;
  - (b) the operator of the Site;
  - (c) the address of the Owner;
  - (d) the partners, where the Owner is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B.17, as amended, shall be included in the notification;
  - (e) the name of the corporation where the Owner is or at any time becomes a corporation, other than a municipal corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C.39, as amended, shall be included in the notification.
- (15) No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance. In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of and provide the successor with a copy of this Certificate, and the Owner shall provide a copy of the notification to the District Manager and the Director.

### **Inspections by the Ministry**

- (16) No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the *OWRA*, the *EPA*, the *PA*, the *SDWA* or the *NMA* of any place to which this Certificate relates, and without limiting the foregoing:
- (a) to enter upon the premises where the approved processing is undertaken, or the location where the records required by the conditions of this Certificate are kept;
  - (b) to have access to, inspect, and copy any records required to be kept by the conditions of this Certificate;
  - (c) to inspect the Site, related equipment and appurtenances;
  - (d) to inspect the practices, procedures, or operations required by the conditions of this Certificate;
  - (e) to conduct interviews with staff, contractors, agents and assignees of the Owner; and
  - (f) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Certificate or the *EPA*, the *OWRA*, the *PA*, the *SDWA* or the *NMA*.

## **Information**

- (17) Any information requested by the Ministry, concerning the operation of the Site and its operation under this Certificate, including but not limited to any records required to be kept by this Certificate, manuals, plans, records, data, procedures and supporting documentation shall be provided to the Ministry, in a timely manner, upon request.
- (18) The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action, under this Certificate or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:
  - (a) an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this Certificate or any statute, regulation or other legal requirement; or
  - (b) acceptance by the Ministry of the information's completeness or accuracy.
- (19) The Owner shall ensure that a copy of this Certificate, in its entirety and including all its Notices of Amendment and the Supporting Documentation listed in Schedule "A" are retained at the Site at all times.

## **2. SERVICE AREA, APPROVED WASTE TYPES, RATES and STORAGE**

- (1) The service area for the Site is the area within the jurisdictional boundaries of The Regional Municipality of Durham and The Regional Municipality of York.
- (2) The operation of this Site is limited to:
  - (a) receipt, temporary storage, transfer and processing, including thermal treatment, of solid non-hazardous waste remaining after Waste Diversion required by the EA Approval, limited to Waste from the following sources:
    - (i) domestic waste and Industrial Commercial and Institutional waste from the Regions' curbside collection and/or from the Regions' waste management facilities; and
    - (ii) waste generated on-Site through activities not relating to the handling and processing of Waste (ie. office, lunch room, etc.);
  - (b) collection and management of the stormwater run-off generated at the Site.
- (3) The following Unacceptable Waste is prohibited from being accepted at the Site:
  - (a) hazardous waste, as defined in the *O. Reg. 347*;
  - (b) wastes which have been source-separated for the purposes of diversion;

- (c) international waste generated outside of Canada, but collected within the jurisdictional boundaries of The Regional Municipality of Durham and The Regional Municipality of York.
- (4) Waste Receipt Rate:
- (a) The maximum daily amount of Waste that is approved to be accepted at the Site shall not exceed 1,520 tonnes per day.
- (5) Storage Restrictions:
- Solids:
- (a) A maximum of 7,350 cubic metres shall be stored inside the Waste pit within the Tipping Building as shown in the Supporting Documentation.
  - (b) Rejected Waste, limited to the Bulky Unprocessable Items removed from the incoming Waste in the Tipping Building shall be stored:
    - (i) in two (2) roll-off bins having a maximum total storage capacity of 30 cubic metres, located within the confines of the Tipping Building; and/or
    - (ii) in the appropriate dedicated bunkers, located within the confines of the Residue Building and described in Conditions 2.(5)(c), 2.(5)(d) and 2.(5)(e), below.
  - (c) A maximum of approximately 77 tonnes or 106 cubic metres of the Residual Waste, limited to the recovered ferrous metals, shall be stored in one (1) dedicated bunker, located within the confines of the Residue Building, described in the Supporting Documentation. The storage duration is limited to a maximum of seven (7) days.
  - (d) A maximum of approximately 120 tonnes or 100 cubic metres of the Residual Waste, limited to the recovered non-ferrous metals, shall be stored in one (1) dedicated bunker, located within the confines of the Residue Building, described in the Supporting Documentation. The storage duration is limited to a maximum of seven (7) days.
  - (e) A maximum of 630 tonnes of the Residual Waste, limited to bottom ash shall be stored in two (2) dedicated bunkers, located within the confines of the Residue Building, described in the Supporting Documentation. The storage duration is limited to a maximum of seven (7) days.
  - (f) A maximum of 700 tonnes of the Residual Waste, limited to the fly ash shall be stored in seven (7) dedicated bunkers, located within the confines of the Residue Building, described in the Supporting Documentation. The storage duration is limited to a maximum of thirty six (36) days.

- (g) A maximum of 85 cubic metres of activated carbon for the carbon injection system shall be stored in one (1) outdoor tank, located adjacent to the APC Building.
- (h) A maximum of 150 cubic metres of lime for the dry scrubber shall be stored in one (1) or more indoor tank(s), located within the confines of the APC Building.
- (i) If required, recirculated residue shall be stored in one (1) or more indoor tank(s), located within the confines of the APC Building.
- (j) A maximum of 35 tonnes or 25 cubic metres of cement for fly ash conditioning shall be stored in one (1) outdoor silo, located adjacent to the Residue Building.
- (k) A maximum of 25 tonnes or 45 cubic metres of pozzolan for fly ash conditioning shall be stored in one (1) outdoor silo, located adjacent to the Residue Building.

Liquids:

- (l)
  - (i) A maximum of 36 cubic metres or 40 tonnes of aqueous ammonia for the SNCR System shall be stored in one (1) outdoor tank, located adjacent to the APC Building.
  - (ii) The Owner shall ensure that the aqueous ammonia storage tank is equipped with a liquid level monitoring device designed to provide a visual and an auditory alarm when the high level setpoint is reached.
  - (iii) The aqueous ammonia storage tank spill containment area and the loading area shall be designed in accordance with the requirements in the Ministry's document entitled "*Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities*" dated May 2007, as amended.
- (6) No outdoor storage of waste, including storage in vehicles, is approved under this Certificate.
- (7) The Owner shall ensure that storage of all wastes is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.
- (8)
  - (a) Waste received at the Site shall be processed within four (4) days from its receipt at the Site.
  - (b) Emergency Waste storage duration extension:
    - (i) The Owner may store the incoming Waste inside the tipping pit within the confines of the Tipping Building for up-to seven (7) days from its receipt at the Site, on an emergency basis only.

- (ii) Within twenty four (24) hours from the start of the emergency storage of the incoming Waste, the Owner shall notify, in writing, the District Manager that the incoming Waste is being stored longer than four (4) days.
  - (iii) Should there be public complaints about the extended incoming Waste storage, the Owner, in consultation with the District Manager, shall determine the cause of the complaints, propose appropriate abatement measures, including but not be limited to the removal and off-site disposal of the Waste contained in the tipping pit, and implement the said measures upon receiving written concurrence from the District Manager within the time frame acceptable to the District Manager.
- (9) In the event that Waste cannot be processed at the Site and the Site is at its approved storage capacity, the Owner shall cease accepting additional Waste. Receipt of additional Waste may be resumed once such receipt complies with the waste storage limitations approved in this Certificate.

3. **SIGNS and SITE SECURITY**

- (1) Prior to receipt of Waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:
  - (a) name of the Owner;
  - (b) this Certificate number;
  - (c) hours during which the Site is open;
  - (d) waste types that are approved to be accepted at the Site;
  - (e) Owner's telephone number to which complaints may be directed;
  - (f) Owner's twenty-four hour emergency telephone number (if different from above);
  - (g) a warning against unauthorized access; and
  - (h) a warning against dumping at the Site.
- (2) The Owner shall ensure that appropriate and visible signs are posted at the Site clearly identifying the wastes and the process reagents and stating warnings about the nature and any possible hazards of the wastes and the reagents.
- (3) The Owner shall ensure that appropriate and visible signs are posted at the Site to prohibit smoking, open flames or sources of ignition from being allowed near any flammable materials storage areas.
- (4) The Owner shall install and maintain appropriate and visible signs at the Site to direct vehicles to the Waste receiving and Residual Waste removal areas and to the reagent unloading areas.
- (5) The Owner shall post appropriate and visible signs along the traffic route providing clear directions to the Site.

- (6) The Owner shall ensure that the Site is fenced in and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.
- (7) The Owner shall ensure that access to the Site, with the exception of the area designated as a Public Information Centre, is regulated and that no unauthorized persons are permitted at the Site without the Trained Personnel escort.
- (8) The Owner shall ensure that the Site is operated in a safe and secure manner, and that Waste, the Residual Waste and the Unacceptable Waste are properly handled, packaged or contained and stored so as not to pose any threat to the general public and the Site personnel.

#### 4. **SITE OPERATIONS**

##### (1) **Operating hours:**

- (a) The Site is approved to operate twenty-four (24) hours per day three hundred and sixty-five (365) days per year.
- (b) Notwithstanding Condition 4.(1)(a), Waste shall only be received at the Site and the Residual Waste shall only be transferred from the Site between 7:00 a.m. and 7:00 p.m. Monday to Saturday. No receipt of the Waste or transfer of the Residual Waste shall be undertaken on statutory holidays.
- (c) Emergency Receipt of Waste:
  - (i) The Owner may receive Waste at the Site outside of the operating hours specified in Condition 4.(1)(b), above, on an emergency basis only.
  - (ii) Within twenty four (24) hours from the receipt of Waste outside of the approved receiving hours, the Owner shall notify, in writing, the District Manager that Waste was received outside of the approved receiving hours.
  - (iii) Should there be complaints about Waste shipments outside of the approved hours, the Owner, in consultation with the District Manager, shall determine the cause of the complaint, propose appropriate abatement measures and implement the said measures upon receiving written concurrence from the District Manager within the time frame acceptable to the District Manager.

##### (2) **Incoming Waste receipt:**

- (a) At the weigh scale, the Trained Personnel shall:
  - (i) inspect the required documentation prior to acceptance of the incoming Waste at the Site; and



- (ii) inspect the incoming Waste with radiation detection equipment.
  - (b) In the Tipping Building, the Trained Personnel shall:
    - (i) visually inspect all incoming Waste being unloaded into the Waste pit; and
    - (ii) once per hour, or as accepted by the District Manager, unload the incoming Waste on the tipping floor for a manual visual inspection and sorting of the incoming Waste.
  - (c) The Owner shall only accept the incoming Waste that is delivered in vehicles that have been approved by the Ministry.
  - (d) The Owner shall ensure that all unloading of incoming Waste at the Site takes place entirely within the confines of the Tipping Building.
- (3) **Unacceptable Waste handling:**
- (a) In the event that waste that is not approved under this Certificate is inadvertently accepted at the Site, the Owner shall ensure that the Unacceptable Waste:
    - (i) is stored in a way that ensures that no adverse effects result from its storage;
    - (ii) is segregated from all other waste;
    - (iii) is handled and removed from the Site in accordance with the *O. Reg. 347* and the *EPA*; and
    - (iv) is removed from the Site within (4) days of its receipt or as acceptable to the District Manager.
  - (b) The Owner shall ensure that all loading of the Unacceptable Waste into transport vehicles is carried out entirely within the confines of the Tipping Building.
- (4) **Waste Sorting:**
- (a) The Trained Personnel shall remove the Bulky Unprocessable Items and Unacceptable Waste from the incoming Waste prior to charging of the Waste to the Boilers.
  - (b) All sorting of the incoming Waste at the Site shall be undertaken indoors, within the confines of the Tipping Building and/or the Refuse Building.
- (5) **Residual Waste Handling and Disposal:**
- (a)
    - (i) Except for transportation of the Residual Waste between the Grizzly Building and the Residue Building, the Owner shall ensure that all

handling of the bottom ash and its segregated constituents, and of the fly ash, is undertaken within the confines of enclosed conveyors and enclosed buildings.

- (ii) The Owner shall ensure that all loading of the Residual Waste into vehicles for its transport from the Site is carried out entirely within the confines of the Residue Building.
  - (b) (i) Different constituents of the Residual Waste shall not be comingled prior to the required compliance testing, unless all Residual Waste is to be disposed of at a Waste Disposal Site that is approved to accept hazardous waste.
  - (ii) The Owner shall ensure that the equipment used in handling of the hazardous wastes or that came in direct contact with the hazardous wastes is not used to handle other wastes.
  - (iii) On an emergency basis, the Owner may use equipment used to handle the hazardous wastes to handle other wastes provided that prior to such use the equipment has been thoroughly cleaned first.
  - (c) (i) Only haulers approved by the Ministry shall be used to transport the Residual Waste from the Site.
  - (ii) The Residual Waste shall be transported from the Site in appropriately covered vehicles that will not allow fugitive dust emissions to be emitted into the natural environment during the said transport.
  - d) Residual Waste generated at the Site shall be disposed of shall only be disposed of at an approved waste disposal site in accordance with the requirements in the *EPA* and the *O. Reg. 347* or at a location with the appropriate jurisdictional approval or a license, if required.
  - (e) Should the Residual Waste limited to the conditioned fly ash and/or the bottom ash be deemed a hazardous waste, the ash shall be disposed of at an approved waste disposal site in accordance with the Land Disposal Restrictions requirements in the *EPA* and the *O. Reg. 347* or at a location with the appropriate jurisdictional approval or a license, if required.
- (6) **Wastewater Management**
- (a) The Owner shall ensure that all wastewater generated at the Site is contained within enclosed buildings, tanks, pipes and conveyors at the Site and the approved outdoor Wastewater Settling Basin.
  - (b) The Owner shall ensure that all wastewater generated at the Site is collected in leak-proof and sufficiently designed wastewater storage facilities:

- (i) Wastewater Holding Tank, to collect the continuous reject water flow from the Boiler make-up water treatment system and the Boiler blowdown, having an approximate holding capacity of 100 cubic metres, located within the confines of the Boiler Building and venting to the atmosphere; and
  - (ii) Wastewater Settling Basin, to collect the wastewater from the floor drains in the buildings at the Site, except for the Tipping Building and the Residue Building, the ash discharger overflow and drain water, the Boiler and turbine-generator washdown water and the APC Equipment area washdown water, having an approximate holding capacity of 38 cubic metres, located outdoors, open to the atmosphere and equipped with a filter basket and an oil skimmer board.
- (c) The wastewater pumps shall be located in the area designed in accordance with the Supporting Documentation to ensure that any potential leaks or drips are contained and directed to the Wastewater Settling Basin.
- (d) (i) The wastewater level in the Wastewater Holding Tank shall be monitored and controlled to ensure that the wastewater inflow to the Tank does not cause the Tank overflow.
- (ii) The wastewater level in the Wastewater Settling Basin shall be monitored and controlled to ensure that the atmospheric precipitation does not cause an overflow from the Basin.
- (e) The Owner shall regularly empty, and clean as necessary, all sumps, wastewater storage/holding areas and equipment that are used to contain, collect and handling the wastewater generated at the Site.
- (f) Should the Owner find it necessary to remove the wastewater from the Site, the wastewater shall only be disposed of at a Ministry-approved site in accordance with the site's certificate of approval or be discharged to the sanitary sewer in accordance with the agreement with the municipality accepting the discharge.
- (g) The floors of the Tipping Building and the Residue Building shall be sufficiently sloped to facilitate the flow of the wastewater generated from the floor cleaning activities and from the truck washdown towards the designated wastewater collection area.
- (h) The Owner shall ensure that the Wastewater Settling Basin is regularly cleaned out and that it does not become a source of odour emissions.
- (7) All activities approved under this Certificate shall only be carried out by appropriately Trained Personnel.

5. **EQUIPMENT and SITE INSPECTIONS and MAINTENANCE**

**Operation and Maintenance**

- (1) Prior to the receipt of the Waste at the Site, the Owner shall prepare and update as necessary, an Operation and Maintenance Manual for all the Equipment, the APC Equipment, the CEM Systems, the Works and any other equipment associated with managing of the Waste and with the control of environmental impacts from the Facility. The Manual shall be prepared in accordance with the written manufacturer's and/or supplier's specifications and good engineering practice.

As a minimum, the Operation and Maintenance Manual shall specify:

- (a) operation procedures of the Equipment, the APC Equipment, the CEM Systems, the Works, and any other equipment associated with managing of the Waste and with the control of environmental impacts from the Facility, in accordance with manufacturers' recommendations and good engineering practices to achieve compliance with this Certificate, the *EPA*, the *OWRA* and their Regulations;
  - (b) calibration procedures for the CEM Systems as required by this Certificate;
  - (c) procedures for start-up and shutdown, including Controlled Shutdown and Emergency Shutdown;
  - (d) quality assurance procedures for the operation and calibration of the CEM Systems in accordance with *40 CFR 60*, Appendix F or *Report EPS 1/PG/7*, as appropriate;
  - (e) Waste receiving and screening procedures;
  - (f) Waste, Rejected Waste and Residual Waste handling procedures;
  - (g) testing and monitoring procedures as required by this Certificate;
  - (h) maintenance and preventative maintenance procedures as required by this Certificate;
  - (i) Facility inspection, including frequency of inspections, procedures;
  - (j) procedure for handling complaints as required by this Certificate.
  - (k) contingency measures to resolve upset conditions and/or minimize the environmental impacts from the Facility;
  - (l) emergency response procedures, including procedures for dealing with power failure, fire, explosion, spills and any other potential emergencies;
  - (m) procedures for record keeping activities as required by this Certificate;
  - (n) description of the responsibilities of the Site personnel and the personnel training protocols; and
  - (o) a list of personnel positions responsible for operation and maintenance, including supervisory personnel and personnel responsible for handling of the emergency situations, recording and reporting pursuant to the requirements of this Certificate, along with the training and experience required for the positions and a description of the responsibilities.
- (2) A copy of this Operations and Maintenance Manual shall be kept at the Site, be accessible to the Site personnel at all times and be updated, as required. The Operations and Maintenance Manual shall be available for inspection by a Provincial Officer upon request.

- (3) The Owner shall implement the operation, maintenance, preventative maintenance and calibration procedures set out in the Operations and Maintenance Manual required by this Certificate.

### **Critical Spare Parts**

- (4)
  - (a) The Owner shall prepare a list of critical spare parts, update this list annually or more frequently, if necessary, to ensure that this list is maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.
  - (b) The Owner shall ensure that the critical spare parts are available at the Site at all times or are immediately available from an off-Site supplier.

### **Inspections**



- (5) Prior to receipt of the Waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including, but not limited to the following:
  - (a) buildings and the indoor waste storage facilities and presence of dust and odour and leaks in or near any openings, such as doorways, window, vent, louver or any other opening;
  - (b) outdoor Residual Waste transport equipment, and the presence of dust and leaks at or near transfer points or the equipment seams;
  - (c) the Equipment, the APC Equipment, the CEM Systems, the Works and any other equipment associated with managing of the Waste and with the control of environmental impacts from the Facility;
  - (d) spill containment areas, loading areas and the conditions around the Wastewater Settling Basin;
  - (e) security fencing, gates, barriers and signs;
  - (f) off-site nuisance impacts such as odour, dust, litter, etc.
  - (g) presence of stormwater pooling at the Site; and
  - (h) condition of the on-Site roads for presence of leaks and drips from the waste delivery trucks or excessive dust emissions.
- (6) The inspections, except for the inspection of the Works, are to be undertaken daily by the Trained Personnel in accordance with the inspection program to ensure that the Facility is maintained in good working order at all times and that no off-Site impacts are occurring. Any deficiencies detected during these regular inspections must be promptly corrected.

### **Inspections and Maintenance of the Works**

- (7) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

## 6. PERFORMANCE REQUIREMENTS

- (1) The Owner shall, ensure that the Facility/Equipment is designed and operated in such a manner as to ensure that the following Performance Requirements are met:
  - (a) the maximum 10-minute average concentration of odour at the most impacted Sensitive Receptor, resulting from the operation of the Facility/Equipment, calculated in accordance with the procedures outlined in the attached Schedule "B", shall not exceed 1 odour unit;
  - (b) the noise emissions from the Facility shall comply with the limits set out in Ministry *Publication NPC-205*;
  - (c) the vibration emissions from the Facility shall comply with the limits set out in Ministry *Publication NPC-207*.
- (2) The Owner shall ensure that the Boilers and the associated APC Equipment and the CEM Systems are designed and operated in such a manner as to ensure that the following Performance Requirements are met:
  - (a)
    - (i) The temperature in the combustion zone of each Boiler shall reach a minimum of 1000 degrees Celsius ( $^{\circ}\text{C}$ ) for one second, prior to introduction of the Waste into the combustion chamber of the Boiler during the start-up, and thereafter maintained during the entire thermal treatment cycle and subsequent shutdown until all Waste combustion is completed.
    - (ii) Compliance with the minimum temperature requirement shall be demonstrated by direct measurement at the location where the combustion gases have achieved the residence time of one second at a minimum temperature of  $1000^{\circ}\text{C}$  (the Target Location) or by correlation of the required temperature of  $1000^{\circ}\text{C}$  for one second to the temperature measured downstream of the Target Location as proven by a method acceptable to the Director.
  - (b) The concentration of residual oxygen in the Undiluted Gases leaving the combustion zone via the economizer outlet of each Boiler, as measured and recorded by the CEM System, shall not be less than 6 percent by volume on a dry basis.
  - (c)
    - (i) The operational target for the concentration of carbon monoxide in the Undiluted Gases leaving the combustion zone via the economizer outlet of each Boiler is 40 milligrams per dry cubic metre, as a 4-hour rolling average, normalized to 11 percent oxygen at a reference temperature of  $25^{\circ}\text{C}$  and a reference pressure of 101.3 kilopascals, as measured and recorded by the CEM System, for the period from and including initial commissioning of the facility to twelve months following the completion of the first Source Testing program.

- (ii) The 4-hour average concentration of carbon monoxide in the Undiluted Gases leaving the combustion zone via the economizer outlet of each Boiler, as measured and recorded by the CEM System, shall not be more than 40 milligrams per dry cubic metre, normalized to 11 percent oxygen at a reference temperature of 25°C and a reference pressure of 101.3 kilopascals, after the first twelve months following the completion of the first Source Testing program.
  - (d) The emissions from the Boilers after those emissions have been controlled by the associated APC Equipment for discharge into the atmosphere via the Stack shall comply with the emission concentration limits listed in the attached Schedule "C", as measured by a CEM System or by Source Testing as applicable.
  - (e) The Boilers shall include combustion air control systems, which are capable of automatically adjusting the distribution and the quantity of combustion air, in such a manner that changes in the Waste Processing Rate and/or Waste composition or irregularities in the loading and/or combustion shall not adversely affect the performance of the Boilers.
  - (f) The Boilers shall provide and maintain a high degree of gas turbulence and mixing in the combustion chamber.
  - (g) The Boilers shall achieve the temperature, oxygen availability and turbulence requirements over the complete range of operating parameters, including feed rate, feed characteristics, combustion air, flue gas flow rate and heat losses.
  - (h) The inlet temperature into each baghouse of the APC Equipment of the Boilers shall not be less than 120°C and not more than 185°C. 
- (3) The Owner shall install and maintain  visual and audible alarm systems to alert the Facility/Equipment operators of any potential deviation from the above Performance Requirements for parameters that are continuously monitored by applicable CEM Systems and shall forthwith take all reasonable actions to bring the Equipment/Facility into compliance with all Performance Conditions.
- (4) In the event that the CEM Systems indicate that emissions from the Boilers and the Stack exceed any Performance Requirements in the attached Schedule "C" for a continuous three (3) hour period, the Owner shall forthwith cut-off all Waste feed into the affected Boiler and initiate an Emergency Shutdown, while maintaining a temperature of 1000°C, as practicable, in the combustion zone of the Boiler.

### **Residual Waste Compliance Criteria**

- (5) (a) The Residual Waste generated at the Site and destined for a non-hazardous waste disposal site in Ontario shall not meet any of the criteria from the definition of "hazardous waste" set out in the *O. Reg. 347*.

(b) The Residual Waste that meets any of the criteria from the definition of "hazardous waste" set out in the *O. Reg. 347* shall be handled and disposed of in accordance with the LDR requirements set out in the *EPA* and the *O. Reg. 347*.

(6) The Residual Waste, limited to the bottom ash, destined for a non-hazardous waste disposal site shall meet the definition of "incinerator ash" set out in the *O. Reg. 347*.

## 7. **TESTING, MONITORING and AUDITING**

### **Source Testing**

(1) The Owner shall perform annual Source Testing in accordance with the procedures and schedule outlined in the attached Schedule "E", to determine the rate of emission of the Test Contaminants from the Stack. **The first Source Testing program shall be conducted not later than six (6) months after the Commencement Date of Operation** of the Facility/Equipment and subsequent Source Testing program shall be conducted once (1) every calendar year thereafter.

### **Continuous Monitoring**

(2) The Owner shall select, test and install appropriate CEM Systems and continuous recording devices in accordance with the requirements outlined in the attached Schedule "F" to conduct and maintain a program to continuously monitor, as a minimum, the following parameters **prior to commencement of operation of the Boilers:**

- (a) the temperature at one (1) second downstream of the combustion zone of each Boiler where most of the combustion has been completed and the combustion temperature is fully developed;
- (b) the inlet temperature of the gases into each baghouse of the APC Equipment of each Boiler;
- (c) the concentration of carbon monoxide, oxygen and organic matter (as methane) in the Undiluted Gases leaving the combustion zone via the economizer outlet of each Boiler;
- (d) the opacity and moisture content of the flue gas and the concentration of oxygen, nitrogen oxides, sulphur dioxide, hydrogen chloride, hydrogen fluoride and ammonia in the Undiluted Gases leaving the baghouse of the APC Equipment of each Boiler.

### **Long-Term Sampling for Dioxins and Furans**

(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.

- (b) The Owner shall evaluate the performance of the long-term sampling system in determining Dioxins and Furans emission trends and/or fluctuations as well as demonstrating the ongoing performance of the APC Equipment associated with the Boilers.

### **Ambient Air Monitoring**

- (4) (a) The Regions shall develop and implement the Ambient Air Monitoring and Reporting Plan, in accordance with the requirements set out in the EA Approval and as determined to be acceptable by the Regional Director.
- (b) The Regions shall report the results of the Ambient Air Monitoring program to the Regional Director in accordance with the Ambient Air Monitoring and Reporting Plan and in accordance with the requirements of Condition 14.
- (c) The Regions shall post the Ambient Air Monitoring and Reporting Plan and the results of the Ambient Air Monitoring program on the Owner's web site for the Facility in accordance with the requirements of the EA Approval and Condition 15.

### **Noise Monitoring - Acoustic Audit**

- (5) The Owner:
  - (a) shall carry out Acoustic Audit measurements on the actual noise emissions due to the operation of the Facility. The Acoustic Audit measurements shall be carried out in accordance with the procedures in *Publication NPC-103* and in accordance to the Noise Monitoring and Reporting Plan prepared in accordance with the requirements set out in the EA Approval and as approved by the Director;
  - (b) shall submit an Acoustic Audit Report on the results of the Acoustic Audit, prepared by an Independent Acoustical Consultant, in accordance with the requirements of *Publication NPC-233* and the Noise Monitoring and Reporting Plan prepared in accordance with the requirements set out in the EA Approval and as approved by the Director, to the District Manager and the Director, not later than three (3) months after the commencement of operation of the Facility.
- (6) The Director:
  - (a) may not accept the results of the Acoustic Audit if the requirements of *Publication NPC-233* or the approved Noise Monitoring and Reporting Plan were not followed;

- (b) may require the Owner to repeat the Acoustic Audit if the results of the Acoustic Audit are found unacceptable to the Director.

### **Residual Waste Testing**

- (7)
  - (a) A minimum of six (6) months prior to the Commencement Date of Operation, the Owner shall submit to the Director for approval, a Testing Protocol for testing of the bottom ash for compliance with the criteria set out in the "incinerator ash" definition from the *O. Reg. 347* and for testing of the Residual Waste for compliance with the criteria set out in this Certificate.
  - (b) As a minimum, the Testing Protocol shall comply with the Ministry's regulatory requirements for sampling and testing of waste, including the requirements set out in the Ministry's document entitled "Principles of Sampling and Analysis of Waste for TCLP under Ontario Regulation 347", dated February 2002, as amended.
  - (c) The Testing Protocol shall include the rationale for the proposed methods and the following:
    - (i) a sampling protocol, including the proposed number of samples to be taken and their locations, to ensure that representative sample(s) are being tested for compliance with this Certificate;
    - (ii) sample(s) handling and preserving procedures;
    - (iii) analytical protocol for the applicable contaminants to ensure that appropriate analytical method(s) are being used for compliance testing required by this Certificate; and
    - (iv) a testing protocol for the bottom ash during the Site commissioning period.
  - (d) The Owner shall implement the Testing Protocol on the Commencement Date of Operation.
- (8) For handling of the bottom ash as a solid non-hazardous waste, the Owner shall follow the following schedule for compliance testing:
  - (a) for the Site commissioning period, the bottom ash shall be tested in accordance with the Testing Protocol approved by the Director;
  - (b) for the period following the Site commissioning period, the bottom ash shall be tested for the content of the combustible materials on an annual basis, until the compliance testing results indicate that the bottom ash meets the "incinerator ash" definition from the *O. Reg. 347* for three (3) consecutive years, following which a triennial compliance testing event may be carried out;

- (c) should any annual or triennial compliance testing event indicate that the bottom ash does not meet the “incinerator ash” definition, prior to each of the next three (3) shipments from the Site, compliance testing of each of the three (3) shipments shall be carried out. Once three (3) consecutive tests re-establish compliance with the “incinerator ash” definition from the *O. Reg. 347* and that the bottom ash does not exceed the Leachate Toxicity Criteria, the compliance testing schedule set out in Condition 7.(8)(b) may be resumed; and
  - (d) should the results of any compliance testing of the bottom ash indicate that the concentrations of the leachate toxic contaminants in the bottom ash equal to or exceed the Leachate Toxicity Criteria, the bottom ash shall be handled as a hazardous waste. Once three (3) consecutive tests re-establish that the bottom ash does not exceed the Leachate Toxicity Criteria, the bottom ash compliance testing schedule set out in Condition 7.(8)(b) may be resumed.
- (9) (a) For handling of the bottom ash as a hazardous waste and for handling of the fly ash, prior to final disposal at a hazardous waste landfill site in Ontario, the Owner shall undertake any sampling and testing that would be required to comply with the LDR requirements set out in the *EPA* and the *O. Reg. 347*.
- (b) The Owner shall follow the following schedule for compliance testing:
- (i) prior to each of the first three (3) shipments of the ash from the Site, the ash shall be tested so that for the compliance with the LDR requirements can be demonstrated;
  - (ii) following the three (3) initial compliance testing events, the ash shall be tested on an annual basis, until the compliance testing results indicate that the ash meets the LDR requirements during the three (3) consecutive years, following which a triennial compliance testing may be carried out; and
  - (iii) should any annual or triennial compliance testing event indicate that the ash does not meet the LDR requirements, prior to next three (3) shipments from the Site, compliance testing of each of the three (3) shipments shall be carried out. Once three (3) consecutive tests re-establish compliance with the LDR requirements, the compliance testing schedule set out in Condition 7.(9)(b)(ii) may be resumed.

**Soil Testing:**

- (10) (a) Within one hundred and twenty (120) days from the date of this Certificate, the Regions shall undertake the soil testing in accordance with the Soil Testing Plan required by this Certificate.
- (b) The soil testing shall be repeated every three (3) years or as agreed upon in writing by the Regional Director.

## **Disposal of Residual Waste**

- (11) The Owners shall ensure that no portion of the Residual Waste undergoing compliance testing is transferred from the Site until the results of the compliance testing required by this Certificate demonstrate compliance with the relevant Ministry's requirements.
- (12) Bottom ash that is not a hazardous waste, as defined in the *O. Reg. 347*, may be disposed of at an approved non-hazardous waste landfill site or at a site approved to accept such waste by an appropriate government agency of equivalent jurisdiction.
- (13) Residual Waste shall be treated to comply with the LDR requirements set out in the *EPA* and the *O. Reg. 347* prior to disposal of at an approved hazardous waste landfill site or at a site approved to accept such waste by an appropriate government agency of equivalent jurisdiction.

## **Groundwater and Surface Water Monitoring**

- (14) (a) The Regions shall develop and implement the Groundwater and Surface Water Monitoring Plan, in accordance with the requirements set out in the EA Approval and as determined to be acceptable to the Regional Director.
- (b) The Regions shall report the results of the Groundwater and Surface Water Monitoring program to the Regional Director and to the Director in accordance with the schedule set out in the EA Approval and in accordance with the requirements of Condition 14.
- (c) The Regions shall post the Groundwater and Surface Water Monitoring Plan and the results of the Groundwater and Surface Water Monitoring program on the Owner's web site for the Facility in accordance with the requirements of the EA Approval and Condition 15.

## **8. NUISANCE IMPACT CONTROL and HOUSEKEEPING**

### **Odour Management**

- (1) (a) The Owner shall maintain a negative air pressure atmosphere in the Tipping Building at all times to contain any potential odours within the confines of the Tipping Building.
- (b) (i) Once per year, or as required by the District Manager, the Owner shall undertake a test to measure the worse case scenario negative air pressure atmosphere throughout the Tipping Building, while the activities approved in this Certificate are carried out in the Tipping Building.
- (ii) Notwithstanding the requirements set out in Condition 8.(1)(b)(i), the Owner shall install sufficient instrumentation to measure the air flow

into the Boilers and demonstrate that adequate air flow is maintained to maintain a negative air pressure atmosphere throughout the Tipping Building.

- (c) In the event that adequate negative air pressure cannot be maintained, the Owner shall implement any necessary additional odour containment and control measures, including, but not necessarily limited to, those in the required Contingency and Emergency Response Plan.
- (2) The Owner shall ensure that the entrance and exit doors into the Tipping Building, the Residue Building and the Grizzly Building are kept closed at all times except to permit the entry or exit of the respective waste transport vehicles and waste handling equipment into and out of these Buildings.
- (3) The Owner shall ensure that, at all times, the air from the Tipping Building, the Residue Building, the Grizzly Building and from the Equipment is exhausted through an appropriate and fully functional APC Equipment approved by this Certificate.
- (4) The Owner shall undertake appropriate housekeeping activities, including regular cleaning of the tipping floor to control potential sources of fugitive odour emissions.
- (5) The Owner shall ensure that no Waste handling equipment or empty storage containers are stored outside, unless they have been washed to prevent fugitive odour emissions.
- (6) The Owner shall regularly clean all equipment and storage areas that are used to handle, process and store waste at the Site, including the surfaces of the outdoor spill containment areas, as required.
- (7)
  - (i) Prior to the receipt of Waste at the Site, the Owner shall provide documentation which outlines the testing carried out by a licensed structural engineer to confirm the effectiveness of the containment in the buildings, conveyors and tanks and silos at the Site.
  - (ii) The testing shall be carried out and repeated as directed by the District Manager in accordance with the test protocol prepared in consultation with and approved by the District Manager.
  - (iii) These tests shall be repeated as directed or agreed by the District Manager.
- (8) The Owner shall prepare and implement an Odour Management and Mitigation Plan in accordance with the requirements set out in the EA Approval and as determined to be acceptable to the Regional Director.
- (9) (a) In addition to the requirements set out in the EA Approval, the Odour Management and Mitigation Plan shall include the following:

- (i) identification of all potential sources of odourous emissions;
  - (ii) description of the preventative and control measures to minimize odourous emissions from the identified sources;
  - (iii) procedures for the implementation of the Odour Management and Mitigation Plan;
  - (iv) inspection and maintenance procedures to ensure effective implementation of the Odour Management and Mitigation Plan; and
  - (v) procedures for verification and recording the progress of the implementation of the Odour Management and Mitigation Plan.
- (b) The Owner shall continue to submit an updated Odour Management and Mitigation Plan until such time as the Regional Director notifies the Owner in writing that further submissions are no longer required.

### **Vehicles and Traffic**

- (10) (a) The Owner shall ensure that all vehicles transporting waste to and from the Site are not leaking or dripping waste when arriving at or leaving the Site.
- (b) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately report the violation to the owner of the vehicle(s) and to the District Manager.
- (c) The Owner shall ensure that the exterior of all vehicles delivering Waste to the Site or hauling waste from the Site is washed prior to the trucks' departure from the Site, if necessary.
- (d) Any necessary truck washing shall occur only in the designated wash down area of the Tipping Building or the Residue Building.
- (11) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

### **Litter**

- (12) The Owner shall:
- (a) take all practical steps to prevent the escape of litter from the Site;
  - (b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
  - (c) if necessary, erect litter fences around the areas causing a litter problem.

### **Dust**

- (13) The Owner shall ensure that all on-site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

## **Vermin and Vectors**

(14) The Owner shall:

- (a) implement necessary housekeeping procedures to eliminate sources and potential sources of attraction for vermin and vectors; and
- (b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

## **Visual Screening**

(15) The Owner shall provide visual screening for the Site in accordance with the documentation included in the attached Schedule "A".

## 9. **STAFF TRAINING**

- (1) (a) The Owner shall ensure that all operators of the Site are trained with respect to the following, as per the specific job requirements of each individual operator:
  - (i) terms and conditions of this Certificate and the requirements of the EA Approval;
  - (ii) operation and management of the Site, or area(s) within the Site, as per the specific job requirements of each individual operator, and which may include procedures for receiving, screening and identifying Waste, refusal, handling, processing and temporarily storing wastes, operation of the Equipment, the APC Equipment, the CEM System and the Works;
  - (iii) testing, monitoring and operating requirements;
  - (iv) maintenance and inspection procedures;
  - (v) recording procedures;
  - (vi) nuisance impact control and housekeeping procedures;
  - (vii) procedures for recording and responding to public complaints;
  - (viii) an outline of the responsibilities of Site personnel including roles and responsibilities during emergency situations;
  - (ix) the Contingency and Emergency Response Plan including exit locations and evacuation routing, and location of relevant equipment available for emergency situations;
  - (x) environmental, and occupational health and safety concerns pertaining to the wastes to be handled;
  - (xi) emergency first-aid information; and
  - (xii) relevant waste management legislation and regulations, including the *EPA*, the *OWRA*, the *O. Reg. 347*, the *O. Reg. 419/05* and the Ministry guidelines affecting thermal treatment facilities.
- (2) The Owner shall ensure that all personnel are trained in the requirements of this Certificate relevant to the employee's position:

- (a) upon commencing employment at the Site in a particular position;
- (b) whenever items listed in Condition 9.(1) are changed or updated; and
- (c) during the planned refresher training.

10. **COMPLAINTS / ODOUR-CONTAMINANT EMISSIONS RESPONSE PROCEDURE**

- (1) The Owner or a designated representative of the Owner shall be available to receive public complaints caused by the operations at the Site twenty-four (24) hours per day, seven (7) days per week.
- (2) If at any time, the Owner or the Ministry receives a complaint or the Owner or the Provincial Officer detects an emission of odour or any contaminant, (Emission Event), from the Site, in addition to the requirements set out in the EA approval, the Owner shall record all relevant information in the computerized tracking system and shall respond to the complaint/Emission Event according to the following procedure:

Step 1: Record of Complaint/Emission Event

- (a) (i) The Owner shall record each complaint/Emission Event and each record shall include the following:
  - (A) name, address and the telephone number of the complainant, if known;
  - (B) time and date of the complaint/Emission Event;
  - (C) details of the complaint; and
- (ii) After the complaint/Emission Event has been recorded in the tracking system, the Owner shall immediately report to the District Manager by phone or e-mail during office hours and to the Ministry's Spills Actions Centre at 1-800-268-6060 after office hours on the receipt of the complaint or occurrence of the Emission Event.

Step 2: Investigation and Handling of Complaint/Emission Event

- (b) The Owner shall immediately initiate investigation of the complaint/Emission Event. As a minimum, the investigation shall include the following:
  - (i) determination of the activities being undertaken at the Site at the time of the complaint/Emission Event;
  - (ii) meteorological conditions including, but not limited to the ambient temperature, approximate wind speed and its direction.
  - (iii) determination if the complaint is attributed to activities being undertaken at the Site and if so, the possible cause(s) of the complaint/Emission Event; and



- (iv) determination of the remedial action(s) to address the cause(s) of the Complaint/Emission Event, and the schedule for the implementation of the necessary remedial action(s).
  - (c) The Owner shall respond to the complainant, if known, and the response shall include the results of the investigation of the Complaint, the action(s) taken or planned to be taken to address the cause(s) of the Complaint, and if any follow-up response(s) will be provided.
  - (d) Upon completed investigation of the Complaint/Emission event, the Owner shall, within three (3) business days, submit a report to the District Manager on the Complaint, on the action(s) taken or planned to be taken to address the cause(s) of the Complaint and on all proposed action(s) to prevent recurrence of the Complaint/Emission Event in the future.
- (3) If, in the opinion of the District Manager, failure of the APC Equipment and/or any other process or equipment upset or malfunction results in off-site Complaint/Emission Event, confirmed by the Owner or a Provincial Officer of the Ministry, the Owner shall, immediately upon notification from the District Manager, implement any necessary additional control measures, including, but not necessarily limited to, those in the Contingency and Emergency Response Plan required by this Certificate.
- (4) If the District Manager deems the additional control measures taken as per condition 10.(3) to be unsuitable, insufficient or ineffective, the District Manager may direct the Owner, in writing, to take further measures to address the noted failure, upset or malfunction including pursuant to section 39 of the *EPA* requiring a reduction in the receipt of Waste, cessation of the receipt of Waste, removal and off-site disposal of Waste from the Tipping Building as well as making repairs or modifications to equipment or processes.

#### 11. **CONTINGENCY and EMERGENCY RESPONSE PLAN**

- (1) (a) The Owner shall develop and implement a Contingency and Emergency Response Plan in accordance with the requirements set out in the EA Approval.
  - (b) Notwithstanding the requirements set out in the EA Approval, the Contingency and Emergency Response Plan shall be prepared in consultation with the District Manager or designate, the local Municipality and the Fire Department.
- (2) In addition to the requirements set out in the EA Approval, the Contingency and Emergency Response Plan, as a minimum, shall include the following:
- (a) the Site plan clearly showing the equipment layout and all storage areas for wastes and reagents;

- (b) a list of Site personnel responsible for the implementation of the contingency measures and various emergency response tasks and their training requirements;
- (c) a list of equipment and materials required for the implementation of the contingency measures and the emergency situation response;
- (d) maintenance and testing program for equipment required for the implementation of the contingency measures and the emergency situation response;
- (e) procedures to be undertaken as part of the implementation of the contingency measures and the emergency situation response;
- (f) names and telephone numbers of waste management companies available for emergency response;
- (g) notification protocol, with names and telephone numbers of persons to be contacted, including the Owner, the Site personnel, the Ministry of the Environment Spills Action Centre and the York Durham District, the local Fire and Police Departments, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour;
- (h) procedures and actions to be taken should the incoming Waste not meet the applicable quality criteria specified in this Certificate;
- (i) procedures and actions to be taken should the outgoing Residual Waste fail to meet the criteria specified in this Certificate;
- (j) procedures and actions to be taken should the current disposal options for the outgoing Residual Waste become unavailable;
- (k) design of the contingency measure, procedures and actions should the emissions from the Site, including the fugitive odour/dust emissions, cause occurrences of public Complaints;
- (l) procedures and actions to be taken should the Owner be unable to maintain the negative pressure in the Tipping Building;
- (m) procedures and actions to be taken should the occurrence of Complaints require the Owner to suspend the waste processing activities at the Site; and
- (n) identification and risk assessment of all reasonably foreseeable 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 this Certificate, including but not limited to:
  - (i) a breakdown of the Facility/Equipment or part of the Facility/Equipment, including the APC Equipment and the CEM Systems associated with the Boilers;
  - (ii) CEM Systems indicate that the Boilers and associated APC Equipment have been out of compliance with the Performance Requirements;
  - (iii) any change in process parameters which may result in non compliance with the Performance Requirements;
  - (iv) power failure resulting in the use of the Emergency Diesel Generator or Total Power Failure; and
  - (v) description of the preventative and control measures to minimize the occurrence or impacts of the above incidents; and
  - (vi) procedures for corrective measures and timelines to take to address the above incidents in a timely manner to effectively prevent or minimize the discharge of any contaminant into the natural environment and continue to maintain compliance with the *EPA* , the Regulations and

this Certificate, including procedures for Waste Processing Rate reduction, waste feed cut-off, Controlled Shutdown or Emergency Shutdown of the Boilers as applicable.

- (3) The Owner shall submit the finalized Contingency and Emergency Response Plan to the Director a minimum of one hundred and twenty (120) days prior to the Commencement Date of Operation, for approval.
- (4) An up-to-date version of the Contingency and Emergency Response Plan shall be kept at the Site at all times, in a central location available to all staff, and it shall be available for inspection by a Provincial Officer upon request.
- (5) The Owner shall ensure that the names and telephone numbers of the persons to be contacted in the event of an emergency situation are kept up-to-date, and that these numbers are prominently displayed at the Site and at all times available to all staff and emergency response personnel.
- (6) The Contingency and Emergency Response Plan shall be reviewed on a regular basis and updated, as necessary. The revised version of the Contingency and Emergency Response Plan shall be submitted to the local Municipality and the Fire Department for comments and to the District Manager for comments and concurrence.
- (7) The Owner shall implement the recommendations of the updated Contingency and Emergency Response Plan, immediately upon receipt of the written concurrence from the District Manager.

12. **EMERGENCY SITUATION RESPONSE and REPORTING**

- (1) The Owner shall immediately take all measures necessary to contain and clean up any spill or leak which may result from the operation at this Site and manage any emergency situation in accordance with the Contingency and Emergency Response Plan.
- (2) The Owner shall ensure that the equipment and materials listed in the Contingency and Emergency Response Plan are immediately available at the Site, are in a good state of repair, and fully operational at all times.
- (3) The Owner shall ensure that all Site personnel responsible for the emergency situation response are fully trained in the use of the equipment and related materials, and in the procedures to be employed in the event of an emergency.
- (4) All Spills as defined in the *EPA* shall be immediately reported to the **Ministry's Spills Action Centre at 1-800-268-6060** and shall be recorded in the log book as to the nature of the emergency situation, and the action taken for clean-up, correction and prevention of future occurrences.

13. **SUBMISSIONS to the REGIONAL DIRECTOR or DISTRICT MANAGER**

- (1) The Owner shall notify the District Manager in writing, at least six (60) days prior to the scheduled date for the first receipt of Waste at the Site, as to whether or not the construction of the Facility has been carried out in accordance with this Certificate to a point of Substantial Completion.
- (2) (a) The Owner shall forthwith notify the District Manager and the Spills Action Centre by telephone, when any of the following incidents occur 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 this Certificate:
  - (i) CEM Systems indicate that the Boilers and associated APC Equipment have been out of compliance with the Performance Requirements triggering a Waste Processing Rate Reduction, Waste Feed cut-off, Controlled Shutdown or Emergency Shutdown as specified in the Emergency Response and Contingency Plan;
  - (ii) failure of the APC Equipment associated with the Boilers; and
  - (iii) power failure resulting in the use of the emergency diesel generator or Total Power Failure;
- (b) In addition to fulfilling the notification requirements from the *EPA*, the Owner shall prepare and submit a written report to the District Manager with respect to any of the above said occurrences, within five (5) calendar days of the occurrence, in the following format:
  - (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.
- (3) Should a Spill, as defined in the *EPA*, occur at the Site, in addition to fulfilling the requirements from the *EPA* and applicable regulations, the Owner shall submit to the District Manager a written report within three (3) calendar days outlining the nature of the Spill, remedial measure taken and the measures taken to prevent future occurrences at the Site.
- (4) (a) Within ninety (90) days from the date of this Certificate, the Regions shall prepare and submit to the District Manager for concurrence, a Soil Testing Plan to monitor the impact of the Site operations at the locations where the ambient air monitoring is proposed by the Owner in accordance with the requirements set out in the EA Approval.

- (b) (i) This Plan shall ensure that representative samples of the soil to be tested are collected in sufficient numbers and that the samples are properly preserved and tested so that reliable data on the soil characteristics is collected.
- (ii) As a minimum, the Plan shall include testing for cadmium, lead, chromium, nickel, cobalt, copper, molybdenum, selenium, zinc and mercury, Dioxins and Furans.
- (iii) This Plan shall comply with the Ministry's regulatory requirements for sampling and testing of soil and it shall include the rationale for the proposed methods.
- (iv) This Plan be kept at the Site at all times and be available for inspection by a Provincial Officer upon request.

14. **RECORDS KEEPING**

- (1) Any information requested by the Ministry concerning the Facility and its operation under this Certificate, including, but not limited to, any records required to be kept by this Certificate, shall be provided to the Ministry, upon request, in a timely manner.
- (2) The Owner shall retain, for a minimum of seven (7) years from the date of their creation, except as noted below, all reports, records and information described in this Certificate.

**Daily Activities**

- (3) The Owner shall maintain an on-Site written or digital record of activities undertaken at the Site. All measurements shall be recorded in consistent metric units of measurement. As a minimum, the record shall include the following:
  - (a) date of record and the name and signature of the person completing the report;
  - (b) quantity and source of the incoming Waste received at the Site;
  - (c) records of the estimated quantity of Waste thermally treated in the Boilers;
  - (d) quantity of the Unacceptable Waste received at the Site by the end of the approved Waste receipt period and the type(s) of the Unacceptable Waste received;
  - (e) quantity and type of the Residual Waste shipped from the Site, including any required outgoing Residual Waste characterization results;
  - (f) destination and/or receiving site(s) for the Residual Waste shipped from the Site;
  - (g) quantity and type of any Rejected Waste accepted at the Site;
  - (h) destination and/or receiving site(s) for the Rejected Waste shipped from the Site;
  - (i) housekeeping activities, including litter collection and washing/cleaning activities, etc.
  - (j) amount of electricity produced;

- (k) amount of excess electricity exported to the electrical grid.

### **Monitoring and Testing Records**

- (4) The Owner shall maintain an on-Site written or digital record of activities undertaken at the Site. All measurements shall be recorded in consistent metric units of measurement. As a minimum, the record shall include the following:
  - (a) day and time of the activity;
  - (b) all original records produced by the recording devices associated with the CEM Systems;
  - (c) a summary of daily records of readings of the CEM Systems, including:
    - (i) the daily minimum and maximum 4-hour average readings for carbon monoxide;
    - (ii) the daily minimum and maximum one hour average readings for oxygen;
    - (iii) the daily minimum and maximum 10-minute average readings for organic matter;
    - (iv) the daily minimum and maximum 24-hour average readings for sulphur dioxide;
    - (v) the daily minimum and maximum 24-hour average readings for nitrogen oxides;
    - (vi) the daily minimum and maximum 24-hour average readings for hydrogen chloride;
    - (vii) the daily minimum and maximum 6-minute average and 2-hour average opacity readings; and
    - (viii) the daily minimum and maximum one-hour average readings for temperature measurements.
  - (d) records of all excursions from the applicable Performance Requirements as measured by the CEM Systems, duration of the excursions, reasons for the excursions and corrective measures taken to eliminate the excursions;
  - (e) all records produced during any Acoustic Audit;
  - (f) all records produced during any Source Testing;
  - (g) all records produced by the long term sampling program for Dioxins and Furans required by this Certificate;
  - (h) all records produced during the Residual Waste compliance testing;
  - (i) all records produced during the Soil Testing;
  - (j) all records produced during the Groundwater and Surface Water Monitoring required by this Certificate;
  - (k) all records produced during the Ambient Air Monitoring required by this Certificate;
  - (l) all records associated with radiation monitoring of the incoming Waste, including but not limited to:
    - (i) transaction number;
    - (ii) hauler;
    - (iii) vehicle ID;
    - (iv) alarm level;
    - (v) maximum CPS;
    - (vi) uSv/hr;

- (vii) comment;
  - (viii) background CPS;
  - (ix) driver time in and out; and
  - (x) name of the Trainer Personnel that carried out the monitoring.
- (m) results of the containment testing carried out in the buildings, conveyors, tanks and silos, as required;
- (n) results the negative pressure in the Tipping Building carried out, as required.

### **Inspections/Maintenance/Repairs**

- (5) The Owner shall maintain an on-Site written or digital record of inspections and maintenance as required by this Certificate. As a minimum, the record shall include the following:
- (a) the name and signature of the Trained Personnel that conducted the inspection;
  - (b) the date and time of the inspection;
  - (c) the list of any deficiencies discovered, including the need for a maintenance or repair activity;
  - (d) the recommendations for remedial action;
  - (e) the date, time and description of actions (repair or maintenance) undertaken;
  - (f) the name and signature of the Trained Personnel who undertook the remedial action; and
  - (g) an estimate of the quantity of any materials removed during cleaning of the Works.

### **Emergency Situations**

- (6) The Owner shall maintain an on-Site written or digital record of the emergency situations. As a minimum, the record shall include the following:
- (a) the type of an emergency situation;
  - (b) description of how the emergency situation was handled;
  - (c) the type and amount of material spilled, if applicable;
  - (d) a description of how the material was cleaned up and stored, if generated; and
  - (e) the location and time of final disposal, if applicable; and
  - (f) description of the preventative and control measures undertaken to minimize the potential for re-occurrence of the emergency situation in the future.

### **Complaints Response Records**

- (7) The Owner shall establish and maintain a written or digital record of complaints received and the responses made as required by this Certificate.

### **Training**

- (8) The Owner shall maintain an on-Site written or digital record of training as required by this Certificate. As a minimum, the record shall include the following:

- (a) date of training;
- (b) name and signature of person who has been trained; and
- (c) description of the training provided.

## **Reports**

- (9) The Owner shall keep at the Site the following reports required by this Certificate:
  - (a) the ESDM Report
  - (b) the Acoustic Assessment Report;
  - (c) the Annual Report; and
  - (d) the Third Party Audit.

## 15. **REPORTING**

### **Annual Report**

- (1) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and to the Advisory Committee, an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:
  - (a) a summary of the quality and the quantity of the Wastes accepted at the Site, including the maximum amount of the Waste received annually and daily and the sources of the Waste;
  - (b) a summary of the quality and the quantity of the Residual Waste shipped from the Site, including the analytical data required to characterize the Residual Waste, the off-Site destinations for the Residual Waste and its subsequent use, if known;
  - (c) estimated material balance for each month documenting the maximum amount of wastes stored at the Site;
  - (d) annual water usage;
  - (e) annual amount of the electricity produced and the annual amount of the electricity exported to the electrical grid;
  - (f) summaries and conclusions from the records required by Conditions 14.(3) through 14.(8) of this Certificate;
  - (g) the Emission Summary Table and the Acoustic Assessment Summary Table for the Facility as of December 31 from the previous calendar year;
  - (h) a summary of dates, duration and reasons for any environmental and operational problems, Boilers downtime, APC Equipment and CEM System malfunctions that may have negatively impacted the quality of the environment or any incidents triggered by the Emergency Response and



Contingency Plan and corrective measures taken to eliminate the environmental impacts of the incidents;

- (i) a summary of the dates, duration and reasons for all excursions from the applicable Performance Requirements as measured by the CEM Systems or as reported by the annual Source Testing, reasons for the excursions and corrective measures taken to eliminate the excursions;
- (j) results of the evaluation of the performance of the long-term sampling system in determining the Dioxins and Furans emission trends and/or fluctuations for the year reported on as well as demonstrating the ongoing performance of the APC Equipment associated with the Boilers;
- (k) dates of all environmental complaints relating to the Site together with cause of the Complaints and actions taken to prevent future Complaints and/or events that could lead to future Complaints;
- (l) any environmental and operational problems that could have negatively impacted the environment, discovered as a result of daily inspections or otherwise and any mitigative actions taken;
- (m) a summary of any emergency situations that have occurred at the Site and how they were handled;
- (n) the results and an interpretive analysis of the results of the groundwater and surface water, including an assessment of the need to amend the monitoring programs;
- (o) summaries of the Advisory Committee meetings, including the issues raised by the public and their current status;
- (p) any recommendations to improve the environmental and process performance of the Site in the future;
- (q) statement of compliance with this Certificate, including compliance with the *O. Reg. 419/05* and all air emission limits based on the results of source testing, continuous monitoring and engineering calculations, as may be appropriate; and
- (r) interpretation of the results and comparison to the results from previous Annual Reports to demonstrate the Facility's impact on the environment.

### **Third Party Audit**

- (2) (a) The Regions shall ensure that an independent technical review of the operations at the Site is undertaken in accordance with the requirements of the EA Approval.
- (b) In addition to the Third Party Audit requirements set out in the EA approval, the Third Party Audit shall include the following:

- (i) a review of the data from the monitoring and testing required by this Certificate;
  - (ii) a review of all complaints received about the operation of the Facility;
  - (iii) any recommendations for improving the operation of the Facility received from the Advisory Committee; and
  - (iv) a recommendation of any improvements that could be made to ensure that the operation of the Facility is optimized and is protective of the health and safety of people and the environment.
- (3) The Regions shall submit a Written Audit Report on the results of the independent technical review to the Regional Director in accordance with the Audit Plan and retain a copy at the Site.

### **Soil Testing Report**

- (4) Within one (1) month of completion of each Soil Testing event, the Regions shall submit to the District Manager a Soil Testing Report, which includes the details on the sampling/testing procedures, the results of the testing and a comparison with the results obtained during the previous Soil Testing.

## **16. PUBLIC ACCESS TO DOCUMENTATION**

- (1) The Owner shall, at all times, maintain documentation that describes the current operations of the Facility. The Owner shall post the documentation at the website for the undertaking and during regular business hours, the Owner shall make the following documents available for inspection at the Site by any interested member of the public, upon submission to the Ministry for review:
- (a) a current ESDM Report that demonstrates compliance with the Performance Limits for the Facility regarding all Compounds of Concern;
  - (b) a current Acoustic Assessment Report that demonstrates compliance with the Performance Limits for the Facility regarding noise emissions;
  - (c) the most recent Annual Report;
  - (d) the most current Third Party Audit Report;
  - (e) Odour Management and Mitigation Plan, prepared in accordance with the requirements of the EA Approval;
  - (f) Noise Monitoring and Reporting Plan, prepared in accordance with the requirements of the EA Approval; and
  - (g) Groundwater and Surface Water Monitoring and Reporting Plan, prepared in accordance with the requirements of the EA Approval.

- (2) The Owner shall ensure that necessary hardware and software are provided at a location available to the public, to provide on-line real-time reporting of the operating parameter data for the Facility, including acceptable operating limits, stack emissions, and all other parameters for which continuous monitoring is required and that continuous records of the same be kept and made available to the public.

17. **ADVISORY COMMITTEE**

- (1) The Regions shall establish an Advisory Committee in accordance with the requirements set out in the EA Approval.

18. **CLOSURE of the SITE**

- (1) A minimum of nine (9) months prior to closure of the Site, the Owner shall submit, for approval by the Director, a written Closure Plan for the Site. This Plan shall include, as a minimum, a description of the work that will be done to facilitate closure of the Site and a schedule for completion of that work.
- (2) Within ten (10) days after closure of the Site, the Owner shall notify the Director and the District Manager, in writing, that the Site is closed and that the approved Closure Plan has been implemented.

## SCHEDULE "A"

### **Supporting Documentation**

- (1) Applications for a Certificate of Approval (Air) dated March 2, 2011, each signed by Cliff Curtis, Commissioner of Works, The Regional Municipality of Durham, by Erin Mahoney, Commissioner of Environmental Services, The Regional Municipality of York and by Matthew R. Mulcahy, Senior Vice President, Business Development, Covanta Durham York Renewable Energy Limited Partnership, and the following supporting documentation:
  - (a) Emission Summary and Dispersion Modelling Report, dated March 2011, prepared by Golder Associates;
  - (b) Acoustic Assessment Report prepared by Golder Associates Ltd., dated March 2011 and signed by Paul Niejadlik.
  
- (2) Applications for a Provisional Certificate of Approval (Waste Disposal Site) dated March 2, 2011, each signed by Cliff Curtis, Commissioner of Works, The Regional Municipality of Durham, by Erin Mahoney, Commissioner of Environmental Services, The Regional Municipality of York and by Matthew R. Mulcahy, Senior Vice President, Business Development, Covanta Durham York Renewable Energy Limited Partnership, and the following supporting documentation:
  - (a) Attachment #1 containing the "Design and Operations Report", dated March 2011, prepared by Golder Associates Ltd.;
  - (b) Attachment #3 containing the "Public Consultation Report", dated March 2011, prepared by Golder Associates Ltd.;
  - (c) Attachment #4 containing the Host Community Agreement
  - (d) Attachment #5 containing the proof of legal name for Covanta Durham York Renewable Energy Limited Partnership; and
  - (e) A letter May 24, 2011 from Anthony Ciccone, Golder Associates Ltd., to Margaret Wojcik, Ontario Ministry of the Environment, providing additional technical information on the proposal and attaching a report entitled "Amendment #1 Durham York Energy Centre Design and Operations Report", dated May 2011;
  
- (3) Applications for a Certificate of Approval of Municipal and Private Sewage Works dated March 2, 2011, each signed by Cliff Curtis, Commissioner of Works, The Regional Municipality of Durham, by Erin Mahoney, Commissioner of Environmental Services, The Regional Municipality of Durham and by Matthew R. Mulcahy, Senior Vice President, Business Development, Covanta Durham York Renewable Energy Limited Partnership, and the following supporting documentation:

- (a) "Surface Water and Groundwater Technical Study Report" dated July 2009, prepared by Jacques Whitford, Markham, Ontario (CD Report).
- (b) "Stormwater Design Model Output" prepared by Sigma Energy, dated March 2001 (CD Report).
- (c) Clearance letter from Central Lake Ontario Conservation date February 22, 2011.
- (d) A letter dated March 23, 2011, from Brian Bahor, Covanta Energy Corporation, to Stefanos Habtom, Ontario Ministry of the Environment, providing additional technical design information on the proposed stormwater management ponds.

## SCHEDULE "B"

### **Procedure to calculate and record the 10-minute average concentration of odour at the Point of Impingement and at the most impacted Sensitive Receptor**

- (a) Calculate and record one-hour average concentration of odour at the Point of Impingement and at the most impacted Sensitive Receptor, employing CALPUFF atmospheric dispersion model or the dispersion model acceptable to the Director that employs at least five (5) years of hourly local meteorological data and that can provide results reported as individual one-hour average odour concentrations.
- (b) Convert and record each of the one-hour average concentrations predicted over the five (5) years of hourly local meteorological data at the Point of Impingement and at the most impacted Sensitive Receptor to 10-minute average concentrations using the One-hour Average to 10-Minute Average Conversion described below; and
- (c) Record and present the 10-Minute Average concentrations predicted to occur over a five (5) year period at the Point of Impingement and at the most impacted Sensitive Receptor in a histogram. The histogram shall identify all predicted 10-minute average odour concentration occurrences in terms of frequency, identifying the number of occurrences over the entire range of predicted odour concentration in increments of not more than 1/10 of one odour unit. The maximum 10-minute average concentration of odour at the Sensitive Receptor will be considered to be the maximum odour concentration at the most impacted Sensitive Receptor that occurs and is represented in the histogram, disregarding outlying data points on the histogram as agreed to by the Director.

#### **One-hour Average To 10-minute Average Conversion**

1. Use the following formula to convert and record one-hour average concentrations predicted by the CALPUFF atmospheric dispersion model or by the dispersion model acceptable to the Director to 10-minute average concentrations:

$$\mathbf{X_{10min} = X_{60min} * 1.65}$$

where X<sub>10min</sub> = 10-minute average concentration  
X<sub>60min</sub> = one-hour average concentration

**SCHEDULE "C"****PERFORMANCE REQUIREMENTS**  
**In-Stack Emission Limits**

<b>Parameter</b>	<b>In-Stack Emission Limit</b>	<b>Verification of Compliance</b>
Total Suspended Particulate Matter (filterable particulate measured in accordance with the Ontario Source Testing Code)	9 mg/Rm3	Results from compliance Source Testing
cadmium	7 µg/Rm3	Results from compliance Source Testing
lead	50 µg/Rm3	Results from compliance Source Testing
mercury	15 µg/Rm3	Results from compliance Source Testing
dioxins and furans	60 pg/Rm3	Results from compliance Source Testing; results expressed as I-TEQ
hydrochloric acid (HCl)	9 mg/Rm3	Calculated as the rolling arithmetic average of 24 hours of data measured by a CEM System that provides data at least once every 15 minutes
sulphur dioxide (SO2)	35 mg/Rm3	Calculated as the rolling arithmetic average of 24 hours of data measured by a CEM System that provides data at least once every 15 minutes
nitrogen oxides (NOx)	121 mg/ Rm3	Calculated as the rolling arithmetic average of 24 hours of data measured by a CEM System that provides data at least once every 15 minutes
organic matter (undiluted, expressed as equivalent methane)	50 ppm <sub>v</sub> (33 mg/ Rm3)	Results from compliance source testing
carbon monoxide	35 ppm <sub>v</sub> (40 mg/Rm3)	Calculated as the rolling arithmetic average of four (4) hours of data measured by a CEM System that provides data at least once every fifteen minutes, in accordance with condition 6 (2) (c)
opacity	10 percent	Calculated as the rolling arithmetic average of six (6) minutes of data measured by a CEM System that provides data at least once every minute
	5 percent	Calculated as the rolling arithmetic average of two (2) hours of data measured by a CEM System that provides data at least once every

mg/Rm3- milligrams per reference cubic metre;

pg/Rm3 - picograms per reference cubic metre

ppmdv parts per million by dry volume,

µg/Rm3 - micrograms per reference cubic metre

R- reference conditions - 25 degrees Celsius, 101.3 kilopascals, dry basis, 11% oxygen



## SCHEDULE "D"

### TEST CONTAMINANTS

Hydrogen Chloride  
Hydrogen Fluoride  
Oxides of Nitrogen expressed as Nitrogen Dioxide  
Sulphur Dioxide  
Total Hydrocarbons, expressed as methane on wet basis  
Carbon Dioxide  
Total Suspended Particulate Matter (< 44 microns)  
Total PM-10 including condensables  
Total PM-2.5 including condensables

#### Metals

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

**Schedule "D" - Cont'd**

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

**Schedule "D" - Cont'd**

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

**Schedule "D" - Cont'd**

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	

## SCHEDULE "E"

### SOURCE TESTING PROCEDURES

1. The Owner shall submit, to the Manager a test protocol including the Pre-Test Information required by the Source Testing Code, at least two (2) months prior to the scheduled Source Testing date.
2.
  - (1) For the purpose of the Source Testing program, the Owner is temporarily permitted to operate the Boilers at a residual oxygen concentration below the performance limit outlined in Condition 6.(2)(b) during the period of the Source Testing. The Owner shall ensure that the concentration of residual oxygen in the Undiluted Gases leaving the combustion zone of the Boilers, as measured and recorded by the CEM System, shall not be less than 5 percent by volume on a dry basis, during this Source Testing program.
  - (2) If the Source Testing results demonstrate that compliance with the Performance Requirements can be maintained at a residual oxygen concentration below the performance limit outlined in Condition 6.(2)(b), the Owner may apply to the Director for approval to alter the required residual oxygen concentration.
3. The Owner shall finalize the test protocol in consultation with the Manager.
4. The Owner shall not commence the Source Testing until the Manager has accepted the test protocol.
5. The Owner shall complete the first Source Testing not later than six (6) months after Commencement of Operation of the Facility/Equipment.
6. The Owner shall conduct subsequent Source Testing at least once (1) every calendar year thereafter.
7. The Owner shall notify the District Manager and the Manager in writing of the location, date and time of any impending Source Testing required by this Certificate, at least fifteen (15) days prior to the Source Testing.
8. The Owner shall submit a report on the Source Testing programs to the District Manager and the Manager not later than three (3) months after completing each Source Testing program. The report shall be in the format described in the Source Testing Code, and shall also include, but not be limited to:
  - (1) an executive summary;
  - (2) records of operating conditions; including process description, records of waste composition and feed rate during the Source Testing;
  - (3) all records produced by the CEM Equipment;
  - (4) procedures followed during the Source Testing and any deviation from the proposed test protocol and the reasons therefore;
  - (5) the results of the analyses of the stack emissions;

- (6) a summary table that compares the Source Testing results, the monitoring data and the records of operating conditions during the Source Testing to the requirements imposed by the *EPA*, the Regulation and/or the Performance Requirements;
  - (7) the results of dispersion calculations in accordance with the *O. Reg. 419/05*, indicating the maximum concentration of the Test Contaminants, at the Point of Impingement.
  - (8) an updated site wide emission source inventory to assess the aggregate point of impingement concentrations of the Test Contaminants.
9. The Owner shall ensure that the Source Testing Report is made available and easily accessible for review by the public at the Facility, immediately after the document is submitted to the Ministry.
10. The Director may not accept the results of the Source Testing if:
- (1) the Source Testing Code or the requirements of the Manager were not followed;  
or
  - (2) the Owner did not notify the District Manager and the Manager of the Source Testing; or
  - (3) the Owner failed to provide a complete report on the Source Testing.
11. If the Director does not accept the results of the Source Testing, the Director may require re-testing.

## SCHEDULE "F"

**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°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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
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 <sub>2</sub>
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 <sub>2</sub>
7) Span Calibration Drift (24-hour):	≤ 0.5 percent O <sub>2</sub>
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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
1) Range (parts per million, ppm):	0 to $\geq$ 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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
1) Span Value (nearest ppm equivalent):	2 times the average normal concentration of the source
2) Relative Accuracy:	$\leq$ 20 percent of the mean value of the reference method test data or $\pm$ 5 ppm whichever is greater
3) Calibration Error:	$\leq$ 2 percent of actual concentration
4) System Bias:	$\leq$ 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):	$\leq$ 5 percent of span value
7) Span Calibration Drift (24-hour):	$\leq$ 5 percent of span value
8) Response Time (90 percent response to a step change):	$\leq$ 240 seconds
9) Operational Test Period:	$\geq$ 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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
1) Analyzer Operating Range (parts per million, ppm):	0 to $\geq 200$ 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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
1) Span Value (nearest ppm equivalent):	2 times the average normal concentration of the source
2) Relative Accuracy:	$\leq 10$ percent of the mean value of the reference method test data
3) Calibration Error:	$\leq 2$ percent of actual concentration
4) System Bias:	$\leq 4$ 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):	$\leq 2.5$ percent of span value
7) Span Calibration Drift (24-hour):	$\leq 2.5$ percent of span value
8) Response Time (90 percent response to a step change):	$\leq 240$ seconds
9) Operational Test Period:	$\geq 168$ 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**

1. Range (parts per million, ppm):
2. Calibration Gas Ports:

**SPECIFICATION**

0 to  $\geq 100$  ppm  
close to the sample point

**PERFORMANCE:**

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

**PARAMETERS**

1. Span Value (nearest ppm equivalent):
2. Relative Accuracy:
3. Calibration Error:
4. System Bias:

**SPECIFICATION**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>5. Procedure for Zero and Span Calibration Check:</li> <li>6. Zero Calibration Drift (24-hour):</li> <li>7. Span Calibration Drift (24-hour):</li> <li>8. Response Time (90 percent response to a step change):</li> <li>9. Operational Test Period:</li> </ol> | <p>2 times the average normal concentration of the source</p> <p><math>\leq 10</math> percent of the mean value of the reference method test data</p> <p><math>\leq 2</math> percent of actual concentration</p> <p><math>\leq 4</math> percent of the mean value of the reference method test data</p> <p>all system components checked</p> <p><math>\leq 2.5</math> percent of span value</p> <p><math>\leq 2.5</math> percent of span value</p> <p><math>\leq 200</math> seconds</p> <p><math>\geq 168</math> hours without corrective maintenance</p> |
|--|---|

**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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
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. 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
11. Response Time (90 percent response to a step change):	≤ 60 seconds
12. 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. 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.

<b>PARAMETERS</b>	<b>SPECIFICATION</b>
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):	0 -100

**PERFORMANCE:**

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

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

**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.



## SCHEDULE "G"

A stormwater management facility to service a 10.0 ha drainage area of the Durham York Energy Centre located on the west side of Osbourne Road and north of the CN Rail, Lot 27, Concession Broken Front, Part, Municipality of Clarington, Regional Municipality of Durham, designed to provide quality and quantity control of stormwater run-off by attenuating runoff from storm events up to 1:100 years return frequency to or below the pre-development levels, consisting of:

### **East Stormwater Management Pond ( East SWM Pond)**

A stormwater management facility to service a 5.7 ha drainage area comprising of the eastern part of the Durham York Energy Centre consisting of the following:

- one (1) approximately 128 m long drainage ditch collecting stormwater runoff from the north eastern part of the site, having an average horizontal slope of 1.56%, depth of 0.5 m, bottom width of 1.0 m, and side slopes of 2.5H:1V, discharging to storm sewers described below;
- one (1) approximately 199 m long drainage ditch collecting stormwater runoff from the eastern part of the site, having an average horizontal slope of 2.77%, depth of 0.5 m, bottom width of 1.0 m, and side slopes of 2.5H:1V, discharging to storm sewers described below;
- approximately fourteen (14) catch basins/maintenance holes and a total of 466.8 m long 450 mm diameter and 34.6 m of 600 mm diameter corrugated PE stormwater sewers conveying stormwater runoff collected from the north and north eastern part of the site, discharging to a forebay of a wet extended detention stormwater management pond described below;
- one (1) forebay with approximate bottom dimensions of 11.0 m wide and 34.8 m long and depth of 1.0 m, equipped with 600 mm diameter corrugated HDPE inlet pipe, a rip-rap covered inlet structure, and a forebay berm with top elevation of 95.0 m masl, discharging to a wet extended detention pond described below;
- one (1) wet extended detention stormwater management pond located at the south east part of the site, with approximate bottom dimensions of 21.0 m wide and 71.4 m long and a maximum depth of 2.7 m at 96.70 m masl elevation, having side slopes of 3H:1V and 5H:1V near the outlet structure, providing a permanent pool storage capacity of 1,008 m<sup>3</sup> at elevation 95.0 m masl, an active storage capacity of 3,099 m<sup>3</sup> at 96.70 m masl elevation, and total storage capacity of 4,107 m<sup>3</sup>, equipped with an outlet structure consisting of a 150 mm diameter reverse slope inlet pipe with a gate valve and a 450 mm diameter perforated pipe riser fitted with 75 mm diameter orifice plate, a 75 mm diameter maintenance discharge pipe with a gate valve, and an emergency overflow structure at elevation 97.0 m masl, discharging through a 450 mm diameter outlet pipe to existing swale along the northern side of the CN Rail line to Tooley Creek and eventually to Lake Ontario;

## West Stormwater Management Pond ( West SWM Pond)

A stormwater management facility to service a 4.3 ha drainage area comprising of the western part of the Durham York Energy Centre consisting of the following:

- one (1) approximately 296 m long drainage ditch collecting stormwater runoff from the north western part of the site, having an average horizontal slope of 1.0%, depth of 0.5 m, bottom width of 1.0 m, and side slopes of 2.5H:1V, discharging to storm sewers described below;
- approximately five (5) catch basins/maintenance holes and a total of 272.2 m long 450 mm diameter corrugated PE stormwater sewers conveying stormwater runoff collected from the western part of the site, discharging to a forebay of a wet extended detention stormwater management pond described below;
- one (1) forebay with approximate bottom dimensions of 13.0 m wide and 26.0 m long and depth of 1.0 m, equipped with 450 mm diameter corrugated HDPE inlet pipe, a rip-rap covered inlet structure, and a forebay berm with top elevation of 95.0 m masl, discharging to a wet extended detention pond described below;
- one (1) wet extended detention stormwater management pond located at the south western part of the site, with approximate bottom dimensions of 13.0 m wide and 58.0 m long and a maximum depth of 2.5 m at 96.5 m masl elevation, having side slopes of 3H:1V and 5H:1V near the outlet structure, providing a permanent storage capacity of 623 m<sup>3</sup> at elevation 95.0 m masl, an active storage capacity of 2,054 m<sup>3</sup> at 96.50 m masl elevation, and total storage capacity of 2,677 m<sup>3</sup>, equipped with an outlet structure consisting of a 150 mm diameter reverse slope inlet pipe with a gate valve and a 450 mm diameter perforated pipe riser fitted with 75 mm diameter orifice plate, a 75 mm diameter maintenance discharge pipe with a gate valve, and an emergency overflow structure at elevation 96.80 m masl, discharging through a 450 mm diameter outlet pipe to existing swale along the northern side of the CN Rail line to Tooley Creek and eventually to Lake Ontario;

including all associated controls and appurtenances.

*The reasons for the imposition of these terms and conditions are as follows:*

## **GENERAL**

Conditions 1.(1), (2), (5), (6), (7), (8), (9), (10), (11), (12), (13), (17), (18) and (19) are included to clarify the legal rights and responsibilities of the Owner.

Conditions Nos.1.(3) and (4) are included to ensure that the Site is operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.

Condition No. 1.(14) is included to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.

Condition No.1.(15) is included to restrict potential transfer or encumbrance of the Site without the notification to the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Certificate.

Condition No. 1.(16) is included to ensure that the appropriate Ministry staff has ready access to the operations of the Site which are approved under this Certificate. The Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the *EPA*, the *OWRA*, the *PA*, the *NMA* and the *SDWA*.

## **SERVICE AREA, APPROVED WASTE TYPES, RATES and STORAGE**

Condition No. 2. is included to specify the approved waste receipt rates, the approved waste types and the service area from which waste may be accepted at the Site based on the Owner's application and supporting documentation. Condition No. 2. is also included to specify the maximum amount of waste that is approved to be stored at the Site.

## **SIGNS and SITE SECURITY**

Condition No. 3. is included to ensure that the Site's users, operators and the public are fully aware of important information and restrictions related to the operation of the Site. Condition No. 3. is also included to ensure that the Site is sufficiently secured, supervised and operated by properly trained personnel and to ensure controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site personnel is on duty.

## **SITE OPERATIONS**

Condition No. 4. is included to outline the operational requirements for the Facility to ensure that the said operation does not result in an adverse effect or a hazard to the natural environment or any person.

## **EQUIPMENT and SITE INSPECTIONS and MAINTENANCE**

Condition No. 5. is included to require the Site to be maintained and inspected thoroughly on a regular basis to ensure that the operations at the Site are undertaken in a manner which does not result in an adverse effect or a hazard to the health and safety of the environment or any person.

## **PERFORMANCE REQUIREMENTS**

Condition No. 6 is included to set out the minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Facility.

## **TESTING, MONITORING and AUDITING**

Condition No. 7. is to require the Owner to gather accurate information on the operation of the Facility so that the environmental impact and subsequent compliance with the *EPA*, the *OWRA*, their Regulations and this Certificate can be verified.

## **NUISANCE IMPACT CONTROL and HOUSEKEEPING**

Condition No. 8. is included to ensure that the Site is operated and maintained in an environmentally acceptable manner which does not result in a negative impact on the natural environment or any person. Condition No. 8 is also included to specify odour control measures to minimize a potential for odour emissions from the Site.

## **STAFF TRAINING**

Condition No. 9. is included to ensure that staff are properly trained in the operation of the equipment and instrumentation used at the Site, in the emergency response procedures and on the requirements and restrictions related to the Site operations under this Certificate.

## **COMPLAINTS RECORDING PROCEDURE**

Condition No.10. is included to require the Owner to respond to any environmental complaints resulting from the Facility appropriately and in a timely manner and that appropriate actions are taken to prevent any further incidents that may cause complaints in the future.

## **CONTINGENCY and EMERGENCY RESPONSE PLAN and EMERGENCY SITUATIONS RESPONSE AND REPORTING**

Conditions Nos.11. and 12. are included to ensure that the Owner is prepared and properly equipped to take immediate action in the event of an emergency situation.

## **SUBMISSIONS to the REGIONAL DIRECTOR or DISTRICT MANAGER**

Condition No. 13. is included to set out the requirements for the submissions to the District Manager and the Regional Director regarding the operation of the Facility and the activities required by this Certificate.

## **RECORDS KEEPING**

Condition No.14. is included to ensure that detailed records of Site activities, inspections, monitoring and upsets are recorded and maintained for inspection and information purposes.

## **REPORTING**

Condition No.15. is to ensure that regular review of site, operations and monitoring is carried out and findings documented by a third party for determining whether or not the Site is being operated in compliance with this Certificate of Approval, the EPA and its regulations and whether or not any changes should be considered.

## **PUBLIC ACCESS to DOCUMENTATION**

Condition No.16. is included to ensure that the public has access to information on the operation of the Site in order to participate in the activities of the Advisory Committee in a meaningful and effective way.

## **ADVISORY COMMITTEE**

Condition No.17. is included to require the Owner to establish a forum for the exchange of information and public dialogue on activities carried out at the Site and to ensure that the local residents are properly informed of the activities at the Site and that their concerns can be heard and acted upon , as necessary. Open communication with the public and local authorities is important in helping to maintain high standards for the operation of the Site and protection of the natural environment. Condition 16. is also included to ensure that the requirements of the EA Approval are fulfilled.

## **CLOSURE of the SITE**

Condition No.18. is included to ensure that the final closure of the Site is completed in accordance with Ministry's standards.

*In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, and in accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written Notice served upon me, the Environmental Review Tribunal, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act and Section 101 of the*

*Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:*

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

*The Notice should also include:*

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

*And the Notice should be signed and dated by the appellant.*

*This Notice must be served upon:*

The Secretary\*  
Environmental Review Tribunal  
655 Bay Street, 15th Floor  
Toronto, Ontario  
M5G 1E5

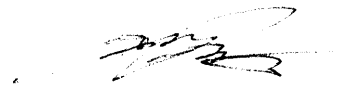
AND

The Director  
Section 9 and 39, *Environmental Protection Act*  
Section 53, *Ontario Water Resources Act*  
Ministry of the Environment  
2 St. Clair Avenue West, Floor 12A  
Toronto, Ontario  
M4V 1L5

**\* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or [www.ert.gov.on.ca](http://www.ert.gov.on.ca)**

*The above noted site is approved under Section 9 and Section 27 of the Environmental Protection Act and Section 53 of the Ontario Water Resources Act.*

DATED AT TORONTO this 28<sup>th</sup> day of June, 2011



Signature  
Ian Parrott, P .Eng.  
Director  
Section 9, *EPA*  
Section 39, *EPA*  
Section 53, *OWRA*

MW,QN,SH/

c: District Manager, MOE York-Durham  
Regional Director, MOE Central Region



vection transfer from the hot gases in which it is immersed, it is also subject to heat exchange by radiation to and from the surrounding surfaces and by conduction through the instrument itself. If the temperature of the surrounding surfaces does not differ from that of the gas (gas flowing through an insulated duct), the temperature indicated by the instrument should accurately represent the gas temperature. If the temperature of the surrounding surfaces is higher or lower than that of the gas, the indicated temperature will be correspondingly higher or lower than the gas temperature.

The variation from the true gas temperature depends on the temperature and velocity of the gas, the temperature of the surroundings, the size of the temperature measuring element, and the construction of the element and its supports. To correct for the errors in temperature measurement caused by the surroundings, it is best to calibrate the instrument to a known and reliable source.

As an example, consider a 22 gauge (0.7112 mm) bare thermocouple. When it is used to measure the gas temperature in boiler, economizer, or air heater cavities with surrounding walls cooler than the gas, the error in the observed readings may be found from Fig. 23 (line for bare TC).

### High velocity thermocouple

The design and operation of steam generating units depend on the evaluation of gas temperatures in the furnace and superheater sections of the equipment. Boiler design to achieve successful thermal performance must take into account the limitations imposed by the allowable metal temperatures of superheater

### Gas temperature measurement

Temperature measurement of combustion gas at different locations within the boiler is important to the boiler design engineer and the operating plant engineer. Accurate temperature measurements of gas entering and leaving the heat absorbing components can confirm design predictions and operating performance.

In all cases of gas temperature measurement, the temperature sensitive element approaches a temperature that is in equilibrium with the conditions of its environment. While it receives heat primarily by con-

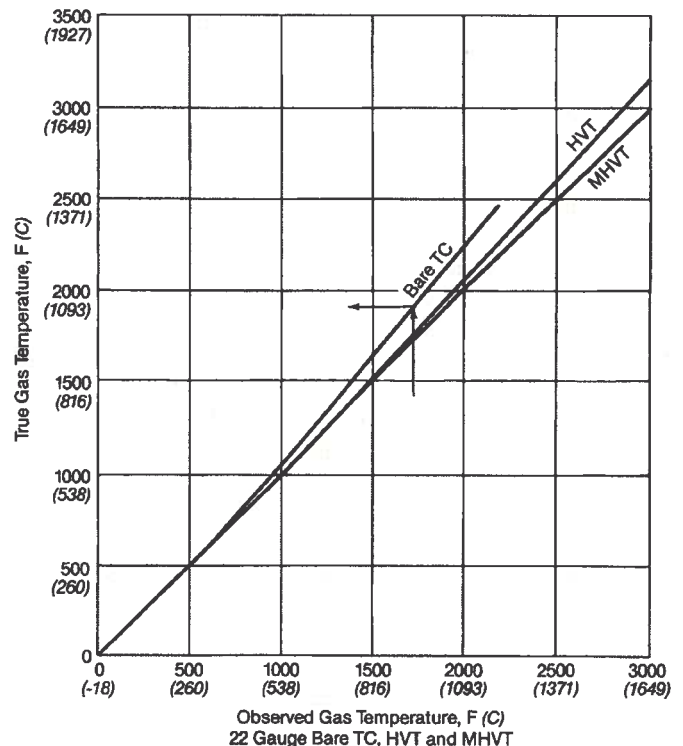


Fig. 23 General magnitude of error in observed readings when measuring temperature in boiler cavities with thermocouples.



tubes and by the fusing characteristics of ash and slag from the current or expected fuel. The overall complexity of combustion and heat transfer relationships prevents exact calculation and accurate measurement of the gas temperatures provides information to confirm calculation methods.

The optical pyrometer and radiation pyrometer are not designed to measure gas temperature. Excessive error is also encountered when gas temperatures in the furnace and superheater areas are measured with a bare thermocouple.

The high velocity and multiple-shield high velocity thermocouples (HVT and MHVT), developed to correct for radiation effects, are the best instruments available for measuring high gas temperatures in cooler surroundings or low gas temperatures in hotter surroundings. Cross-sections through single and multiple-shield high velocity thermocouples developed for use in boiler testing are shown in Fig. 24.

The surfaces (water-cooled walls, or superheater or boiler tube banks) surrounding the usual location of a gas traverse are cooler than the gases. Consequently, the readings from a bare unshielded thermocouple indicate lower temperatures than those obtained with an HVT. For the same reason, an HVT generally indicates lower values than an MHVT. A comparison between bare thermocouple, HVT and MHVT results in typical boiler furnaces and cavities is given in Fig. 23.

MHVT measurements closely approach true gas temperatures. In this design, the thermocouple junction is surrounded by multiple shields, all of which receive heat by convection induced by the high gas flow rate. In this manner, the heat transfer by radiation is so reduced that there is virtually no heat exchange between the junction and the innermost shield. Because of the small flow areas that rapidly become clogged by ash, use of the MHVT is limited to clean gas conditions. Where traverses are taken in dust- or slag-laden gases, it is usually necessary to use the HVT. The readings are corrected by comparison with results obtained under clean gas conditions from an MHVT.

For temperatures exceeding 2200F (1204C), noble metal thermocouples are required and it is important to protect the thermocouple from contamination by the gases or entrained ash. Various coverings, shown in Fig. 24, provide some protection for the wires, especially when fouling occurs from molten slag at temperatures above 2400F (1316C). When platinum thermocouples are used in gas above 2600F (1427C), appreciable calibration drift may occur even while taking measurements requiring only several minutes of exposure time. The thermocouple elements should be checked before and after use with corrections applied to the observed readings. When the error ( $\Delta T$ ) reaches 40 to 60F (22 to 33C), the contaminated end of the thermocouple should be removed and a new hot junction should be made using the sound portion of the wire.

Because heat transfer by radiation is proportional to the surface area, emissivity, and difference of the source and receiver absolute temperatures, the effects of radiation increase as the temperature difference between the thermocouple hot junction and the surrounding surfaces increases. Also, because heat trans-

fer to the thermocouple by convection is proportional to the gas mass velocity and the temperature difference between gas and thermocouple, the junction temperature may be brought closer to the true temperature of the gas by increasing the rate of mass velocity and convection heat transfer at the thermocouple while shielding the junction from radiation.

A special high velocity thermocouple probe for measuring high gas temperatures in boilers is illustrated in Fig. 25. This portable assembly is primarily used for making test traverses in high duty zones by insertion through inspection doors or other test openings in the setting.

This thermocouple is supported by a water-cooled probe. The measuring junction is surrounded by a tubular porcelain radiation shield through which gas flow is induced at high velocity by an attached aspirator. The gas aspiration rate over the thermocouple can be checked by an orifice incorporated with the aspirator and connected to the probe by a flexible hose. The gas mass velocity (or mass flux) over the thermocouple junction should be at least 15,000 lb/h ft<sup>2</sup> (20.34 kg/m<sup>2</sup> s). Convection heat transfer to the junction and shield is simultaneous and both approach the temperature of the gas stream. Radiation transfer at the junction is diminished by the shield. Because the shield is exposed to the radiation effect of the surroundings, it may gain or lose heat and its temperature may be slightly different from the junction temperature.

With the increasing size of steam generators, handling long HVT probes has become more difficult but,

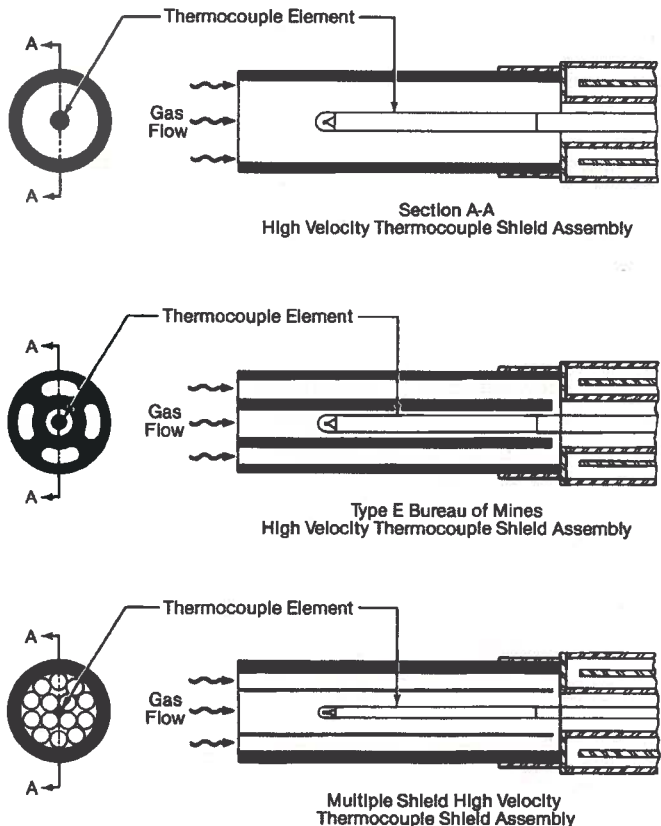


Fig. 24 Shield assemblies for high velocity thermocouple (HVT) and multiple-shield, high velocity thermocouple (MHVT).

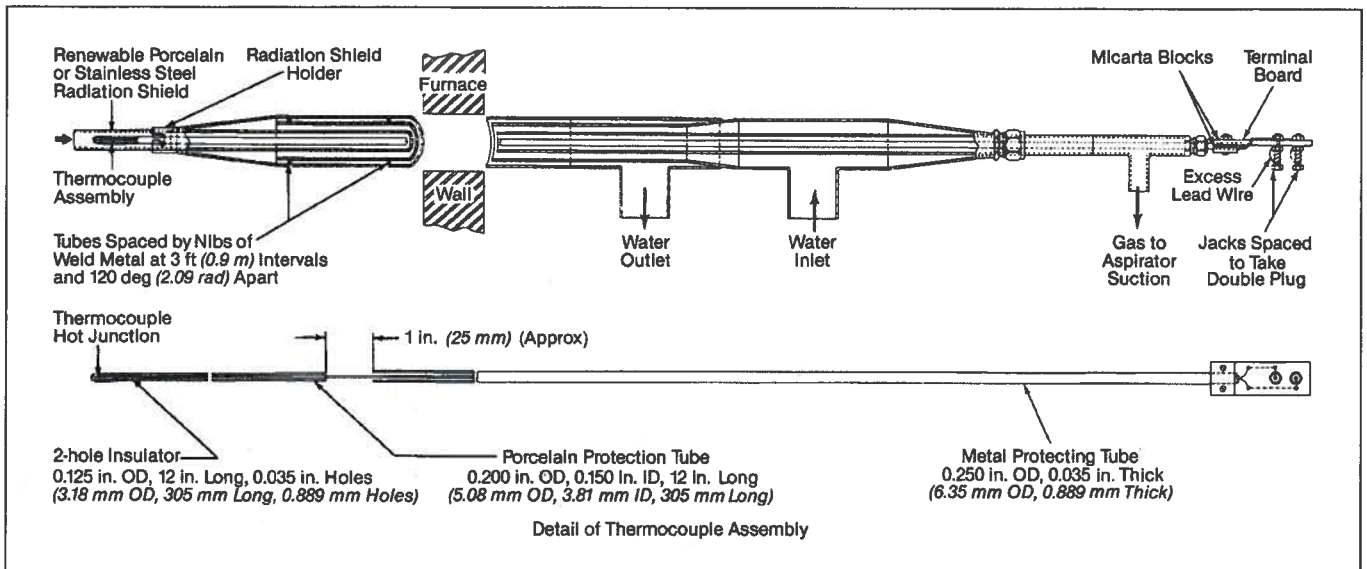


Fig. 25 Rugged, water-cooled, high velocity thermocouple (HVT) for determining high gas temperatures.

to date, no acceptable point by point measurement of high temperature gases has been fully developed.

and insert these thermocouples using a sootblower carriage. The remotely insertable thermocouple is called a thermoprobe.

### Measurement evaluations

Large boilers may have significant variation in actual measurements at a particular measurement plane. Where significant data variation exists, data reduction may require mathematical methods to weight-average individual measured values during the data reduction process.

Flue gas temperature measurements at the economizer outlet during performance tests are an example of a large number of data points which require reduction to a single representative temperature.

A weighted average temperature becomes time consuming and the need for such accuracy must be justified. An average of the individual temperature measurements is usually acceptable if a sufficient number of points are obtained. The average gas temperature may be approached by increasing the number of points or by instrument design to satisfy a particular requirement. For example, in a heat loss efficiency test, multiple measuring locations are used to indicate flue gas exit temperatures for determining dry gas loss. The number of points required by the ASME Performance Test Code permits efficiency accuracies within 0.05%.

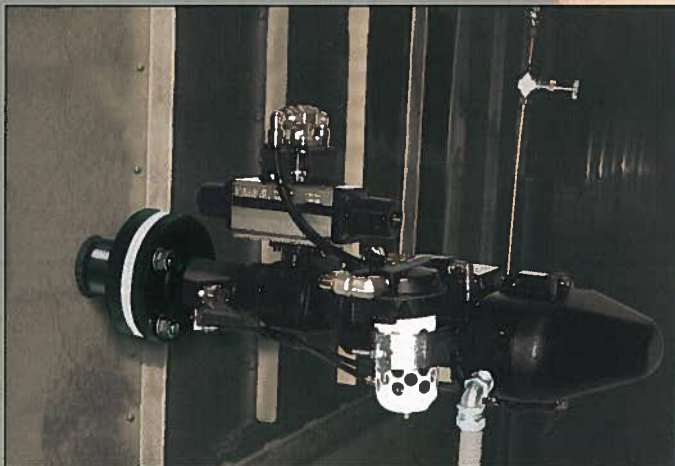
Under certain circumstances, the maximum, rather than average, gas temperature may be required for equipment protection. A moveable probe with one or two thermocouples may be used to determine the location of this high temperature. For instance, during boiler pressurization and before steam is flowing through the superheater or reheater tubes, a bare thermocouple temporarily installed in the gas stream immediately before the tubes may be used to indicate the highest temperature to prevent tube overheating. These thermocouples are normally removed after steam flow is adequate for cooling. On units designed for remote operation, it is possible to remotely retract



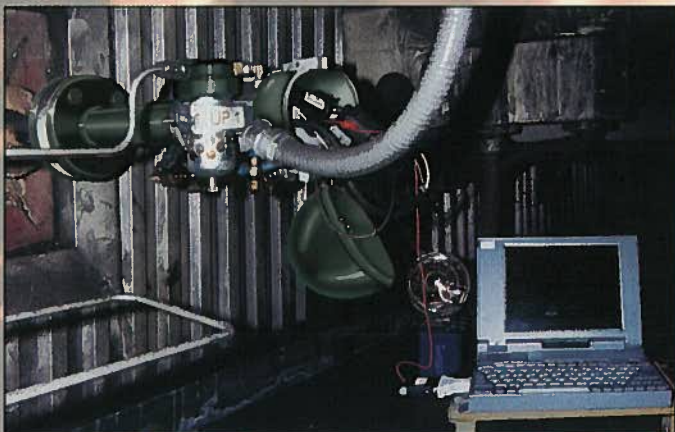
# Infra-View<sup>®</sup> Patented Infrared Boiler / Furnace Thermometers (250°F to 3,000°F Range)

## Infra-View Remote Infrared Temperature Sensing

Infra-View<sup>®</sup> Infrared Thermometers are remote sensing infrared detectors that are permanently flange mounted on any port, door or penetration into the boiler or furnace. The Infra-View patented design is supplied with a rugged protective cooling jacket that is factory assembled and pre-piped with an air cooler, purging and filtering system designed to work in most severe service environments. Customer supplied compressed air and two wire shielded signal cable is all that is necessary for operation when integrated in a 4-20 mA signal loop supplied from a DCS, digital or analog recording device. The Infra-View<sup>®</sup> infrared "non-contact" sensor monitors flue gas temperatures in the boiler or furnace ranging from 250°F to 3,000°F (higher end temperature available).



Infra-View<sup>®</sup> Boiler / Furnace Thermometer mounted on boiler with optional air actuated Infra-View<sup>®</sup> Valve designed to open with air purge and spring to close to protect sensor on plant air loss.



Infra-View<sup>®</sup> Boiler Thermometer maintenance and customization being performed with a laptop computer in the field. Sensor programming can be accomplished anywhere along (2) wire loop or at DCS.

## Infra-View<sup>®</sup> Performance & Control Applications

- **Startup Temperature:** Monitor flue gas temperature ramp from 250°F to 1,000°F for boiler startup when bringing the steam turbine online in lieu of retractable temperature probes.
- **Soot Blower Control:** Record time vs. temperature histories to improve boiler performance and control of soot blower operation and duration. Monitor thermal transients during cleaning to improve heat transfer on boiler tubes from under cleaning which could lead to slugging conditions. Monitor boiler gas temperature for comparison to steam outlet temperature for determining soot blower activation.
- **Low NO<sub>x</sub> Applications:** Sense temperature "window" set points between 1,600°F and 2,100°F for injection of low NO<sub>x</sub> enhancers with urea or ammonia in Selective Noncatalytic Reduction Systems.
- **Reduce Ash Fusion/Slagging:** Monitor maximum allowable temperature in the boiler superheat/reheat section for ash fusion alarm point annunciation.
- **High Temperature Alarm:** Monitor highest temperature and maximum load condition for most efficient operation and prevent boiler waterwall, reheat and superheat tube failure.
- **Fluidized Bed Boilers:** Determine optimal temperature for pulverized limestone injection on flue gas desulfurization systems and general operating conditions.
- **Primary Furnace Area (B&W/FW):** Monitor flue gas temperatures in separate sections of boilers with division walls to ensure temperature balance.
- **Fireball Centering (ABB-CE):** Identify fireball centering problems on tangentially fired boilers for control with burner corner dampers.
- **Waste/Refuse Incinerators:** Monitor compliance temperatures for incineration of toxic wastes at 1800°F, Infra-View can be certified to NIST standards.
- **Monitor Black Liquor Temperatures:** The temperature of the gas in the recovery boiler is critical to its efficient operation and performance. Excessive temperatures can cause smelling or cindering of black liquor particles and can fuse to superheat and reheat tubes thereby decreasing the heat rate of the boiler from plugging of heat transfer surfaces.

Infra-View<sup>®</sup>  
Internet Home Page @  
[www.infra-view.com](http://www.infra-view.com)

**JNT<sup>®</sup>**  
**JNT TECHNICAL  
SERVICES INC.**

85 Industrial Avenue, Little Ferry, New Jersey 07643 • Telephone 201-641-2130 • Fax 201-641-2309



# Infra-View<sup>®</sup> Patented Infrared Boiler / Furnace Thermometers (250°F to 3,000°F Range)

## Principle of Operation

The Infra-View<sup>®</sup> sensor detects the heated CO<sub>2</sub> gas created in a boiler or furnace as a byproduct of the combustion process when fossil fuels are burned, such as coal, natural gas, oil, lignite and orimulsion. The infrared spectral response of the Infra-View<sup>®</sup> sensor is preset specifically to detect CO<sub>2</sub> infrared energy by using a thin film thermopile with a spectral filter designed to block out all other wavelengths of infrared

emissions. Since the Infra-View detector is sensitive to only the hot CO<sub>2</sub> gas spectrum, it can measure the average, high or low temperature of the CO<sub>2</sub> gas directly within the field of view as it is heated within the specified temperature range.



Infra-View<sup>®</sup> Boiler / furnace Thermometer mounted on large coal fired utility boiler.

## Specifications

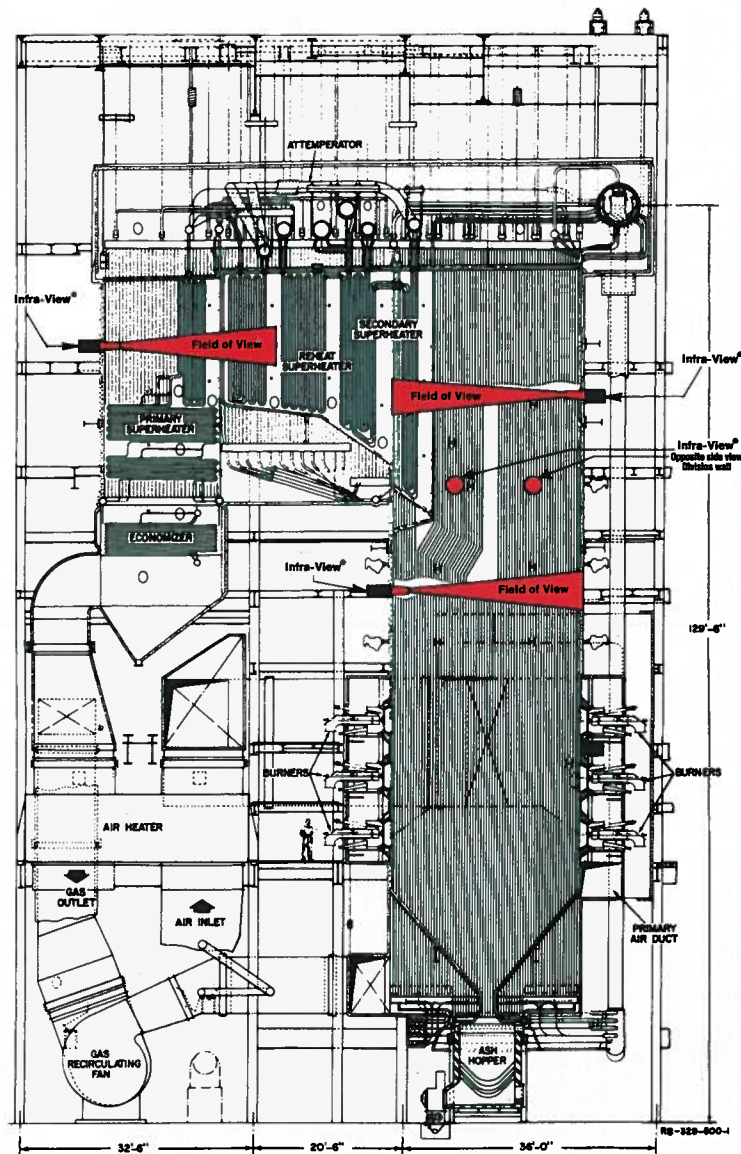
**Power Requirement:** 24 VDC 4-20 mA integrated loop  
**Cooling Requirement:** 15 SCFM (Standard Plant Air)  
**Ambient Operating Temp:** 250°F Max.  
**Field of View (FOV):** 30:1 (i.e., 3 ft spot @ 90 ft.)  
**Response Time:** 100 msec (600 readings/min.)  
**Data Output:** Digital 4-20 mA Loop Powered  
**Accuracy:** 1% of Reading (Max. Error ± 30°F) NIST Calibration Cert. Avail.

**Measured Temperature Range:** 250°F to 3,000°F  
**Infrared Spectral Response:** Heated CO<sub>2</sub> Gas  
**Weight:** 20 lbs (9Kg) with Infra-View<sup>®</sup> Valve: 24" (61 cm)  
**Infra-View<sup>®</sup> Sensor:** Intelligent 2 wire 4-20 mA loop powered digital device that is field addressable utilizing HART<sup>®</sup> protocol preset to specifically detect infrared emissions from heated boiler / furnace flue gas containing CO<sub>2</sub>. On line maintenance and customization can be performed with a laptop or PC with Infra-View<sup>®</sup> Software and HART<sup>®</sup> serial port adapter, anywhere along two-wire loop without data output interference. (Infra-View<sup>®</sup> Software is optional)

### Signal Conditioning / On line Programming Functions

- 1) Peak Hold Mode: Measures highest temperature in FOV and holds reading from 0-10 min.
- 2) Average Mode: Measures average temperature in FOV. Displays updated reading every 0-55 sec. (Stabilizes rapid signal output fluctuations)
- 3) Programmable annunciation alarm set point from 250°F to 3,000°F
- 4) Selectable temperature range (low and high end)
- 5) Fahrenheit or Celsius Outputs (250°F/121°C to 3,000°F/1,649°C)
- 6) Internal Ambient temperature monitoring of sensor to prevent thermal overheating and damage.
- 7) Complete graphing function of temperature vs. time analysis.
- 8) On line temperature data logging function into ASCII database for export to Excel or Lotus 1-2-3 format. Descriptions and tag nomenclatures can be written to sensor memory.

## Infra-View<sup>®</sup>



*Suggested locations for installation of  
Infra-View<sup>®</sup> Boiler Thermometers.*

**JNT<sup>®</sup>** JNT TECHNICAL SERVICES INC.

85 Industrial Avenue, Little Ferry, New Jersey 07643 • Telephone 201-641-2130 • Fax 201-641-2309

# Infra-View®

## Infrared Boiler/Furnace Thermometer

### 1. INTRODUCTION

The Infra-View Boiler/Furnace Thermometer is a remote infrared temperature sensor designed to passively monitor the amount of thermal energy emitted from CO<sub>2</sub> gas in a boiler or furnace. The Infra-View Boiler/Furnace Thermometer operates continuously during startup and normal operation providing a temperature reading with an accuracy of  $\pm 1\%$  of the actual temperature sensed.

The Infra-View Boiler/Furnace Thermometer operates as an integrated temperature measurement subsystem consisting of optical elements, infrared spectral filters, digital electronics and a NEMA 4 housing. They are built to operate on a 100 percent duty cycle in industrial environments at 24 VDC. Output consists of a 4 – 20 mA signal commonly available for use with controllers, recorders, alarms, or DCS interfaces.

### 2. GENERAL CONSIDERATIONS

All instruments are carefully packed to protect them from damage in shipment. Upon receipt, the package should be visually inspected for any signs of damage in transit. Any noticeable damage should be immediately reported to the carrier.

Verify that the model number is correct and that all accessories ordered are included in the shipment.

### 3. INSTALLATION

The Infra-View Infrared Boiler/Furnace Thermometer is shipped completely assembled with a combination instrument and protective cooling jacket. The protective jacket is equipped with a 2" X 1-1/2", 150 lb. reducing flange. See Figure 3. Standard installation is for customer to install a 2" schedule 40 nipple between six (6) and eighteen (18) inches in length welded or screwed to a 2", 150 lb. mating flange. If a nipple longer than eighteen (18) inches is desired, consult with JNT prior to installation. The nipple with the 2" 150 lb. flange should be welded onto the boiler observation door, sootblower port or other suitable location prior to installation of the Infra-View protective jacket.

The Infra-View Infrared Boiler/Furnace Thermometer is shipped with a non-asbestos insulating spacer secured to the flange. In the finished installation, the automatic draining air filter must be in a vertical position with the drain valve facing down to operate properly.

## 10. SPECIFICATIONS

Output Range:	250° - 3000°F (120°C-1650°C) (4 – 20mA) Adjustable to any span within range using Infra-View Software.
Accuracy:	±1% of Reading (500°F-3000°F) (260°C-1650°C) Max±30°F ±2% of Reading (350°F-500°F) (177°C-260°C) Max±10°F ±4% of Reading (250°F-350°F) (120°C-177°C) Max±14°F
Repeatability:	±0.5% of Reading, ± 1 Digit °F (°C)
Response Time:	100 msec.
Emissivity:	0.10 to 0.99, in 0.01 increments. Preset at factory for hot CO <sub>2</sub> gas measurement
Peak/Valley Hold:	0 – 10 minutes. Extends decay time from last reading
Averaging:	0 – 55 seconds. Digital output updated by setting desired interval.
Default:	Less than 4mA signal output for under/over range.
Field of View:	The field of view is the distance to minimum target diameter ratio. This is preset at 30:1. At 30' (9.14m) spot size will be 1' (30.48cm) in diameter.
Sight Tube:	Maximum Length 30" (76.2cm) Recommended Length 6" (16.24cm)
Housing:	Aluminum, NEMA 4, Air Cooled/Purged
Overall Length:	IV-2000 21" (53cm) IV-2000-V 23" (58cm)
Total Weight:	IV-2000 22lbs. (10kg) IV-2000-V 29lbs (13.15kg)
Environmental Rating:	IP 65, IEC 529, NEMA 4 Ambient operating temperature not to exceed 200°F with cooling air operational



### **Declaration on Conformity for the European Community**

This instrument conforms to the following standards:

EMC: EN50081-1:1992, EN50082-1:1992

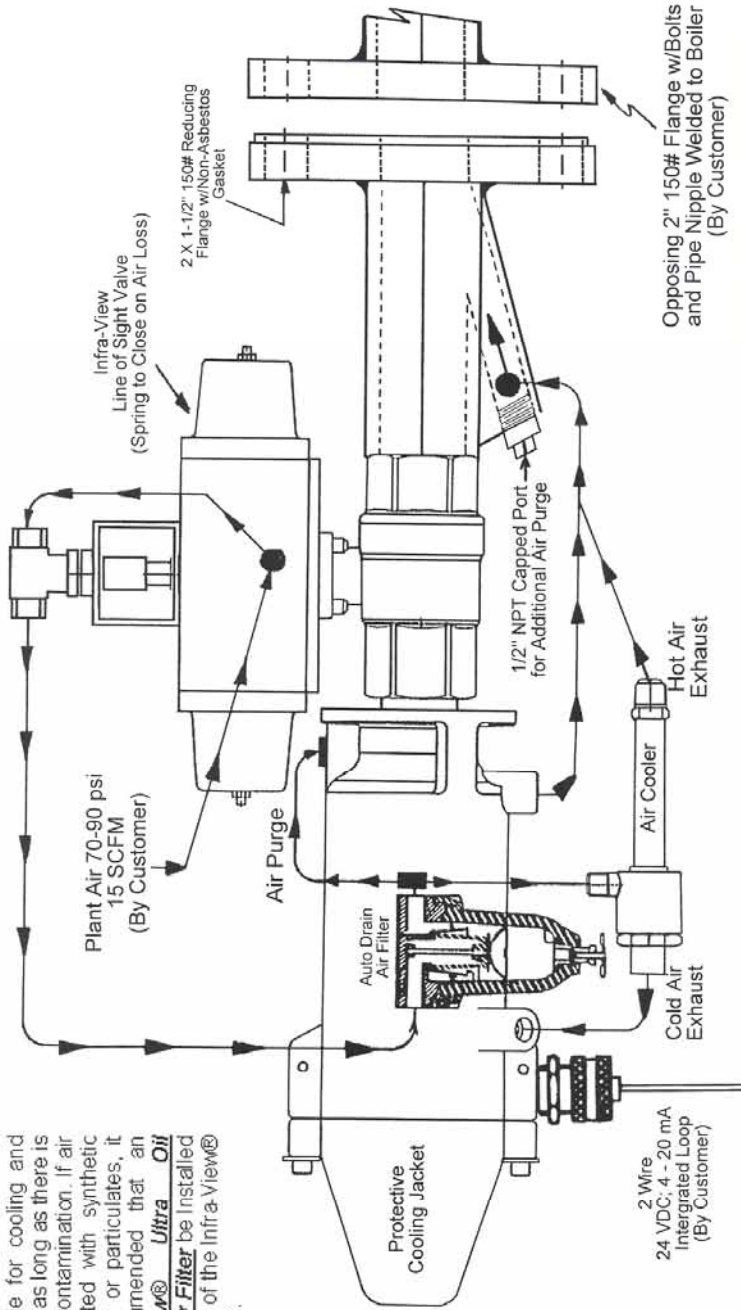
Safety: EN61010-1:1993 / A2:1995

Vibration: IEC 68-2-6(MIL STD 810D), 3 axis, 11...200 Hz, 3 G

Shock: IEC 68-2-27(MIL STD 810D), 3 axis, 11 ms, 50 G



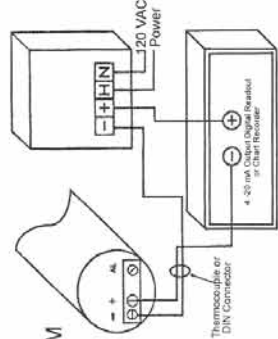
**Note:** Plant air is acceptable for cooling and air purge as long as there is minimal contamination. If air is saturated with synthetic oil, water or particulates, it is recommended that an **Infra-View® Ultra Oil Extractor Filter** be installed upstream of the Infra-View® air supply.



Opposing 2" 150# Flange w/Bolts and Pipe Nipple Welded to Boiler (By Customer)

Infra-View® Protective Cooling Jacket with Infra-View® Valve

	NTS	DRAWN BY 
		REVISED BY MP - 31 Aug. 04
85 Industrial Avenue, Little Ferry, NJ 07643 Telephone 201-641-2130 - FAX 201-641-2309		
DATE 30 Nov. 99	Length = 24" (61 cm) CAL Weight = 27 lbs. (12 Kg)	DRAWING NUMBER IV2000-V Rev.2



WIRING LOOP DIAGRAM

Sensor Legend	
+	= 4-20mA (Orange)
-	= 4-20mA (Blue)
AL	= Alarm

CRYSTALINE © BWX11 ARCHITECTS' STANDARD FORM MADE IN U.S.A.



Load point			1=NOM	2	3	4	5	6
Fuel throughput		kg/h	9083	7872	7089	5995	8461	11281
		lb/hr	20025	17355	15627	13217	18653	24870
Low heating value	LHV	kJ/kg	11630	13630	13630	10448	7005	7005
High heating value	HHV	kJ/kg	13000	15000	15000	11818	8374	8374

**Calculated air and gas flows (wet) under normal conditions**

Underfire air	m <sup>3</sup> /h	36610	37290	33580	21610	20690	27590
	SCFM	23130	23560	21210	13650	13070	17430
IGR for tertiary gas supply	m <sup>3</sup> /h	10800	10880	9800	6440	6400	8540
	SCFM	6820	6880	6200	4080	4040	5400

Overfire air	m <sup>3</sup> /h	5400	5440	4900	3220	3200	4270
	SCFM	3410	3440	3100	2040	2020	2700

False air not participating in combustion	m <sup>3</sup> /h	4600	4600	4600	4600	4600	4600
	SCFM	2910	2910	2910	2910	2910	2910

Flue gas in furnace	m <sup>3</sup> /h	48380	48200	43410	29140	30030	39980
	SCFM	30560	30440	27420	18400	18970	25260
Specific flue gas volume in furnace	m <sup>3</sup> /kg	5,326	6,123	6,124	4,861	3,549	3,544
	scuft/lb	91,558	105,250	105,267	83,552	61,009	60,919
Flue gas at boiler outlet	m <sup>3</sup> /h	52980	52800	48010	33740	34630	44580
	SCFM	33470	33350	30330	21310	21880	28170
Specific flue gas volume at boiler outlet	m <sup>3</sup> /kg	5,833	6,707	6,773	5,628	4,093	3,952
	scuft/lb	100,263	115,294	116,422	96,742	70,354	67,928



	Units	Range Name	Value	
<b>Constants</b>				
Elev of OFA ports	m	E_OFA	13.80	
Elev of Test IP	m	E_Lwr_IP	16.589	
Elev of Continuous IP	m	E_Upr_IP	19.25	
Combustion Constant	%	K_c	1.152	
Furnace Depth	m	furn_depth	4.267	
Furnace Width	m	furn_width	4.267	
Reference Air Temperature	°C	T_AIR_REF	27.0	
False Air Flow	Nm <sup>3</sup> /h	Q_False_C	1.05	Percent of Q_TOT
<b>Measured Inputs</b>				
Test Infra-red Pyrometer (IP)	°C	T_Lwr_IP	<b>1160</b>	
Continuous Temperature IP	°C	T_Upr_IP	<b>1070</b>	
Total Air Flow	Nm <sup>3</sup> /h	Q_TOT	<b>48,363</b>	
Seal Air Flow	Nm <sup>3</sup> /h	Q_SEAL	<b>2,198</b>	
IGR Flow	Nm <sup>3</sup> /h	Q_IGR	<b>11,868</b>	
<b>Calculations</b>			<b>Formulae</b>	
Furnace Temperature Gradient	°C/m	$\nabla T_{per\_m}$	33.8	$(T_{Lwr\_IP} - T_{Upr\_IP}) / (E_{Upr\_IP} - E_{Lwr\_IP})$
Temperature at OFA Elev	°C	T_OFA	1254.3	$T_{Lwr\_IP} + \nabla T_{per\_m} * (E_{Lwr\_IP} - E_{OFA})$
		P	43561.424	$(1.05 * Q_{TOT} - Q_{IGR} - 0.5 * Q_{SEAL}) * K_c$
		R	300.16	$273.16 + T_{AIR\_REF}$
Temperature at 1-sec elev.	°C	T_1SEC	<b>1144.1</b>	$\nabla T_{per\_m} / (furn\_depth * furn\_width * 3600) * (P / R * 273.16 + P * T_{OFA} / 2 / R) / (1 + \nabla T_{per\_m} / (furn\_depth * furn\_width * 3600) * P / (2 * R))$
Average 1-Second Zone Temp	°C	T_C avg	1199.2	$(T_{OFA} + T_{1SEC}) / 2$
Average 1-Second Zone Flow	actual m3/hr	Q_C	213,680	$(1.05 * Q_{TOT} - Q_{IGR} - 0.5 * Q_{SEAL}) * K_c * (273.16 + T_{C\ avg}) / (273.16 + T_{AIR\_REF})$
Average 1-Second Zone Velocity	actual m/sec	V_C	3.26	$Q_C / (furn\_depth * furn\_width) / 3600$
1-second elevation	m	E_1SEC	17.06	$E_{OFA} + V_C * 1$
Minimum Continuous Monitored Temp.	°C	T_Upr_IP_MIN	925.9	$T_{Upr\_IP} - (T_{1SEC} - 1000)$

## Notes:

All measured air flows in DCS are "Normalized" to 27°C, 1013,25 mbar

Combustion zone flue gas flow assumes:

5% of Total air added as False/tramp air.

Only 50% of Seal air enters combustion zone.

No "Fresh" air enters VLN system.

**DURHAM VLN refractory  
temperature curve first pass**

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