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**The Environmental Permitting (England  
and Wales) Regulations 2010**

**Permit: EPR/LP3030XA  
Cardiff Energy Recovery Facility**

**Environmental Monitoring Report  
4<sup>th</sup> Quarter 2017: 1<sup>st</sup> October – 31<sup>st</sup> December 2017**

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## Quality Assurance

This report has been prepared with all reasonable skill, care and diligence. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

### **Report Details**

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## **1. Introduction**

Cardiff Energy Recovery Facility is located immediately north of Cardiff Docks. The facility has an annual throughput of 425,000 tonnes per year of residual municipal and C&I waste and has the capability of exporting approximately 30MW of electrical power from the process.

In accordance with the requirements of Condition 4.2.3, Schedule 4 and table S4.1 of Permit EPR/LP3030XA issued by Natural Resources Wales to Viridor Waste Management Limited (Viridor)

This report summarises the environmental data collected at the site during the fourth quarter calendar period of 2017, between 1<sup>st</sup> October and 31<sup>st</sup> December.

The report will cover the following areas of environmental monitoring:

- Section 2 – Point Source Emissions to Air
- Section 3 – Point Source Emissions to Water
- Section 4 – Residue Quality Monitoring Requirements

## **2. Point Source Emissions to Air**

### **2.1. Introduction**

Permit Condition 3.5.1(a) and Tables S3.1 and S3.1(a) require Viridor to undertake performance monitoring of the point source emissions to air arising at sample points A1 and A2 on a continuous and periodic basis.

A summary of the continuous point source emissions to air monitoring data at sample point A1 and A2, for the period, is included as Table 1.

The measurement frequency for periodic point source emissions to air monitoring data at sample point A1 and A2 is on a bi-annual basis, after 12 months of operation.

### **2.2 Commentary on Data**

The concentrations recorded under normal operation during the review period remained compliant with the limits set out in the Permit with the exception of the events listed in Paragraph 2.3below

Line 1 was in operation for 83.1% of the quarter and Line 2 for 69.7%.

### **2.3 Schedule Notices Issued**

One Schedule 5 notification was submitted to NRW during the review period for emissions to air. Viridor reported the following information to NRW within PART A of the aforementioned Schedule 5 notification.

Daily mean limit	10mg/m <sup>3</sup>	recorded at
10.94mg/m <sup>3</sup>		
½ hour mean limit	60mg/m <sup>3</sup>	recorded at 65.18mg/m <sup>3</sup> for the
30 minutes between 22:30H and 22:59H		

A follow up PART B of the Schedule 5 notification was subsequently submitted to NRW for review.

**Table 1: Emissions to Air from A1 and A2 (CEMS)**

Releases to Air from Incinerators – Continuous Monitoring – Air 2								
Parameter	Limit	Reference Period	A1		A2		Test Method	Uncertainty**
			Max	Avg	Max	Avg		
Oxides of nitrogen	200 mg/m³	Daily mean	181.7	170.1	268.8	182.1	BS EN 15267-3	
	400 mg/m³	½ hourly mean	264.4		332.0			
Particulate Matter	10 mg/m³	Daily mean	0.6	0.5	0.5	0.4		
	30 mg/m³	½ hourly mean	1.0		0.8			
Total Organic Carbon (TOC)	10 mg/m³	Daily mean	0.6	0.3	0.6	0.3		
	20 mg/m³	½ hourly mean	4.6		3.8			
Hydrogen chloride	10 mg/m³	Daily mean	9.3	7.4	10.9	8.1		
	60 mg/m³	½ hourly mean	17.1		65.2			
Sulphur dioxide	50 mg/m³	Daily mean	40.6	13.1	15.4	5.9		
	200 mg/m³	½ hourly mean	83.4		51.5			
Carbon monoxide	50 mg/m³	Daily mean	15.1	7.4	18.9	5.2		
	100 mg/m³	½ hourly mean*						
Ammonia	No limit set	Daily mean	1	1	6.0	2.8		

\*Note. ½ hourly monitoring for CO is no longer required in the latest version of the permit.

\*\*Note. CEMS data figures are adjusted for the method uncertainty

**Table 2: Emissions to Air from A1 and A2 Periodic**

Substance / Parameter	Emission Limit Value	Reference Period	A1 Result	Uncertainty	Sample Date / Time	A2 Result	Uncertainty	Sample Date / Time	Test Method
Nitrous oxide	None set mg/m <sup>3</sup>	Periodic over 30 minutes. Maximum 8 hours	10.5	3.5	15_11_2017 from 12:00 to 13:00H	14.5	3.7	15_11_2017 from 10:00 to 11:00H	TGN M22
Hydrogen fluoride	2 mg/m <sup>3</sup>		0.028	0.0021	15_11_2017 from 10:01 to 11:01H	0.030	0.0022	15_11_2017 from 12:11 to 13:11H	ISO 15713
Cd and Th and their compounds	0.05 mg/m <sup>3</sup>		0.00073	0.00012	17_11_2017 from 08:50 to 09:20H and from 09:25 to 09:55H	0.00073	0.00012	17_11_2017 from 09:05 to 09:35 and from 09:40 to 10:10H	EN 14385
Hg and its compounds	0.05 mg/m <sup>3</sup>		0.0026	0.00035		0.0014	0.00019		MID 14385
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	0.5 mg/m <sup>3</sup>		0.017	0.0025		0.014	0.0021		EN 14385
Dioxins & Furans (I-TEQ)	0.1 ng/m <sup>3</sup>	Mean over period minimum 6 hours, maximum 8 hours	0.032	0.0066	15_11_2017 from 08:40 to 11:40H and from 11:45 to 14:45H	0.0095	0.002	05_01_2018 from 07:40 to 10:40 and from 10:43 to 13:43H	EN 1948 1-3
PCBs (WHO-TEQ Humans / Mammals)	None set ng/m <sup>3</sup>		0.0036	0.00075		0.00076	0.00016		EN 1948 1-3
PCBs (WHO-TEQ Fish)	None set ng/m <sup>3</sup>		0.00016	0.000034		0.000040	0.00001		EN 1948 1-3
PCBs (WHO-TEQ Birds)	None set ng/m <sup>3</sup>		0.0057	0.0012		0.00188	0.00039		EN 1948 1-3
Dioxins/Furans (WHO-TEQ Humans/Mammals)	None set ng/m <sup>3</sup>		0.032	0.0066		0.0091	0.002		EN 1948 1-3
Dioxins/Furans (WHO-TEQ Fish)	None set ng/m <sup>3</sup>		0.033	0.0068		0.0097	0.002		EN 1948 1-3
Dioxins/Furans (WHO-TEQ Birds)	None set ng/m <sup>3</sup>		0.047	0.0096		0.0150	0.003		EN 1948 1-3

Anthanthrene	None set $\mu\text{g}/\text{m}^3$	Mean over period minimum 6 hours, maximum 8 hours	<0.015	0.0035	16_11_2017 from 09:38 to 12:38H and from 12:42 to 15:42H	<0.010	0.0021	15_11_2017 from 09:00 to 09:13H and from 09:20 to 12:06H and from 12:10 to 15:10H	ISO 11338
Benzo(a)anthracene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Benzo(a)pyrene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Benzo(b)fluoranthene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Benzo(b)naphtho(2,1-d)thiophene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Benzo(c)phenanthrene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Benzo(ghi)perylene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Benzo(k)fluoranthene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Cholanthrene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Chrysene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Cyclopenta(cd)pyrene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Dibenzo(ai)pyrene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Dibenzo(ah)anthracene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Fluoranthene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		0.021	0.0043		
Indeno(123-cd)pyrene	None set $\mu\text{g}/\text{m}^3$		<0.015	0.0035		<0.010	0.0021		
Naphthalene	None set $\mu\text{g}/\text{m}^3$		0.403.2	0.092		0.21	0.043		

### **3. Point Source Emissions to Water**

#### **3.1. Introduction**

Permit Condition 3.5.1(a) and Table S3.2 requires Viridor to ensure sample point W1 is free of oil, grease and visible solids.

#### **3.2 Commentary on Data**

During the quarter monitoring point W1 has remained free of oil and grease.

#### **3.3 Schedule Notices Issued**

No Permit limit exceedances were recorded during the review period for emissions to water.

## **4. Residue Quality Monitoring Requirements**

### **4.1. Introduction**

Permit Condition 3.5.1(c) and Table S3.5 require Viridor to undertake residue quality monitoring at quarterly intervals following the first year of operation. This applies for both bottom ash and air pollution control residues.

### **4.2 Commentary on Data**

#### **Incinerator Bottom Ash**

Figures shown in Table 3 detail the quarterly analysis undertaken in line with the criteria laid out in the ESA protocol.

#### **Air Pollution Control Residues**

Figures shown in Table 3 detail the analysis undertaken during the quarter.

**Table 3: Residue Quality**

Residue quality					
Parameter	Limit	Normal Operation			
		Bottom ash		APC Residues	
		Line 1	Line 2	Line 1	Line 2
		Quarter 4	Quarter 4		
Total Organic Carbon	3%	2.1	2.0		
		Composite			
Quarter		Quarter 4 (report date 7_12_17)		Quarter 4 (report date 5_12_17)	Quarter 4 (5_12_17)
Copper (mg/kg)	---	1532.3		621	626
Nickel (mg/kg)	---	59.4		14.8	13.9
Lead (mg/kg)	---	341		2258	2160
Zinc (mg/kg)	---	1932.2		15480	15480
Antimony (mg/kg)	---	140		958	935
Arsenic (mg/kg)	---	12.5		67.3	64.0
Cadmium (mg/kg)	---	9.93		311	313
Chromium (mg/kg)	---	130		50.8	45.4
Cobalt (mg/kg)	---	33.9		5.3	5.5
Manganese (mg/kg)	---	1099		389	394
Mercury (mg/kg)	---	<0.5		10.6	12.0

Thallium (mg/kg)	---	<0.1	1	1.1
Vanadium (mg/kg)	---	36.9	<10	<10
Dioxins / Furans (WHO 2005 TEQ) (ng/kg)	---	-	692.98	674.30
PCB (WHO 2005 TEQ) (ng/kg)	---	-	47.52	28.34