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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 2015: 1<sup>st</sup> October – 31<sup>st</sup> December 2015**

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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 a design capacity to process 350,000 tonnes per year of residual municipal and C&I waste and has the capability of exporting approximately 30MW of electrical power.

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) on 4<sup>th</sup> November 2010, Viridor is required to submit a summary of the environmental monitoring works undertaken at the site on a quarterly basis. Such reports will form the basis of the annual environmental review report, which is to be submitted to Natural Resources Wales by the 30<sup>th</sup> April as agreed in writing with the Natural Resources Wales of each year in accordance with Condition 4.2.2 of the Permit.

Viridor took over full operation of the Plant on 31<sup>st</sup> January 2015.

This report summarises the environmental data collected at the site during the fourth quarter calendar period of 2015, 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.

A summary of the point source emissions to air monitoring data at sample point A1 and A2 for the period is included as Table 1 and 2.

### **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 detailed in 2.3.

### **2.3 Schedule Notices Issued**

04/10/2015 - Schedule notification Part C was submitted for an abnormal operation occurrence, as a result of a disturbance in the abatement system on Line 2.

06/10/2015 - Schedule notification Part C was submitted for an abnormal operation occurrence, as a result of a disturbance in the abatement system on Line 1.

06/10/2015 - Schedule notification Part A was submitted due to a marginally elevated 1/2 hourly TOC reading. (Part B was submitted 06/10/2015)

17/10/2015 - Schedule notification Part A was submitted due to a slightly elevated ½ hourly SO<sub>2</sub> reading. (Part B was submitted 20/10/2015)

30/11/2015 - Schedule notification Part C was submitted for an abnormal operation occurrence, as a result of a disturbance in the abatement system on Line 1.

21/12/2015 - Schedule notification Part C was submitted for an abnormal operation occurrence, as a result of a disturbance in the abatement system on Line 2.

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

Emissions to Air from ERF – Continuous Monitoring								
Parameter	Limit	Reference Period	A1		A2		Test Method	Uncertainty**
			Max	Avg	Max	Avg		
Oxides of nitrogen	200 mg/m <sup>3</sup>	Daily mean	190	181	191	179	BS EN 15267-3	
	400 mg/m <sup>3</sup>	½ hourly mean	328	185	320	182		
Particulate Matter	10 mg/m <sup>3</sup>	Daily mean	1	1	0	0		
	30 mg/m <sup>3</sup>	½ hourly mean	1	1	1	0		
Total Organic Carbon (TOC)	10 mg/m <sup>3</sup>	Daily mean	0	0	0	0		
	20 mg/m <sup>3</sup>	½ hourly mean	22.7	1	6	0		
Hydrogen chloride	10 mg/m <sup>3</sup>	Daily mean	8	6	8	6		
	60 mg/m <sup>3</sup>	½ hourly mean	44	7	52	6		
Sulphur dioxide	50 mg/m <sup>3</sup>	Daily mean	22	11	15	6		
	200 mg/m <sup>3</sup>	½ hourly mean	258	16	129	8		
Carbon monoxide	50 mg/m <sup>3</sup>	Daily mean	12	6	15	8		
	100 mg/m <sup>3</sup>	½ hourly mean*	-	-	-	-		
Ammonia	No limit set	Daily mean	6	2	4	2		

\*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 Q4)**

Substance / Parameter	Emission Limit Value	Ref. Period	A1 Result	Uncertainty	Sample Date / Time	A2 Result	Uncertainty	Sample Date / Time	Test Method
Nitrous oxide	-	Periodic over 30 minutes. Maximum 8 hours	8.4	3.8	22/12/2015 11:33-14:33	10.2	3.9	23/12/2015 11:00-13:00	TGN M22
Hydrogen fluoride	2 mg/m <sup>3</sup>		<0.034	0.003	16/12/2015 13:00-14:00	<0.027	0.002	17/12/2015 11:45-12:45	ISO 15713
Cd and Th and their compounds	0.05 mg/m <sup>3</sup>		0.0010	0.0002	16/12/2015 09:00 -0930; 09:34-10:04	0.0008	0.00014	17/12/2015 08:14-08:44; 08:48-09:18	EN 14385
Hg and its compounds	0.05 mg/m <sup>3</sup>		0.014	0.002		0.025	0.004		EN 13211
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	0.5 mg/m <sup>3</sup>		0.014	0.002		0.0075	0.0013		EN 14385
Dioxins & Furans (I-TEQ)	0.1 ng/m <sup>3</sup>	Mean over period minimum 6 hours, maximum 8 hours	0.023	0.005	14/10/2015 08:38-11:38; 11:42-14:42	0.015	0.003	15/10/2015 08:00-11:00; 11:05-14:05	EN 1948 1-3
PCBs (WHO-TEQ Humans / Mammals)	None set ng/m <sup>3</sup>		0.0022	0.0005		0.0015	0.0003		EN 1948 1-3
PCBs (WHO-TEQ Fish)	None set ng/m <sup>3</sup>		0.00010	0.00002		0.000068	0.000014		EN 1948 1-3
PCBs (WHO-TEQ Birds)	None set ng/m <sup>3</sup>		0.0040	0.0008		0.0034	0.0007		EN 1948 1-3
Dioxins/Furans (WHO-TEQ Humans/Mam)	None set ng/m <sup>3</sup>		0.021	0.004		0.014	0.003		EN 1948 1-3
Dioxins/Furans (WHO-TEQ Fish)	None set ng/m <sup>3</sup>		0.024	0.005		0.016	0.003		EN 1948 1-3

Dioxins/Furans (WHO-TEQ Birds)	None set ng/m <sup>3</sup>		0.037	0.008		0.027	0.006		EN 1948 1-3
Anthanthrene	None set µg/m <sup>3</sup>	Mean over period minimum 6 hours, maximum 8 hours	<0.011	0.003	22/12/2015 07:48-10:48; 10:50:13:50	<0.012	0.003	23/12/2015 07:45-10:45; 10:47-13:47	ISO 11338
Benzo(a)anthracene	None set µg/m <sup>3</sup>		0.023	0.005		0.012	0.003		
Benzo(a)pyrene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Benzo(b)fluoranthene	None set µg/m <sup>3</sup>		0.011	0.003		<0.012	0.003		
Benzo(b)naphtho(2,1-d)thiophene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Benzo(c)phenanthrene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Benzo(ghi)perylene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Benzo(k)fluoranthene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Cholanthrene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Chrysene	None set µg/m <sup>3</sup>		0.023	0.023		<0.012	0.003		
Cyclopenta(cd)pyrene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Dibenzo(ai)pyrene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Dibenzo(ah)anthracene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Fluoranthene	None set µg/m <sup>3</sup>		0.069	0.069		0.024	0.005		
Indeno(123-cd)pyrene	None set µg/m <sup>3</sup>		<0.011	0.003		<0.012	0.003		
Naphthalene	None set µg/m <sup>3</sup>		1.9	0.44		0.75	0.17		

### **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.

Suspended solids were observed on sampling during October, however, it was identified that the sampling method used by the third party contractor wasn't providing an accurate representation of water quality at W1. Therefore the sampling method has since been revised.

#### **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 minimum monthly intervals for both bottom ash and air pollution control residues.

### **4.2 Commentary on Data**

#### **Incinerator Bottom Ash**

Figures shown in Table 4 detail the monthly analysis undertaken in line with the criteria laid out in the ESA protocol.

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

Figures shown in Table 4 detail the monthly analysis undertaken for each line during the quarter.

**Table 4: Residue Quality**

Residue quality										
Parameter	Limit	Normal Operation								
		Bottom ash						APC Residues		
		Line 1			Line 2			Line 1		
		Oct	Nov	Dec	Oct	Nov	Dec			
Total Organic Carbon	3%	1.8	0.6	1.0	1.5	0.7	1.0			
		Composite								
		Oct	Nov	Dec	Oct	Nov	Dec	Oct	Nov	Dec
Antimony (mg/kg)	---	132	106	360	541	854	747	814	801	743
Cadmium (mg/kg)	---	11	5.31	30.9	177	196	200	216	164	185
Thallium (mg/kg)	---	0.18	0.01	<0.1	0.60	0.96	0.88	0.77	0.96	0.82
Mercury (mg/kg)	---	<0.5	<0.01	<0.5	4.72	7.06	7.85	6.83	10.4	8.98
Lead (mg/kg)	---	1,360	389	1,076	2,242	1,945	1,715	3,211	1,973	1,546
Chromium (mg/kg)	---	138	102	143	16.7	40.4	28.0	25.8	29.6	42.8
Copper (mg/kg)	---	3,847	2,024	3,048	390	581	600	658	530	639
Manganese (mg/kg)	---	1,126	815	962	<10	434	391	363	404	456
Nickel (mg/kg)	---	228	88.5	130	<10	13.3	10.5	<10	10.4	13.7
Arsenic (mg/kg)	---	18	13.9	32.2	27.7	38.2	37.3	44.6	40	31.9
Cobalt (mg/kg)	---	28.8	27.3	32.3	3.0	5.7	4.2	4.3	4.2	5.9
Vanadium (mg/kg)	---	30.3	30.4	56.1	<10	<10	<10	<10	<10	10.5

Zinc (mg/kg)	---	2,922	2,210	5057	8,429	11,000	12,094	11,230	11,167	10,765
Dioxins / Furans (WHO 2005 TEQ) (ng/kg)	---	10.3	7.91	7.68	483	627	592	128	715	463
PCB (WHO 2005 TEQ) (ng/kg)	---	1.91	0.43	0.63	32.7	25.7	27.4	0.80	27.7	19.0