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

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

Annual Performance Report 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 4.2.2, Schedule 4 and Table S4.1 of Permit EPR/LP3030XA issued by Natural Resources Wales to Viridor Waste Management Limited (Viridor) on 4th November 2010, Viridor is required to produce an annual performance report which is to be submitted to Natural Resources Wales by the 30th April as agreed in writing with Natural Resources Wales of each year.

Viridor took over the operation of the Plant on 31st January 2015.

This report summarises the environmental and performance data collected at the site 1st January 2015 – 31st December 2015 and fulfil the reporting requirement of Chapter IV, Article 55 (2) of the Industrial Emissions Directive.

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
- Section 5 – Performance Parameters

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 Table 2.

2.2 Commentary on Data

The recorded concentrations remained compliant with the limits set out in Permit Tables S3.1 and S3.1(a) during the review period with the exception of those listed in 2.3.

Line 1 was in operation for 72% of the year and Line 2 for 76%.

Note 1: Individual detail of periodic sampling events, timings, uncertainty and method used have previously been supplied to Natural Resources Wales within the 2015 quarterly reports. Therefore, a summary of the average results recorded from the sampling during 2015 has been supplied within Table 2.

Note 2: Results recorded by both, periodic and continuous monitoring have generally been within the range expected for the energy recovery operation.

2.3 Schedule Notices Issued

Schedule 5 Part C Notifications were raised for abnormal operation due to disturbances in the abatement system on the following dates for Line 1: 25/02/2015; 08/06/2015; 05/07/2015; 06/07/2015; 02/08/2015; 26/09/2015; 06/10/2015 and 30/11/2015.

Schedule 5 Part C Notifications were raised for abnormal operation due to disturbances in the abatement system on the following dates for Line 2: 09/02/2015; 17/02/2015; 23/02/2015; 10/07/2015; 11/08/2015; 04/10/2015 and 21/12/2015

22/02/2015 – Schedule 5 Notification Part A for CO 10 minute average spike at sample point A2 (Part B was submitted 23/02/2015).

06/10/2015 – Schedule 5 Notification Part A was submitted due to a marginally elevated ½ hourly TOC reading. (Part B was submitted 06/10/2015)

17/10/2015 - Schedule 5 Notification Part A was submitted due to a slightly elevated ½ hourly SO₂ reading. (Part B was submitted 20/10/2015).

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
			Max	Avg**	Max	Avg**	
Oxides of nitrogen	200 mg/m ³	Daily mean	199	180	198	175	BS EN 15267-3
	400 mg/m ³	½ hourly mean	400		377		
Particulate Matter	10 mg/m ³	Daily mean	2	0.6	1	0.5	
	30 mg/m ³	½ hourly mean	7		3		
Total Organic Carbon (TOC)	10 mg/m ³	Daily mean	3	0.3	1	0	
	20 mg/m ³	½ hourly mean	22.7		17		
Hydrogen chloride	10 mg/m ³	Daily mean	10	6.7	10	6.4	
	60 mg/m ³	½ hourly mean	52		57		
Sulphur dioxide	50 mg/m ³	Daily mean	30	10.4	21	6.2	
	200 mg/m ³	½ hourly mean	258		129		
Carbon monoxide	50 mg/m ³	Daily mean	36	11.2	40	9.6	
	100 mg/m ³	½ hourly mean*	-	-	-	-	
Ammonia	No limit set	Daily mean	7	0.4	7	1.5	

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

** Note. Daily averages for the year have been supplied for further information.

*** 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	A1	A2
Nitrous oxide	-	7.4	12.0
Hydrogen fluoride	2 mg/m ³	0.07	0.08
Cd and Th and their compounds	0.05 mg/m ³	0.0009	0.0008
Hg and its compounds	0.05 mg/m ³	0.0057	0.0085
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	0.5 mg/m ³	0.018	0.0169
Dioxins & Furans (I-TEQ)	0.1 ng/m ³	0.083	0.050
PCBs (WHO-TEQ Humans / Mammals)	None set ng/m ³	0.007	0.004
PCBs (WHO-TEQ Fish)	None set ng/m ³	0.0004	0.0002
PCBs (WHO-TEQ Birds)	None set ng/m ³	0.013	0.008
Dioxins & Furans (WHO-TEQ Humans / Mammals)	None set ng/m ³	0.081	0.046
Dioxins & Furans (WHO-TEQ Fish)	None set ng/m ³	0.090	0.054
Dioxins & Furans (WHO-TEQ Birds)	None set ng/m ³	0.141	0.090
Anthanthrene	None set µg/m ³	0.031	0.036
Benzo(a)anthracene	None set µg/m ³	0.0178	0.015
Benzo(a)pyrene	None set µg/m ³	0.0145	0.015
Benzo(b)fluoranthene	None set µg/m ³	0.033	0.043
Benzo(b)naphtho(2,1-d)thiophene	None set µg/m ³	<0.013	<0.014
Benzo(c)phenanthrene	None set µg/m ³	<0.013	<0.014
Benzo(ghi)perylene	None set µg/m ³	0.018	<0.014
Benzo(k)fluoranthene	None set µg/m ³	0.019	0.031
Cholanthrene	None set µg/m ³	0.044	0.035
Chrysene	None set µg/m ³	0.029	0.015
Cyclopenta(cd)pyrene	None set µg/m ³	<0.013	<0.014
Dibenzo(ai)pyrene	None set µg/m ³	0.015	<0.014
Dibenzo(ah)anthracene	None set µg/m ³	0.012	<0.014
Fluoranthene	None set µg/m ³	0.07	0.055
Indeno(123-cd)pyrene	None set µg/m ³	0.015	<0.014
Naphthalene	None set µg/m ³	1.48	1.44

Note [1]: Where LOD was observed on all sampling events; the max LOD result observed was reported for the average.

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

Routine sampling was undertaken at W1 during 2015.

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 are an average of the analysis undertaken during 2015 which have followed the criteria laid out in the ESA protocol.

Air Pollution Control Residues

Figures shown in Table 3 are an average of the analysis undertaken during 2015.

Table 3: Residue Quality

Residue quality									
Parameter	Limit	Normal Operation				Before use of a new disposal or recycling route			
		Bottom ash		APC Residues		Bottom ash (Soluble fractions)		APC Residues (Soluble fractions)	
		Line 1	Line 2	Line 1	Line 2	Line 1	Line 2	Line 1	Line 2
Total Organic Carbon	3%	0.91	0.96						
Antimony (mg/kg)	---	145		720	676				
Cadmium (mg/kg)	---	18.7		218	205				
Thallium (mg/kg)	---	0.37		0.91	0.88				
Mercury (mg/kg)	---	<0.86		5.37	5.83				
Lead (mg/kg)	---	949		2,397	2,344				
Chromium (mg/kg)	---	112		26.3	28.0				
Copper (mg/kg)	---	2,482		554	529				
Manganese (mg/kg)	---	868		371	375				
Nickel (mg/kg)	---	99.1		13.2	11.9				
Arsenic (mg/kg)	---	13.6		38.9	35.3				
Cobalt (mg/kg)	---	32.0		4.57	4.45				
Vanadium (mg/kg)	---	33.2		8.85	8.58				

Zinc (mg/kg)	---	3,014	12,000	11,092				
Dioxins/Furans ITEQ (ng/kg)	---	12.0	2,302	1,879				
PCB (WHO- TEQ) Humans (ng/kg)	---	11.7	2,231	1,928				
Total soluble fraction (%)	---							
Metals only soluble fraction (%)	---							

5. Performance Parameters

5.1 Introduction

Condition 4.2.2 (b), (c), Table S4.2 and S4.3 of the Permit set out the reporting criteria for performance parameters.

5.2 Commentary on Data

The recorded performance data is set out in Tables 4; 5; 6 and 7.

Table 4: Energy 1

Parameter	Total (MWh)	Specific usage (MWh / tonne incinerated)
Electricity generated	194,361	0.65
Electricity exported to the National Grid	172,176	0.58
Energy exported as heat (if any)	0	0
Energy usage	26,469	0.09

Table 5: Performance 1

Parameter	Units	
Total municipal (domestic household) waste received on site	Tonnes	148,632
Total commercial and industrial waste received on site	Tonnes	138,897
Municipal waste incinerated	Tonnes	154,460
Commercial and industrial waste incinerated	Tonnes	142,781
Total waste incinerated	Tonnes	297,241
Unsuitable waste sent off-site for treatment	Tonnes	0
Rejected material sent for off-site disposal	Tonnes	86
Gas oil consumption	Tonnes	1051
Dry Urea Reagent usage	kg/tonne waste incinerated	1.38
Hydrated Calcium Hydroxide Reagent usage	kg/tonne waste incinerated	17.9
Activated carbon used	kg/tonne waste incinerated	0.36

Table 6: Water Usage 1

Parameter	Units	
Mains water usage	m ³	65587
Mains water usage	Litres/tonne waste incinerated	221

Table 7: Residues

Parameter	Units	
Total Air Pollution Control residues disposed of	kg/tonne waste incinerated	30.4
Total bottom ash generated	kg/tonne waste incinerated	205
Total bottom ash recycled	kg/tonne waste incinerated	62.3
Total bottom ash disposed of	kg/tonne waste incinerated	152