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

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

Annual Performance Report 2019

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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 will process approximately 22.96 tonnes of residual municipal and C&I waste per line, per hour 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; therefore the 2019 Report is the fifth document.

This report summarises the environmental and performance data collected at the site 1st January 2019 – 31st December 2019 and fulfils 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.

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 88.9% of the year and Line 2 for 87.9%.

Note 1: Detail of periodic sampling timings, uncertainty and method used have previously been supplied to Natural Resources Wales within the 2019 quarterly reports.

Note 2: Results recorded by both, periodic and continuous monitoring have broadly been within the range expected for the energy recovery operation, with exception to the exceedances included in 2.3 below.

2.3 Schedule Notices Issued

Q1

Part A notification reported on	10 January 2019
Date of event	09 January 2019
Parameter	CO (daily mean) reading on Line 2.
Part A notification submitted on	15 February 2019
Date of event	13 February 2019
Event	Elevated HCl (1/2 hour mean) reading on Line 1.
Part C Notification reported on	8 March 2019 (after discussions with NRW)
Date of event	5 March 2019
Details	Abnormal operation on Line 2. At 20:30H on Tuesday 5 March 2019, there was a failure of communication between the Distributed Control System (DCS) and the Continuous Emissions Monitoring System (CEMS).

Q2

Part A notification reported on	30 April 2019
Date of event	Started 28 April 2019 at 18:09H
Details	Elevated CO (95%ile 10 minute average over ANY 24 hour period) on Line 2. 8 exceedances occurred when allowed 7.2 exceedances.
Part C notification submitted on	7 May 2019
Date of event	4 May 2019
Event	Abnormal operation – lime dosing tripped for 38 Minutes
Part A notification reported on	15 May 2019
Date of event	13 May 2019
Details	Line 1 CO daily average Line 1 VOC ½ hourly average
Part A Notification reported on	16 May 2019
Date of event	Started on 25 April 2019 at 22:00H
Event	Elevated CO (95%ile 10 minute average over ANY 24 hour period) on Line 2. 10 exceedances occurred when allowed 7.2 exceedances.

Q3

Part A Notification reported on	22 July 2019
Date of Event	Started 21 July 2019 at 16:40H
Details	Elevated CO (95%ile 10 minute average over ANY 24 hour period) on Line 2. 8 exceedances occurred when allowed 7.2 exceedances.
Part A reported on	19 August 2019
Date of Event	19 August 2019 between 08:30H and 08:59H.
Details	SO ₂ exceedance via Stream 1 Exceeding the permissible ELV 1/2hourly average.

Q4

Part C notification reported on	04 November 2019
Date of event	Started 4 November 2019 at 02:30H
Details	Abatement plant failed – Urea dosing ½ hour exceedance from 02:30H to 02:59H Recorded 402.1mg/m ³ when ELV = 400mg/m ³

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	207.15	182.2	203.775	180.55	BS EN 15267-3
	400 mg/m ³	½ hourly mean	349.825		255.65		
Particulate Matter	10 mg/m ³	Daily mean	0.625	0.525	0.45	0.375	
	30 mg/m ³	½ hourly mean	1.525		0.65		
Total Organic Carbon (TOC)	10 mg/m ³	Daily mean	0.625	0.2	0.925	0.133	
	20 mg/m ³	½ hourly mean	13		9.225		
Hydrogen chloride	10 mg/m ³	Daily mean	10.625	8.5	10.225	8.375	
	60 mg/m ³	½ hourly mean	44.6		48.2		
Sulphur dioxide	50 mg/m ³	Daily mean	42.025	23.525	23.5	11.55	
	200 mg/m ³	½ hourly mean	144.1		78.65		
Carbon monoxide	50 mg/m ³	Daily mean	33.475	8.175	51.3	8.375	
	100 mg/m ³	½ hourly mean*					
Ammonia	No limit set	Daily mean	2.1	2.1	5.2	2.125	

*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 (H1 and H2 combined average)

Substance / Parameter	Emission Limit Value	A1	A2
Nitrous oxide	None set mg/m ³	7.97	8.85
Hydrogen fluoride	2 mg/m ³	0.03	0.04
Cd and Th and their compounds	0.05 mg/m ³	0.0008	0.0005
Hg and its compounds	0.05 mg/m ³	0.0023	0.00155
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	0.5 mg/m ³	0.04925	0.0272
Dioxins & Furans (I-TEQ)	0.1 ng/m ³	0.024	0.01402
PCBs (WHO-TEQ Humans / Mammals)	None set ng/m ³	0.0011225	0.000875
PCBs (WHO-TEQ Fish)	None set ng/m ³	0.000087	0.000065
PCBs (WHO-TEQ Birds)	None set ng/m ³	0.0036285	0.00257
Dioxins & Furans (WHO-TEQ Humans / Mammals)	None set ng/m ³	0.02515	0.061
Dioxins & Furans (WHO-TEQ Fish)	None set ng/m ³	0.0268	0.01615
Dioxins & Furans (WHO-TEQ Birds)	None set ng/m ³	0.0339	0.019075
Anthanthrene	None set µg/m ³	<0.00625	<0.00685
Benzo(a)anthracene	None set µg/m ³	<0.00625	<0.00685
Benzo(a)pyrene	None set µg/m ³	<0.00625	<0.00685
Benzo(b)fluoranthene	None set µg/m ³	<0.00625	<0.00685
Benzo(b)naphtho(2,1-d) thiophene	None set µg/m ³	<0.0135	<0.0074
Benzo(c)phenanthrene	None set µg/m ³	<0.0135	<0.0074
Benzo(ghi)perylene	None set µg/m ³	<0.00625	<0.00685
Benzo(k)fluoranthene	None set µg/m ³	<0.00625	<0.0074
Cholanthrene	None set µg/m ³	<0.0135	<0.0074
Chrysene	None set µg/m ³	<0.00625	<0.01015
Cyclopenta(cd)pyrene	None set µg/m ³	<0.00675	<0.0074
Dibenzo(ai)pyrene	None set µg/m ³	<0.00725	<0.12285
Dibenzo(ah)anthracene	None set µg/m ³	<0.00625	<0.0167
Fluoranthene	None set µg/m ³	0.003	0.015
Indeno(123-cd) pyrene	None set µg/m ³	<0.00625	<0.0167
Naphthalene	None set µg/m ³	0.32	0.405

Note [1]: Where LOD was observed on all sampling events; the max LOD result was used 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

During the year 2020 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 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 2019 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 2019.

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)	
		Composite	Line 1	Line 2	Line 1	Line 2	Line 1	Line 2
Total Organic Carbon	3%	1.15						
Antimony (mg/kg)	---	279.5	981	847.5				
Cadmium (mg/kg)	---	29.15	275.5	274.75				
Thallium (mg/kg)	---	<0.1	0.925	0.8				
Mercury (mg/kg)	---	<0.5	7.1675	8.3425				
Lead (mg/kg)	---	666.275	1616	4411.25				
Chromium (mg/kg)	---	132.75	43.675	37.35				
Copper (mg/kg)	---	1717.4	607.25	538.25				
Manganese (mg/kg)	---	1170	384.75	363.25				
Nickel (mg/kg)	---	68.65	14.525	13.775				
Arsenic (mg/kg)	---	25.95	61.075	59.825				
Cobalt (mg/kg)	---	31.55	4.675	3.9				
Vanadium (mg/kg)	---	38.775	17.8	17.2				

Zinc (mg/kg)	---	3605.35	15262.5	12965				
Dioxins (top) /Furans (bottom) ITEQ (ng/kg)	---	5.061 6.059	165.394 232.085	162.981 213.061				
PCB (WHO-TEQ) Humans (ng/kg)	---	2.032	6.924	8.981				
Total soluble fraction (%)	---							
Metals only soluble fraction (%)	---							

Please note. The units used for Dioxin Furan and PCBs are in ng/m3 whilst the units for other determinants (except TOC) are in mg/m3.

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 (MW / tonne incinerated)
Electricity generated	257,132	0.70
Electricity exported to the National Grid	230,251	0.62
Energy exported as heat (if any)	0	0
Energy usage (909MWh brought onto site from National Grid + 26,881MWh parasitic off take)	27,790	0.07

Table 5: Performance 1

Parameter	Units	
Total municipal (domestic household) waste received on site	Tonnes	272,459
Total commercial and industrial waste received on site	Tonnes	97,287
Municipal waste incinerated	Tonnes	266,854
Commercial and industrial waste incinerated	Tonnes	98,788
Total waste incinerated	Tonnes	365,643
Unsuitable waste sent off-site for treatment	Tonnes	0
Rejected material sent for off-site disposal	Tonnes	27.14
Gas oil consumption 373,329 litres (conv factor litres to kg = 0.91) = (339.7 tonnes)	Tonnes	339.7
Dry Urea Reagent usage (462 tonnes)	kg/tonne waste incinerated	1.26
Hydrated Calcium Hydroxide Reagent usage (4791 tonnes)	kg/tonne waste incinerated	13.1
Activated carbon used (113 tonnes)	kg/tonne waste incinerated	0.31

Table 6: Water Usage 1

Parameter	Units	
Mains water usage	m ³	61,241
Mains water usage 61,241 x 1000L /365,643	Litres/tonne waste incinerated	167.48

Table 7: Residues

Parameter	Units	
Total Air Pollution Control residues disposed of (11,940.9T)	kg/tonne waste incinerated	32.65
Total bottom ash generated (73,561.29T)	kg/tonne waste incinerated	201.18
Total bottom ash recycled	kg/tonne waste incinerated	201.18
Total bottom ash disposed of	kg/tonne waste incinerated	0