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The Viridor logo, featuring the word "Viridor" in a large, white, serif font on a black background.

**Transforming waste™**

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

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

**Environmental Monitoring Report  
Q4 2021**

**1 October – 31 December 2021**

Prepared by:  
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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**

Report Title:	Cardiff Energy Recovery Facility Environmental Report Q4 1 October – 31 December 2021
Report Date:	31 January 2022
Version:	1

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## **1. Introduction**

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

In accordance with the requirements of Permit EPR/LP3030XA issued by Natural Resources Wales to Viridor Waste Management Limited (Viridor) on 4 May 2018, Viridor is required to submit an Environmental Monitoring Report on a quarterly basis.

This report summarises the environmental data collected at the site during the Q4 of 2021 (1 October – 31 December 2021).

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 were obtained by running a quarterly continuous emissions report on CDAS software report.

Line 1 was in operation for 1,963 hours (88.9%) of the quarter and  
Line 2 was in operation for 2,202 hours (99.7%) of the quarter.  
(Percentages calculated when OND = 92 days = max 2,208 hours).

### **2.3 Schedule Notices Issued**

Event on 31 October 2021 21:30H to 21:59H Release to air of 29.68mg/m3 WPD external power loss	Line 2	VOC	ELV is 20mg/m3.
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Event on 20 December 2021 14:30H to 14:59H Release to air of 72.47mg/m3	Line 1	HCl	ELV is 60mg/m3.
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**Table 1: Emissions to Air from A1 and A2 (CEMS) taken from A1- Cbiss reports \*\*\*\***

Releases to Air from Incinerators – Continuous Monitoring – Air 2							
Parameter	Limit	Reference Period	A1		A2		Test Method
			Max		Max		
Oxides of nitrogen	200 mg/m <sup>3</sup>	Daily mean	185		192		BS EN 15267-3
	400 mg/m <sup>3</sup>	½ hourly mean	342		355		
Particulate Matter	10 mg/m <sup>3</sup>	Daily mean	1		1		
	30 mg/m <sup>3</sup>	½ hourly mean	1		2		
Total Organic Carbon (TOC)	10 mg/m <sup>3</sup>	Daily mean	0		0		
	20 mg/m <sup>3</sup>	½ hourly mean	8		30		
Hydrogen chloride	10 mg/m <sup>3</sup>	Daily mean	9		10		
	60 mg/m <sup>3</sup>	½ hourly mean	72		58		
Sulphur dioxide	50 mg/m <sup>3</sup>	Daily mean	34		42		
	200 mg/m <sup>3</sup>	½ hourly mean	101		160		
Carbon monoxide	50 mg/m <sup>3</sup>	Daily mean	0		20		
	100 mg/m <sup>3</sup>	½ hourly mean*					

\* 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

\*\*\* Corrective factor determined by NPL during latest QAL 2 (inputted into CDAS on 22 February 2021).

\*\*\*\* Average data values not required by the permit (see e-mail from Tony Leahey 28\_1\_2021 at 11:38H)

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**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	10.2	11.1	9 Nov 2021 12:00 – 13:00	8.98	11.1	9 Nov 2021 16:00 – 17:00	EN 14792
Hydrogen fluoride	2 mg/m <sup>3</sup>		0.01	0.012	2 Nov 2021 15:05 – 16:05	0.01	0.01	3 Nov 2021 16:50 – 17:50	SRM - BS ISO 15713
Hg and its compounds	0.05 mg/m <sup>3</sup>		0.0031	0.0007	4 Nov 2021 TriPLICATE 12:05 – 15:40	0.0034	0.0008	4 Nov 2021 TriPLICATE 08:20 – 11:55	SRM - BS EN 13211 / MID 14385
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	0.5 mg/m <sup>3</sup>		0.044	0.0052	2 Nov 2021 16:15 – 18:20	0.0332	0.0043	3 Nov 2021 14:35 – 16:40	EN 14385

Dioxins & Furans (I-TEQ)	0.1 ng/m <sup>3</sup>	Mean over period minimum 6 hours, maximum 8 hours	0.0255	0.0037	2 Nov 2021 08:40 – 14:50	0.0037	0.1	3 Nov 2021 08:20– 14:30	SRM - BS EN 1948-1
PCBs (WHO-TEQ Humans / Mammals)	None set ng/m <sup>3</sup>		0.0022	0.0001		0.0013	0.00005		SRM - BS EN 1948-1
PCBs (WHO-TEQ Fish)	None set ng/m <sup>3</sup>		0.0001	0.000004		0.0001	0.000002		SRM - BS EN 1948-1
PCBs (WHO-TEQ Birds)	None set ng/m <sup>3</sup>		0.0042	0.0001		0.0026	0.0001		SRM - BS EN 1948-1
Dioxins/Furans (WHO-TEQ Humans/Mammals)	None set ng/m <sup>3</sup>		0.0202	0.0029		0.0226	0.0033		SRM - BS EN 1948-1
Dioxins/Furans (WHO-TEQ Fish)	None set ng/m <sup>3</sup>		0.0258	0.0037		0.0270	0.0039		SRM - BS EN 1948-1
Dioxins/Furans (WHO-TEQ Birds)	None set ng/m <sup>3</sup>		0.0404	0.0058		0.0375	0.0054		EN 1948 1-3
Anthanthrene	None set µg/m <sup>3</sup>	Mean over period minimum 6 hours, maximum 8 hours	< 0.0011	200.6	2 Nov 2021 08:40 – 14:50	< 0.0011	200.6	3 Nov 2021 08:20– 14:30	SRM - BS ISO 11338 - 1
Benzo(a)anthracene	None set µg/m <sup>3</sup>		0.01	44.26		0.00	90.2		
Benzo(a)pyrene	None set µg/m <sup>3</sup>		0.00	53.1		0.00	136.0		
Benzo(b)fluoranthene	None set µg/m <sup>3</sup>		0.01	30.6		0.00	57.0		
Benzo(b)naptho(2,1-d)thiophene	None set µg/m <sup>3</sup>		0.00	130.8		0.00	120.1		
Benzo(c)phenanthrene	None set µg/m <sup>3</sup>		< 0.0011	200.6		< 0.0011	200.6		
Benzo(ghi)perylene	None set µg/m <sup>3</sup>		0.01	26.8		0.01	44.1		
Benzo(k)fluoranthene	None set µg/m <sup>3</sup>		0.0011	66.4		0.00	167.4		
Cholanthrene	None set µg/m <sup>3</sup>		< 0.0011	200.6		< 0.0011	200.6		

Chrysene	None set $\mu\text{g}/\text{m}^3$		0.01	25.2		0.01	38.1		
Cyclopenta(cd)pyrene	None set $\mu\text{g}/\text{m}^3$		< 0.0011	200.6		< 0.0011	200.6		
Dibenzo(ai)pyrene	None set $\mu\text{g}/\text{m}^3$		< 0.0011	200.6		< 0.0011	200.6		
Dibenzo(ah)anthracene	None set $\mu\text{g}/\text{m}^3$		< 0.0011	200.6		< 0.0011	200.6		
Fluoranthene	None set $\mu\text{g}/\text{m}^3$		0.03	17.3		0.04	16.7		
Indeno(123-cd)pyrene	None set $\mu\text{g}/\text{m}^3$		0.01	34.0		0.00	90.2		
Naphthalene	None set $\mu\text{g}/\text{m}^3$		0.33	15.5		0.34	15.6		



### **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
		Received at lab 25_10_2021 Reported to Viridor 1_11_2021	Received at lab 25_10_2021 Reported to Viridor 1_11_2021		
Total Organic Carbon	3%	1.2%	1.1%		
		Composite			
		Received at lab 21_10_2021 Reported to Viridor 3_11_2021		Received at lab 25_10_2021 Metals reported to Viridor 28_10_2021 D, F + PCBs reported to Viridor 2_11_2021	Received at lab 25_10_2021 Metals reported to Viridor 28_10_2021 D, F + PCBs reported to Viridor 2_11_2021
Antimony (mg/kg)	---	272		1296	1176
Cadmium (mg/kg)	---	25.1		283	246
Thallium (mg/kg)	---	<0.1		1.0	1.0
Mercury (mg/kg)	---	<0.5		5.71	4.49

Lead (mg/kg)	---	596.1	1732	1556
Chromium (mg/kg)	---	122	50.2	51.5
Copper (mg/kg)	---	1977.6	594	520
Manganese (mg/kg)	---	1022	353	465
Nickel (mg/kg)	---	92.4	19.6	26.3
Arsenic (mg/kg)	---	22.7	88.1	85.8
Cobalt (mg/kg)	---	40.8	8.6	8.1
Vanadium (mg/kg)	---	30.8	<10.0	<10
Zinc (mg/kg)	---	3325.2	14590	13320
Dioxins / Furans (WHO 2005 TEQ) (ng/kg)	---	Dioxins = 1.04089 Furans = 1.18597	Dioxins = 121.051 Furans = 206.768	Dioxins = 146.417 Furans = 259.906
PCB (WHO 2005 TEQ) (ng/kg)	---	0.09456	12.2142	5.72847