

# Staffordshire ERF

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**Annual Report**

**2016**

**EPR/HP3431HK**

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Approved Date: 27/01/2017

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## 1. INTRODUCTION

This is the Annual Performance Report for the Staffordshire Energy Recovery Facility (Staffordshire ERF) for 2016. This annual report is the facility's fourth complete annual report.

## 2. FACILITY INFORMATION

Plant Operator	Veolia ES Staffordshire Ltd
Name of Facility	Staffordshire Energy Recovery Facility
EPR Permit Number	HP3431HK
Facility Address	Staffordshire Energy Recovery Facility The Dell Enterprise Drive Four Ashes Wolverhampton Staffordshire WV10 7DF
Telephone Number	0203 567 6300

The ERF is operated by Veolia ES Staffordshire Ltd, a wholly owned subsidiary of Veolia. The plant is designed to burn predominantly residual municipal solid waste and now has a capacity to process up to 340,000 Tonnes annually. The facility has been built to serve Staffordshire County Council, its eight constituent Councils, and its other partner authorities.

The facility can generate approximately 29MW of electricity from waste. The facility uses 3.2MW and the balance is exported to the national grid. In tangible terms the electricity generated is equivalent to 66,000 homes.

The facility is designed so that it can supply heat, if a client becomes available in the future.

Technical details of the plant:

- Constructions Industrielles de la Mediterranee (CNIM) - Design
- Maximum Permitted Refuse throughput – 340,000 tonnes per annum
- Two waste streams each with a capacity of 20 tonnes per hour.
- Storage capacity 4,500 Tonnes – Approximately four and a half days full plant capacity
- Number of tipping bays – 5
- Steam output – 64.5 tonnes of steam per hour at 400°C at 60 BAR
- Flue gas treatment – CNIM ammonia injection for the reduction of NOx, dry lime injection for the removal of acid gases, activated carbon injection for removal of metals and dioxins followed by high performance bag filters for removal of particulates, dispersal via two 80 metre high stacks.
- Maximum energy generating capacity 29MW

The ERF is regulated by the Environment Agency and is certified in compliance with:

- ISO 9001 : 2008
- ISO 14001 : 2004, and
- OHSAS 18001 : 2007



The facility is permitted to accept the following waste types:

Waste code	Description
<b>02</b>	<b>WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING</b>
<b>02 02</b>	<b>wastes from the preparation and processing of meat, fish and other foods of animal origin</b>
02 02 02	animal-tissue waste
02 02 03	materials unsuitable for consumption or processing
<b>16</b>	<b>WASTES NOT OTHERWISE SPECIFIED IN THE LIST</b>
<b>16 03</b>	<b>off-specification batches and unused products</b>
16 03 06	organic wastes other than those mentioned in 16 03 05
<b>18</b>	<b>WASTES FROM HUMAN OR ANIMAL HEALTH CARE AND/OR RELATED RESEARCH (except kitchen and restaurant wastes not arising from immediate health care)</b>
<b>18 01</b>	<b>wastes from natal care, diagnosis, treatment or prevention of disease in humans</b>
18 01 04	wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers)
<b>19</b>	<b>WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE</b>
<b>19 12</b>	<b>wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified</b>
19 12 01	paper and cardboard
19 12 07	Wood other than that mentioned in 19 12 06
19 12 08	textiles
19 12 10	Combustible waste (refuse derived fuel)
19 12 12	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11

Waste code	Description
<b>20</b>	<b>MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS</b>
<b>20 01</b>	<b>separately collected fractions (except 15 01)</b>
20 01 01	paper and cardboard
20 01 08	biodegradable kitchen and canteen waste
20 01 10	clothes
20 01 11	textiles
20 01 38	Wood other than that mentioned in 20 01 37
20 01 39	plastics
20 01 99	other fractions not otherwise specified (hygiene waste collected from domestic facilities that is not classified as clinical waste)
<b>20 02</b>	<b>garden and park wastes (including cemetery waste)</b>
20 02 01	biodegradable waste
<b>20 03</b>	<b>other municipal wastes</b>
20 03 01	Mixed municipal waste
20 03 02	Waste from markets
20 03 03	Street cleaning residues
20 03 07	Bulky waste

### 3. OPERATIONAL INFORMATION

Operational Details		
Operational hours	Line 1: 8385 Line 2: 8348	Hours
Total Waste Incinerated	339,946.4	Tonnes
Total Municipal Waste Incinerated	307743	Tonnes
Total Commercial Waste Incinerated	32203	Tonnes
Metals Recovered	4,375	Tonnes
Incinerator Bottom Ash Produced	69028	Tonnes
APC Residues	8698	Tonnes

Reporting of Water and Other Raw Material Usage for the year 2016

Raw Material	Usage	Unit	Specific Usage	Unit
Mains water	48306	m <sup>3</sup>	145	kg/t
Total water usage	48306	m <sup>3</sup>	145	kg/t
Ammonia	1103	Tonnes	3.2	Kg/t
Activated carbon	103.9	Tonnes	0.3	kg/t
Lime/hydrated lime	4538	Tonnes	13.3	kg/t

(Specific Usage is measured in kg/tonne waste incinerated)

Reporting of Energy Usage/Export for the year 2016

Energy Source	Energy (MWh)	Specific energy	Units
Electricity produced	234430	690	KWh/tonne of waste incinerated (dry basis)
Electricity imported	133	0.3	
Electricity Exported	209515	616	
Electricity used by ERF	25,048	74	
Gas Oil	170133 Litres	0.6	L/tonne of waste incinerated (dry basis)
Thermal Energy produced (Steam Production)	866859 Tonnes	3.1	Tonnes/Tonne waste incinerated
Waste heat utilised by ERF	0	0	KWh/tonne of waste incinerated (dry basis)

## Reporting of Waste Disposal and Recovery for the year 2016

Waste Description	Disposal Route	Annual Tonnes	Recovery Tonnes	Kg / Tonne Waste
1) Hazardous Wastes				
APC Residues	Empire /Minosus	8,697	0	25
IBA which is classified as hazardous waste		0	0	0
Total hazardous waste	Empire /Minosus	8,697	0	25
2) Non-Hazardous Wastes				
IBA	Recycling	69028	69028	205
Other non-hazardous wastes	Metals Recycled	4376	4376	13
Total non-hazardous waste		73404	73404	218
TOTAL WASTE	-	82101	77715	243

## Reporting of other performance indicators for the period 2016

Parameter	Result
Number of periods of WID abnormal operation	0
Cumulative hours of WID abnormal operation for 2016	0



## 4. EMISSIONS TO AIR

All gaseous emissions generated during the combustion process pass through an extensive flue gas cleaning process which starts in the boiler directly above the furnace with injected ammonia to reduce the levels of oxides of nitrogen. After the boiler, super heater and economiser the gases are cooled to approximately 150 degrees centigrade. Activated carbon is added to remove metals and dioxins, and lime is added to remove acidic gases such as SO<sub>2</sub> and HCL. Most of this reaction occurs in the bag filters where particulates are removed and APCr is formed. There is a recirculation of APC where the used lime and carbon is recirculated further to remove chlorinated gases via a recirculation silo. This secondary reactant is recirculated back to the original process via a lab loop. The cleaned gasses are finally released into the atmosphere through the chimney after the bag house.

In compliance with the IED and EPR Permit, the flue gasses are continuously monitored using MCERTS accredited equipment. In addition to the continuous monitoring, an extractive sampling campaign is undertaken on a quarterly basis by an approved service supplier. The organisation used for analysis and monitoring are accredited by the United Kingdom Accreditation Service (UKAS) and the Environment Agency's Monitoring Certification Scheme (MCERTS).

The parameters measured and their frequency of monitoring are summarised below.

Parameters	Continuous	Jan – Jun	Jul – Dec
Particulate Matter	✓		
TOC	✓		
Hydrogen Chloride	✓		
Oxides of Nitrogen	✓		
Carbon Monoxide	✓		
Sulphur Dioxides	✓		
Ammonia	✓		
Nitrous Oxide		✓	✓
Hydrogen Fluoride		✓	✓
Mercury		✓	✓
Arsenic		✓	✓
Cadmium		✓	✓
Chromium		✓	✓
Copper		✓	✓
Cobalt		✓	✓
Nickel		✓	✓
Manganese		✓	✓
Antimony		✓	✓
Lead		✓	✓
Thallium		✓	✓
Vanadium		✓	✓
Dioxins and Furans		✓	✓
Dioxin-like PCBs		✓	✓
PAHs		✓	✓

### 4.1 Continuous Emissions

Through the process there is continuous emissions monitoring of six main pollutants with ELVs using MCERTS approved instruments. The pollutants measured in this way comprise: particulates, total organic carbon, carbon monoxide, sulphur dioxide and oxides of nitrogen.

Pollutant	Chemical Symbol	ELV	Measurement	Monitoring Standard
Particulates	PMx	30mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Total Organic Carbon	TOC	20mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Hydrogen Chloride	HCL	60mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Carbon Monoxide	CO	100mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		50mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Sulphur Dioxide	SO2	200mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		50mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Oxides of Nitrogen	NO and NO2 as NOX	400mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		200mg/m3	daily average	BS EN 14181 and BS EN 15267-3

A summary of the continuous emissions can be seen below for 2016 for average daily figures per month:

#### Stream 1 Monthly mean

	ELV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dust	10	0	0	0	0	0	0	0	0	0	0	0	0
Total Organic Carbon	10	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.5	0.3	0.3	0.3
Hydrogen Chloride	10	6.2	5.2	3.1	5.8	6.9	7.1	7.2	7.2	6.9	6.6	7.3	7.1
Carbon Monoxide	50	3.3	3	2.8	2.3	2.3	2.8	2.6	2	2.3	2.8	3.6	2.9
Sulphur Dioxide	50	17.3	18.9	22.8	25.6	27.1	21.8	21	19.1	20.5	22.1	23.5	9.7
Oxides of Nitrogen	200	143.6	142.6	142.5	145.5	147.5	146.1	147	149.1	146.9	145.5	142.2	148.1

#### Stream 2 Monthly mean

	ELV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dust	10	0	0	0	0	0	0	0	0	0	0	0	0.1
Total Organic Carbon	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.3	0.2	0.1
Hydrogen Chloride	10	6.5	5.7	4.3	6.8	6.1	5.5	6.3	6.3	6.3	5.8	6.8	7.4
Carbon Monoxide	50	2.9	2.8	1.6	1.7	1.6	1.5	1.5	1.2	1.5	1.7	2.3	1.9
Sulphur Dioxide	50	22.3	25.3	21.9	25	27.6	23.6	29.4	29.6	30.7	28.9	23.1	17.7
Oxides of Nitrogen	200	153.2	152.9	153	156.7	155.5	154	154.2	157.3	156.6	156	157.3	157.8

An interpretation shows that the emission levels are consistently stable from month to month. This data is communicated monthly to the public via our Veolia website in terms of a percentage of each ELV. A more detailed WID report is sent to the EA each month showing emissions per pollutant per line, per month in terms of half hourly averages and daily averages.



## 4.2 Extractive Sampling

Typically these pollutants are far harder to measure and are only present in very low concentrations so are taken from the stack using appropriate methodologies.

Extractive testing data is shown in Appendix B.

An interpretation of the data shows that the extractive samples are an order of magnitude below the prescribed limits in the permit.

## 4.3 Annual Mass Emissions

CEMS gas mass emissions are calculated by the MCERT Software developed by Envirosoft. These are shown in Appendix B.

An interpretation of the CEMS Mass Emission is that there is generally a steady state of control. Extractive mass emissions are calculated by using CEMS data and extractive results.

Annual Mass Emissions		
Parameter	Units	Annual Total
Hydrogen Fluoride	Kg	53,7
Mercury	Kg	2,3
Arsenic	Kg	1
Cadmium	Kg	1,2
Chromium	Kg	4,3
Copper	Kg	3
Nickel	Kg	6,9
Manganese	Kg	5,6
Antimony	Kg	2
Lead	Kg	19,6
Thallium	Kg	1,1
Dioxins and Furans*	Kg	0,00000826
PAHs	Kg	1,7
PCBs*	Kg	0,00193

\*Measured concentrations were used to derive these mass emissions ie NOT converted to toxic equivalence first. Non-detects included

# 5 INCINERATOR BOTTOM ASH (IBA) AND AIR POLLUTION CONTROL (APC) RESIDUE

## 5.1 IBA

The plant has undergone rigorous testing to prove that the IBA is non-hazardous. The IBA is of a consistently high standard and there have been no failures in the last 24 samples. IBA is transported to Ballast Phoenix in Castle Bromwich, where it is reprocessed into a number of different graded aggregates. Metals are further extracted from the process and recycled.

In addition to Dioxins/Furans and dioxin-like PCB's, Total Organic Carbon, metals tested in IBA are Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc and their compounds.

Frequency	Monitoring	Test	Limit
Monthly	IBA	TOC	< 3%
Monthly	IBA	Metals, dioxins/furans and dioxin-like PCB's	No limit

The results can be seen in Appendix C.

An interpretation shows that the results are uniform and that the IBA quality does not vary a great deal and is fully compliant.

## 5.2 APC

APC residue is the fine particulate matter that is removed at the end of the gas cleansing process. It contains residues from the waste gas and the reactants used to treat the gas. APC is captured in the bag house filters in the plant before the gas is emitted and dispersed through the ERF's two 80m stacks. The APC from the Staffordshire ERF is sent to another Veolia facility for use in their treatment facility, Empire Works or for permanent underground storage at Minosus.

The results can be seen in Appendix C.

An interpretation shows that the results are uniform and that the APC quality does not vary and is uniform.

## 6 ENVIRONMENTAL CONTROLS

Staffordshire ERF has an experienced Veolia management team from other existing plants. The plant has been designed using proven technology and experience and is performing well. The plant supports our company ethos, as we operate 10 facilities in the UK. Reliable environmental controls and a robust management system ensure that compliance with the Industrial Emissions Directive and EPR Permit.

Veolia staff are aware of the environmental impacts of their work and exercise a high standard of housekeeping. Training and competency of staff is controlled by the Veolia Business Management System. The Management System covers training, awareness and competence. The company identifies the training requirements of its employees and provides suitable resources to ensure they have the required knowledge, skills and expertise to carry out their duties.

APPENDIX A – EXTRACTIVE EMISSIONS  
APPENDIX B – MASS EMISSIONS  
APPENDIX C – IBA AND APC RESULTS



## APPENDIX A

Permit Number: ERR/HP3431HK Operator: Veolia ES Staffordshire Ltd  
 Facility: Staffordshire ERF Form Number: Air7 / 01/01/2012  
 Reporting of periodically monitored emissions to air for the period from 01/01/16 to 30/06/16  
 Permit Number: ERR/HP3431HK Operator: Veolia ES Staffordshire Ltd  
 Facility: Staffordshire ERF Form Number: Air7 / 01/01/2012  
 Reporting of periodically monitored emissions to air for the period from 01/01/16 to 30/06/16

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result <sup>(1)</sup>	Test Method	Result Date and Time <sup>(2)</sup>	Uncertainty <sup>(3)</sup>
A1 & A2	Hydrogen Fluoride	2 mg/m <sup>3</sup>	Periodic over minimum 1-hour period	A1: 0.03 mg/m <sup>3</sup> A2: 0.02 mg/m <sup>3</sup>	BS ISO 15713	A1: 09/02/16 – 07:55 – 08:55 A2: 10/02/16 – 08:00 – 09:00	14% 14%
A1 & A2	Cadmium & Thallium and their compounds (total)	0.05 mg/m <sup>3</sup>	over minimum 30 minute, maximum 8 hour period	A1: 0.0012 mg/m <sup>3</sup> A2: 0.0011 mg/m <sup>3</sup>	BS EN 14385	A1: 12/02/16 – 10:00 – 12:02 A2: 12/02/16 – 07:15 – 09:17	8% 8%
A1 & A2	Mercury and its compounds	0.05 mg/m <sup>3</sup>	over minimum 30 minute, maximum 8 hour period	A1: 0.00066 mg/m <sup>3</sup> A2: 0.00074 mg/m <sup>3</sup>	BS EN 14385	A1: 12/02/16 – 10:00 – 12:02 A2: 12/02/16 – 07:15 – 09:17	14% 14%
A1 & A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m <sup>3</sup>	over minimum 30 minute, maximum 8 hour period	A1: 0.039 mg/m <sup>3</sup> A2: 0.020 mg/m <sup>3</sup>	BS EN 14385	A1: 12/02/16 – 10:00 – 12:02 A2: 12/02/16 – 07:15 – 09:17	10% 6%
A1 & A2	N <sub>2</sub> O	N/A	Periodic Over minimum 1-hour period	A1: 0.35 mg/m <sup>3</sup> A2: 0.20 mg/m <sup>3</sup>	EA TGN M22	A1: 09/02/16 – 10:30 – 11:30 A2: 10/02/16 – 10:30 – 11:30	9% 9%
A1 & A2	Dioxins / Furans (I-TEQ)	0.1 ng/m <sup>3</sup>	over minimum 6 hour period, maximum 8 hour period	A1: 0.0053 – 0.0056 ng/m <sup>3</sup> A2: 0.0023 – 0.0025 ng/m <sup>3</sup>	BS EN 1948 Parts 1, 2 and 3	A1: 09/03/16 07:25 – 13:35 A2: 11/02/16 – 07:10 – 13:15	15% 20%

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result <sup>(1)</sup>	Test Method	Result Date and Time <sup>(2)</sup>	Uncertainty <sup>(3)</sup>
A1 & A2	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.058 – 0.058 ng/m <sup>3</sup> A2: 0.000044 – 0.00034 ng/m <sup>3</sup>	BS EN/TS 1948-4	A1: 17/02/16 06:50 – 12:55 A2: 11/02/16 – 07:10 – 13:15	21% 17%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0029 – 0.0029 ng/m <sup>3</sup> A2: 0.0000069 – 0.000020 ng/m <sup>3</sup>	BS EN/TS 1948-4	A1: 17/02/16 06:50 – 12:55 A2: 11/02/16 – 07:10 – 13:15	21% 15%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.10 – 0.10 ng/m <sup>3</sup> A2: 0.0019 – 0.0022 ng/m <sup>3</sup>	BS EN/TS 1948-4	A1: 17/02/16 06:50 – 12:55 A2: 11/02/16 – 07:10 – 13:15	14% 16%
A1 & A2	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0062 – 0.0065 ng/m <sup>3</sup> A2: 0.0026 – 0.0028 ng/m <sup>3</sup>	BS EN 1948 Parts 1, 2 and 3	A1: 09/03/16 07:25 – 13:35 A2: 11/02/16 – 07:10 – 13:15	18% 21%
A1 & A2	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0060 – 0.0063 ng/m <sup>3</sup> A2: 0.0025 – 0.0027 ng/m <sup>3</sup>	BS EN 1948 Parts 1, 2 and 3	A1: 09/03/16 07:25 – 13:35 A2: 11/02/16 – 07:10 – 13:15	20% 23%
A1 & A2	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0094 – 0.0097 ng/m <sup>3</sup> A2: 0.0040 – 0.0043 ng/m <sup>3</sup>	BS EN 1948 Parts 1, 2 and 3	A1: 09/03/16 07:25 – 13:35 A2: 11/02/16 – 07:10 – 13:15	20% 25%



Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result (1)	Test Method	Result Date and Time (2)	Uncertainty (3)
A1 & A2	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies		A1: 1.34 µg/m <sup>3</sup> A2: 0.32 µg/m <sup>3</sup>	BS ISO 11338-1 and BS ISO 11338-2	09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	11% 15%
A1 & A2	Anthracene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Benzo[a]anthracene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Benzo[b]fluoranthene	No limit applies		A1: 0.027 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	18% >100%
A1 & A2	Benzo[k]fluoranthene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Benzo[b]naph(2,1-d')thiophene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Benzo[c]phenanthrene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Benzo[ghi]perylene	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.027 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	18% 19%
A1 & A2	Benzo[a]pyrene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Cholanthrene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Chrysene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Cyclopenta[c,d]pyrene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Dibenzo[a,h]anthracene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Dibenzo[a,i]pyrene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Fluoranthene	No limit applies		A1: 0.044 µg/m <sup>3</sup> A2: 0.064 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	18% 19%
A1 & A2	Indo[1,2,3-cd]pyrene	No limit applies		A1: 0.013 µg/m <sup>3</sup> A2: 0.013 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	>100% >100%
A1 & A2	Naphthalene	No limit applies		A1: 0.68 µg/m <sup>3</sup> A2: 0.077 µg/m <sup>3</sup>		09/02/16 07:10 – 13:12 10/02/16 06:50 – 12:52	18% >19%

[1] For dioxins and dioxin-like PCBs, the result are to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum

[2] The date and time of the sample that produced the result is given.

[3] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed ..... Date.....05.04.16.....

(authorised to sign as representative of Operator)



Permit Number: ERR/HP3431HK Operator: Veolia ES Staffordshire Ltd  
 Facility: Staffordshire ERF Form Number: Air7 / 01/01/2012

### Reporting of periodically monitored emissions to air for the period from 01/07/16 to 31/12/16

Permit Number: ERR/HP3431HK Operator: Veolia ES Staffordshire Ltd  
 Facility: Staffordshire ERF Form Number: Air7 / 01/01/2012  
 Reporting of periodically monitored emissions to air for the period from 01/07/16 to 31/12/16

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result <sup>(1)</sup>	Test Method	Result Date and Time <sup>(2)</sup>	Uncertainty <sup>(3)</sup>
A1 & A2	Hydrogen Fluoride	2 mg/m <sup>3</sup>	Periodic over minimum 1-hour period	A1: 0.03 mg/m <sup>3</sup> A2: 0.03 mg/m <sup>3</sup>	BS ISO 15713	A1: 09/08/16 – 07:35 – 08:35 A2: 10/08/16 – 07:30 – 08:30	14% 14%
A1 & A2	Cadmium & Thallium and their compounds (total)	0.05 mg/m <sup>3</sup>	over minimum 30 minute, maximum 8 hour period	A1: 0.0012 mg/m <sup>3</sup> A2: 0.0012 mg/m <sup>3</sup>	BS EN 14385	A1: 12/08/16 – 10:15 – 12:17 A2: 12/08/16 – 07:30 – 09:32	8% 8%
A1 & A2	Mercury and its compounds	0.05 mg/m <sup>3</sup>	over minimum 30 minute, maximum 8 hour period	A1: 0.0017 mg/m <sup>3</sup> A2: 0.0017 mg/m <sup>3</sup>	BS EN 14385	A1: 12/08/16 – 10:15 – 12:17 A2: 12/08/16 – 07:30 – 09:32	13% 13%
A1 & A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m <sup>3</sup>	over minimum 30 minute, maximum 8 hour period	A1: 0.017 mg/m <sup>3</sup> A2: 0.017 mg/m <sup>3</sup>	BS EN 14385	A1: 12/08/16 – 10:15 – 12:17 A2: 12/08/16 – 07:30 – 09:32	5% 5%
A1 & A2	N <sub>2</sub> O	N/A	Periodic Over minimum 1-hour period	A1: 0.29 mg/m <sup>3</sup> A2: 0.21 mg/m <sup>3</sup>	EA TGN M22	A1: 09/08/16 – 11:00 – 12:00 A2: 10/08/16 – 11:00 – 12:00	10% 10%
A1 & A2	Dioxins / Furans (I-TEQ)	0.1 ng/m <sup>3</sup>	over minimum 6 hour period, maximum 8 hour period	A1: 0.0036 – 0.0043 ng/m <sup>3</sup> A2: 0.0046 – 0.0052 ng/m <sup>3</sup>	BS EN 1948 Parts 1, 2 and 3	A1: 09/08/16 – 06:50 – 12:55 A2: 10/08/16 – 06:50 – 12:56	17% 14%

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result <sup>[1]</sup>	Test Method	Result Date and Time <sup>[2]</sup>	Uncertainty <sup>[3]</sup>
A1 & A2	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.000027 – 0.00047 ng/m <sup>3</sup> A2: 0.000016 – 0.00044 ng/m <sup>3</sup>	BS EN/TS 1948-4	A1: 09/08/16 – 06:50 – 12:55 A2: 10/08/16 – 06:50 – 12:56	18% 18%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0000081 – 0.000028 ng/m <sup>3</sup> A2: 0.0000052 – 0.000024 ng/m <sup>3</sup>	BS EN/TS 1948-4	A1: 09/08/16 – 06:50 – 12:55 A2: 10/08/16 – 06:50 – 12:56	16% 17%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0020 – 0.0024 ng/m <sup>3</sup> A2: 0.0013 – 0.0016 ng/m <sup>3</sup>	BS EN/TS 1948-4	A1: 09/08/16 – 06:50 – 12:55 A2: 10/08/16 – 06:50 – 12:56	13% 13%
A1 & A2	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0036 – 0.0045 ng/m <sup>3</sup> A2: 0.0046 – 0.0055 ng/m <sup>3</sup>	BS EN 1948 Parts 1, 2 and 3	A1: 09/08/16 – 06:50 – 12:55 A2: 10/08/16 – 06:50 – 12:56	17% 15%
A1 & A2	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0034 – 0.0043 ng/m <sup>3</sup> A2: 0.0045 – 0.0053 ng/m <sup>3</sup>	BS EN 1948 Parts 1, 2 and 3	A1: 09/08/16 – 06:50 – 12:55 A2: 10/08/16 – 06:50 – 12:56	21% 19%
A1 & A2	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0.0058 – 0.0067 ng/m <sup>3</sup> A2: 0.0059 – 0.0078 ng/m <sup>3</sup>	BS EN 1948 Parts 1, 2 and 3	A1: 09/08/16 – 06:50 – 12:55 A2: 10/08/16 – 06:50 – 12:56	24% 19%



Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result (1)	Test Method	Result Date and Time (2)	Uncertainty (3)
A1 & A2	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 1.03 µg/m <sup>3</sup> A2: 0.89 µg/m <sup>3</sup>	BS ISO 11338-1 and BS ISO 11338-2	15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	13% 13%
A1 & A2	Anthracene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Benzo[a]anthracene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Benzo[b]fluoranthene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Benzo[k]fluoranthene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Benzo[b]naph(2,1-d)thiophene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Benzo[c]phenanthrene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Benzo[ghi]perylene	No limit applies		A1: 0.030 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	18% >100%
A1 & A2	Benzo[a]pyrene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Cholanthrene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Chrysene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Cyclopenta(c,d)pyrene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Dibenzo[a,h]anthracene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Dibenzo[a,i]pyrene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Fluoranthene	No limit applies		A1: 0.075 µg/m <sup>3</sup> A2: 0.059 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	18% 18%
A1 & A2	Indo[1,2,3-cd]pyrene	No limit applies		A1: 0.015 µg/m <sup>3</sup> A2: 0.015 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	>100% >100%
A1 & A2	Naphthalene	No limit applies		A1: 0.73 µg/m <sup>3</sup> A2: 0.62 µg/m <sup>3</sup>		15/08/16 06:55 – 12:58 11/08/16 06:50 – 12:53	18% 18%

[1] For dioxins and dioxin-like PCBs, the result are to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum

[2] The date and time of the sample that produced the result is given.

[3] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed:  Date: 22.09.16

(authorised to sign as representative of Operator)



## APPENDIX B

OPERATIONAL SUMMARY for each month of the YEAR to 31/12/2016

Operator: Veolia  
 Installation: Stafford EfW  
 Confidence adjusted values  
 Release Point: Unit 1

Average concentrations from valid 30 min averages.

Month	NO x (mg/m3)	CO (mg/m3)	SO2 (mg/m3)	HCl (mg/m3)	VOC (mg/m3)	NH3 (mg/m3)	Dust (mg/m3)	Flow (Nm3/hr)
January	143.6	3.3	17.3	6.20	0.18	0.51	0.00	118197
February	142.6	3.0	18.9	5.22	0.20	1.26	0.00	117323
March	142.5	2.8	22.8	3.09	0.19	2.36	0.00	112587
April	145.5	2.3	25.6	5.81	0.21	1.01	0.00	118256
May	147.5	2.3	27.1	6.85	0.25	1.95	0.00	117475
June	146.1	2.8	21.8	7.06	0.28	3.60	0.00	115846
July	147.0	2.6	21.0	7.22	0.30	3.04	0.00	114138
August	149.1	2.0	19.1	7.20	0.34	2.68	0.00	117909
September	146.6	2.3	20.3	6.94	0.54	2.68	0.00	118152
October	145.5	2.8	22.1	6.62	0.33	1.99	0.00	118338
November	142.2	3.6	23.5	7.26	0.29	1.98	0.00	118753
December	148.1	2.9	19.7	7.11	0.31	0.93	0.01	117742
Yearly Average	145.7	2.7	21.5	6.49	0.29	1.99	0.00	117183

## Mass release

Month	NO x	CO	SO2	HCl	VOC	NH3	Dust	Burn time
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(hrs)
January	15834.8	320.3	1887.5	903.81	22.08	45.91	-	743
February	14315.0	268.7	1886.5	692.93	23.00	103.21	-	682
March	9225.2	159.6	1474.3	269.07	13.09	123.22	-	459
April	14956.1	204.5	2606.9	790.74	23.78	83.59	-	693
May	16196.9	220.6	2954.3	993.34	32.39	171.65	-	743
June	15347.5	257.4	2263.6	977.04	33.50	301.84	-	720
July	15717.4	243.5	2223.8	1016.52	36.84	260.00	-	744
August	16465.3	191.2	2076.0	1046.92	43.51	237.80	0.00	744
September	15135.1	210.3	2071.3	944.08	63.39	223.01	-	695
October	16058.7	269.5	2418.7	965.28	41.92	176.80	-	743
November	14094.9	306.2	2313.4	948.57	33.49	157.04	-	664
December	16242.9	279.4	2140.4	1030.67	38.03	81.85	0.72	742
<b>Total</b>	<b>179590.0</b>	<b>2931.0</b>	<b>26316.7</b>	<b>10578.98</b>	<b>405.03</b>	<b>1965.93</b>	<b>0.72</b>	<b>8370</b>

OPERATIONAL SUMMARY for each month of the YEAR to 31/12/2016

Operator: Veolia

Installation: Stafford EFW

Confidence adjusted values

Release Point: Unit 2

Average concentrations from valid 30 min averages.

Month	NO x (mg/m3)	CO (mg/m3)	SO2 (mg/m3)	HCI (mg/m3)	VOC (mg/m3)	NH3 (mg/m3)	Dust (mg/m3)	Flow (Nm3/hr)
January	153.2	2.9	22.3	6.46	0.10	1.82	0.00	115920
February	152.9	2.8	25.3	5.67	0.11	1.89	0.00	114125
March	153.0	1.6	21.9	4.25	0.08	1.57	0.00	115464
April	156.7	1.7	25.0	6.78	0.14	0.55	0.00	118400
May	155.5	1.6	27.6	6.10	0.14	0.63	0.00	117993
June	154.0	1.5	23.6	5.55	0.14	0.45	0.00	117235
July	154.2	1.5	29.4	6.32	0.13	0.27	0.00	117473
August	157.3	1.2	29.6	6.34	0.16	0.31	0.00	118020
September	156.4	1.5	30.6	6.26	0.38	0.26	0.00	118801
October	156.0	1.7	28.9	5.76	0.32	0.18	0.00	121888
November	157.3	2.3	23.1	6.84	0.16	4.99	0.00	119657
December	157.8	1.9	17.7	7.39	0.11	5.78	0.60	115624
<b>Yearly Average</b>	<b>155.4</b>	<b>1.9</b>	<b>25.5</b>	<b>6.21</b>	<b>0.17</b>	<b>1.56</b>	<b>0.05</b>	<b>117631</b>



## Mass release

Month	NO x	CO	SO2	HCl	VOC	NH3	Dust	Burn time
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(hrs)
January	16553.9	277.5	2393.7	922.65	10.68	157.74	-	743
February	14075.2	234.7	2323.2	692.50	10.46	140.60	-	644
March	11081.9	99.3	1582.7	409.48	5.72	91.28	-	501
April	16734.0	167.0	2641.8	956.06	16.10	46.94	0.14	719
May	17132.7	152.4	2997.7	888.86	15.25	56.53	-	744
June	14862.3	135.8	2252.7	707.91	13.71	34.80	-	655
July	16889.2	145.5	3182.5	913.18	14.47	23.51	-	744
August	17313.3	118.3	3215.4	922.32	18.68	27.45	-	744
September	16654.2	141.8	3218.2	880.16	45.81	22.59	-	714
October	17175.3	172.0	3142.7	836.87	40.52	15.57	-	720
November	16957.1	221.6	2488.0	968.44	18.84	413.92	-	719
December	16879.5	180.2	1880.2	1045.14	13.07	492.65	72.74	737
<b>Total</b>	<b>192308.6</b>	<b>2046.0</b>	<b>31318.7</b>	<b>10143.57</b>	<b>223.31</b>	<b>1523.57</b>	<b>72.88</b>	<b>8381</b>

Operator : Veolia ES Staffordshire Ltd

Operator: Veolia

Analysis month: Jan-16


Installation : Staffordshire ERF  
Form Number : Residue 1/01/01/2012

### Reporting of Ash Composition for the period from

Ash Composition (LOI/TOC):		
	LOI (%)	% Carbon (TOC) %
Bottom ash	2.76	1.04

\* At least one of LOI or TOC to be reported

Ash Composition (Metals, Dioxins, etc.)																	
	Sb mg/kg	Cd mg/kg	Ti mg/kg	Hg mg/kg	Pb mg/kg	Cr mg/kg	Cu mg/kg	Mn mg/kg	Ni mg/kg	As mg/kg	Co mg/kg	V mg/kg	Zn mg/kg	DIOXIN I-TEQ ng/kg	DIOXIN		
															WHO-TEQ ng/kg		
															Humans/ mammals	Birds	Fish
Bottom ash	73.0	6.38	<1	<1	524	83.4	2499	1006	145	9.16	65.2	80.9	2361	1.66	1.75	1.75	
APC residue	704	119	0.50	7.80	1026	80.9	467	501	39.8	337	11.5	57.8	7740	511	517	600	

Signed:  Date: 29.02.16  
(authorised to sign as representative of Operator)

Operator : Veolia ES Staffordshire Ltd

Operator : Veolia

Analysis month: Apr-16

Form Number: Residue 1/01/01/2012

### Ash Composition (LOI/TOC):

\* At least one of LOI or TOC to be reported

Signed:  Date: 08.06.18

23



Permit Number : ERR/HP3431HK

Operator : Veolia ES Staffordshire Ltd

Permit Reference Number: EPR/3431HK

Operator : Veolia

Analysis month: Jul-16

Installation : Staffordshire ERF


Form Number : Residue 1/01/01/2012

Reporting of Ash Composition for the period from

Ash Composition (LOI/TOC):		
	LOI (%)	% Carbon (TOC) <sup>w/w</sup>
Bottom ash	2.48	0.94

\*At least one of LOI or TOC to be reported

Ash Composition (Metals, Dioxins, etc.)																	
	Sb mg/kg	Cd mg/kg	Tl mg/kg	Hg mg/kg	Pb mg/kg	Cr mg/kg	Cu mg/kg	Mn mg/kg	Ni mg/kg	As mg/kg	Co mg/kg	V mg/kg	Zn mg/kg	DIOXIN I-TEQ ng/kg	DIOXIN		
															Humans/ mammals	Birds	Fish
Bottom ash	83.5	8.47	0.07	0.36	568	91.2	2145	624	105	6.97	31.6	37.2	1985	1.71	3.52	7.32	3.89
APC residue	701	179	0.50	11.9	1192	78.1	557	386	26.1	43.0	9.60	18.9	9289	329	664	1578	760

Signed:  Date: 01.09.16  
(authorised to sign as representative of Operator)

# Staffordshire ERF – Annual Report

ERP/HP3431HK

Permit Number : ERR/HP3431HK

Operator : Veolia ES Staffordshire Ltd

Permit Reference Number: EPR/3431HK

Operator : Veolia

Analysis month: Oct-16

Installation : Staffordshire ERF

Form Number : Residue 1/01/01/2012

Reporting of Ash Composition for the period from

## Ash Composition (LOI/TOC):

	LOI (%)	% Carbon (IOC) <sup>Wt</sup> /w
Bottom ash	2.53	0.76

\* At least one of LOI or TOC to be reported

## Ash Composition (Metals, Dioxins, etc.)

	Sb mg/kg	Cd mg/kg	Tl mg/kg	Hg mg/kg	Pb mg/kg	Cr mg/kg	Cu mg/kg	Mn mg/kg	Ni mg/kg	As mg/kg	Co mg/kg	V mg/kg	Zn mg/kg	DIOXIN I-IEQ ng/kg	DIOXINS, FURANS & DIOXIN-LIKE		
															WHO-TEQ ng/kg	Humans & mammals	Birds
Bottom ash	65.7	6.02	0.08	0.38	766	99.1	1952	1643	205	6.28	56.7	26.9	2704	2.42		2.54	5.39
APC residue	877	196	0.80	8.60	1473	66.1	448	315	14.1	51.2	6.70	13.6	9725	329		334	743
																	2.81
																	379

Signed:  Date: 27.01.17  
(authorised to sign as representative of Operator)