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## **Annual Environmental Report Twinwoods Heat and Power Limited**

This report is the annual Environmental report for Twinwoods Heat and Power Limited for submission to the local site officer to demonstrate that the conditions within the permit have been complied with for the period 1<sup>st</sup> January to 31<sup>st</sup> December 2018.

This report will address the following areas:

- Summary of Environmental Compliance and Environment Agency Inspections
- Changes Relevant to Permit
- Emissions to Air (Continuous and Periodic);
- Waste Disposal and Recovery;
- Water and Raw Material Use;
- Energy Use/Export;
- Residue Composition;
- Ash Solubility; and
- Performance Indicators.

### Summary of Environmental Compliance and Environment Agency Inspections

Twinwoods has been visited by the Environment Agency once in 2018 on the 13<sup>th</sup> November 2018 by Emma D'Avilar and Neil Goudie. A Compliance Assessment Report was issued after the visit which scored no breaches of permit conditions. There was some guidance issued with regards to fire prevention and firewater control which have been considered and are to be actioned.

### Changes Relevant to Permit

Variation applications were submitted in March and April which were subsequently withdrawn. A further application was submitted and was duly made on the 31<sup>st</sup> May 2018. This variation was to allow hazardous waste wood to be used for energy recovery in addition to the non-hazardous wood currently allowed as

well as to address changes in the plant from the original design and permit to the current as built process. A Schedule 5 notice was issued and responded to and the final permit was issued on the 30<sup>th</sup> November 2018.

#### Emissions to Air

Emissions to air for 2018 is summarised in the table below. It should be noted that the CEMs continues to operate during start-up and shutdown conditions which is the reason for the number of exceedances of the parameters. Also, until October the plant was operating on Extended WID limits which was subsequently backdated until the 1<sup>st</sup> July. Twinwoods Heat and Power Limited also do not stop monitoring during normal trips of the plant as well, for example, if wood feed stops the CO will increase due to the thing of the grate.

A QAL2 was undertaken in August and is appended to this annual report.

Emissions to air												
NO <sub>x</sub>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ hourly monthly mean	175	174	195	205	186	196	188	199	204	183	190	180
½ hourly exceedances	0	0	3	12	7	0	0	3	5	3	0	0
Daily average exceedances	4	0	11	12	14	9	1	8	13	7	1	6
Particulate Matter												
½ hourly monthly mean	0.5	7.6	0.8	0.9	1.7	0.2	0.2	0.3	0.5	1.3	1.0	1.4
½ hourly exceedances	1	6	0	1	3	0	0	0	1	2	0	0
Daily average exceedances	0	1	0	0	1	0	0	0	0	0	0	1
TOC												

½ hourly monthly mean	0.9	0.6	3.1	4.4	11.6	1.4	1.7	1.7	3.6	1.6	0.3	0.2
½ hourly exceedances	3	4	8	13	77	3	0	5	9	0	0	0
Daily average exceedances	0	0	2	1	4	0	0	1	1	0	0	0
<b>CO</b>												
½ hourly monthly mean	60	89	88	69	105	39	48	44	60	55	42	34
½ hourly exceedances	113	69	135	125	148	27	22	37	67	73	34	29
Daily average exceedances	17	9	19	16	18	2	9	1	10	10	5	3
<b>SO<sub>2</sub></b>												
½ hourly monthly mean	26	24	27	36	See note	18	22	26	19	24	17	10
½ hourly exceedances	0	0	0	4	1	0	0	9	0	0	0	0
Daily average exceedances	0	0	0	1	1	0	0	2	0	1	0	0
<b>HCl</b>												
½ hourly monthly mean	5.8	8.9	7.1	9.3	8.8	8.7	10	9.8	8.7	8.2	6.8	6.7
½ hourly exceedances	4	24	1	14	6	0	0	0	3	2	0	0
Daily average exceedances	2	5	1	6	4	0	9	5	2	2	0	0

Permit Number: EPR/SP3638KV/006

Operator: Twinwoods Heat and Power Limited

Facility: Twinwoods Co-incinerator

Form Number: Air 9 / 30/11/2018

### Reporting of periodically monitored emissions to air for the period from 1<sup>st</sup> January to 31<sup>st</sup> December 2018

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	Hydrogen fluoride	2 mg/m <sup>3</sup>	Periodic over minimum 1-hour period	0.48	BS ISO 15713	1-3/8/18	0.04
A1	Cadmium & thallium and their compounds (total)	0.05 mg/m <sup>3</sup>	over minimum 30 minute, maximum 8 hour period	0.004	BS EN 14385	1-3/8/18	0.001
A1	Mercury and its compounds	0.05 mg/m <sup>3</sup>	over minimum 30 minute, maximum 8 hour period	<0.00006	BS EN 13211	1-3/8/18	0.0001
A1	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	0.21	BS EN 14385	1-3/8/18	0.05
A1	Dioxins / Furans (I-TEQ)	0.1 ng/m <sup>3</sup>	over minimum 6 hour period, maximum 8 hour period	0.076	BS EN 1948 Parts 1, 2 and 3	1-3/8/18	0.016
A1	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.0146	BS EN/TS 1948-4	1-3/8/18	0.0030

Registered Address:  
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33 Cavendish Square,  
London W1G 0PW

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	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.0008	BS EN/TS 1948-4	1-3/8/18	0.0002
A1	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.0440	BS EN/TS 1948-4	1-3/8/18	0.0091
A1	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.076	BS EN/TS 1948-4	1-3/8/18	0.016
						1-3/8/18	

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	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.082	BS EN/TS 1948-4	1-3/8/18	0.017
A1	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	0.206	BS EN/TS 1948-4	1-3/8/18	0.043
	<i>Poly-cyclic aromatic hydrocarbons (PAHs)</i>						
A1	Total	No limit applies	over minimum 6 hour period, maximum 8 hour period	18.3µg/m3	BS ISO 11338-1 and BS ISO 1138-2	1-3/8/18	3.8
A1	Anthanthrene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Benzo{a}anthracene	No limit applies		<0.025µg/m3		1-3/8/18	0.005

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	Benzo[b]fluoranthene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Benzo[k]fluoranthene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Benzo[b]naph(2,1-d)thiophene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Benzo[c]phenanthrene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Benzo[ghi]perylene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Benzo[a]pyrene	No limit applies		0.075µg/m3		1-3/8/18	0.015
A1	Cholanthrene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Chrysene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Cyclopenta(c,d)pyrene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Dibenzo[ah]anthracene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Dibenzo[a,i]pyrene	No limit applies		No result		1-3/8/18	0.005

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	Fluoranthene	No limit applies		0.224		1-3/8/18	0.046
A1	Indo[1,2,3-cd]pyrene	No limit applies		<0.025µg/m3		1-3/8/18	0.005
A1	Naphthalene	No limit applies		17µg/m3		1-3/8/18	3.7
A1	Ammonia	No limit applies	Periodic over minimum 1-hour period	0.49 mg/m3	Procedural requirements of BE EN 14791	1-3/8/18	0.04
A1	Nitrous Oxide	No limit applies	Periodic over minimum 1-hour period	3.8 mg/m3	BS EN ISO 21258	1-3/8/18	2.0

[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.

Operator's comments: The first periodic test was performed in August 2018. The facility was then retrospectively informed that the site was deemed to have become operational since 1<sup>st</sup> July 2018 and scheduled the second quarterly test for the soonest date available which was 18-20<sup>th</sup> December. However, this had to be postponed until January the 22<sup>nd</sup>-24<sup>th</sup> due to an unexpected plant shutdown because of a tube leak.



Signed

Date 08/02/2019

Marcus Buckle authorised to sign as representative of Twinwoods Heat and Power Limited

Registered Address:

15<sup>th</sup> Floor,

33 Cavendish Square,

London W1G 0PW

Permit Number : EPR/SP3638KV/006

Operator : Twinwoods Heat and Power Limited

Facility : Twinwoods Co-incinerator

Form Number : R1 / 30/11/2018

### Reporting of Waste Disposal and Recovery for the year 2018

Waste Description	Disposal	Recovery		Tonnes/tonne of waste incinerated
	Route	Tonnes	Tonnes	
1) Hazardous Wastes	Hazardous wood returned to supplier	3	3	0
APC Residues	Treatment then reuse	0	457.9	0
IBA which is classified as hazardous waste	-	0	0	0
Total hazardous waste	-	0	460.9	0
2) Non-Hazardous Wastes				
IBA	Aggregate	0	660.5	0
Other non-hazardous wastes	Landfill	0.28	0	0
Total non-hazardous waste	-	0.28	660.5	0
3) Other solid residues	-	0	0	0
TOTAL WASTE	-	3.28	1,118.4	0

Operator's comments :

Signed



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Operator : Twinwoods Heat and Power Limited

Facility : Twinwoods Co-incinerator

Form Number : WU/RM1 / 30/11/2018

**Reporting of Water and Other Raw Material Usage for the year 2018**

Raw Material	Usage	Unit	Specific Usage	Unit
Mains water	50,314	m <sup>3</sup>	2.07	m <sup>3</sup> /t
Total water usage	50,314	m <sup>3</sup>	2.07	m <sup>3</sup> /t
Urea	39	Tonnes	1.61	kg/t
Activated carbon	3	Tonnes	0.124	kg/t
Sodium bicarbonate	194.8	Tonnes	8.03	kg/t

Operator's comments :



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Permit Number : EPR/SP3638KV/006

Operator : Twinwoods Heat and Power Limited

Facility : Twinwoods Co-incinerator

Form Number : energy 1 / 30/11/2018

**Reporting of Energy Usage/Export for the year 2018**

Energy Source	Energy Usage	Unit	Primary Energy note 1 (MWh)
Electricity produced	17,769	MWh	17,769
Electricity imported	861	MWh	2,066.4
Electricity Exported	14,100	MWh	14,100
Gas Oil	45.078	tonnes	524.26
Steam/hot water Exported	0	MWh	-

Note 1 Conversion factor for imported electricity to primary energy =2.4

Operator's comments :



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Permit Number : EPR/SP3638KV/006

Operator : Twinwoods Heat and Power Limited

Facility : Twinwoods Co-Incenerator

Form Number : Residues 1 / 30/11/2018

### Reporting of residue quality for the period from January to December 2018

Ash Composition (TOC/LOI)			
	LOI (%)	% Carbon (TOC) <sup>w/w</sup>	
Bottom Ash	<0.1%	<0.2%	

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

Ash Composition - Metals													
	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
Bottom Ash	To be tested												
Fly ash	Combine d with APC residues												
APC residues	To be tested												
Other solid residues													

Ash composition dioxins and dioxin-like PCBs				
	DIOXIN I-TEQ ng/kg	DIOXIN WHO-TEQ ng/kg		DIOXIN-LIKE PCBs ng/kg
		Humans / mammals	Birds	Fish

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Bottom ash	To be tested				
Fly ash					
APC residues	To be tested				
Other solid residues					



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Permit Number : EPR/SP3638KV/006

Operator : Twinwoods Heat and Power Limited

Facility : Twinwoods Co-incinerator

Form Number : Residues 2 / 30/11/2018

### Reporting of Ash Solubility for the period from January to December 2018

Ash solubility – total soluble fractions	
	Total soluble fraction %
Bottom ash	
Fly ash	
APC residues	
Other solid residues	

Ash Solubility - Metals													
	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
<b>Bottom ash</b>													
Test 1	<0.01	<0.01	Not tested	<0.005	0.067	<0.05	0.075	Not tested	<0.05	<0.05	Not tested	Not tested	4.2
Test 2	0.022	<0.01		<0.005	0.12	<0.05	<0.05		<0.05	<0.05			<0.5
Test 3	<0.01	<0.01		<0.005	0.053	<0.05	<0.05		<0.05	<0.05			<0.5
Test 4	<0.01	<0.01		<0.005	0.049	<0.05	<0.05		<0.05	<0.05			0.68
Test 5	<0.01	<0.01		<0.005	0.33	0.54	<0.05		<0.05	<0.05			1.5
Test 6	37	<0.46		<0.005	130	16	27		0.2	220			55
Test 7	<0.01	<0.01		<0.005	0.012	0.16	<0.05		<0.05	<0.05			1.3
Fly ash													
APC residues													
Other solid residues													

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Facility : Twinwoods Co-incinerator

Form Number : performance 1 / 30/11/2018

**Reporting of other performance indicators for the period 2018**

Parameter	Result
Operating hours for the year	6,963 hours
Number of periods of abnormal operation	1
Cumulative hours of abnormal operation for this calendar year	2

Operator's comments : Sodium bicarbonate PLC failure due to 3 successive power outages from the electricity board.



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