



Dublin Waste to Energy Limited,  
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Mr James Nolan,  
Executive Engineer,  
Dublin City Council,  
Environment & Transportation Department,  
Block 1, Floor 6, Civic Offices,  
Fishamble Street,  
Dublin 8.

19<sup>th</sup> September 2017.

Re: Environment SPC Committee.

Dear James

I am in receipt of your questions from Mr Moss and Mr McCarthy of the SPC with regard to carbon usage forwarded in August and September.

Firstly, I intend to address the questions raised by Mr Moss in his email.

**How is the PAC dosage rate adjusted to remove varying levels of Dioxin (PCDD/F) and Mercury from the Flue Gas?**

*Dosage rates are based on in-depth chemical analysis of the absorption of the compounds by the activated carbon. Such research and analysis has been carried out by doctorate level scientists at multiple universities across the world. This research is coupled with the experience of Hitachi Zosen Inova (HZI) – the technology provider, and by Covanta's own experience and has resulted in the carbon dosage rate of 90 – 100 mg/Nm<sup>3</sup> being set. This is approximately twice the rate required to ensure the levels of dioxins and mercury remain within the emission limit values. This will be reviewed on a quarterly basis initially post in-stack sampling and analysis.*

**What happens to the saturated PAC (powdered activated carbon)?**

*This is collected as part of the flue gas treatment residue and is exported to Europe for recovery there.*

**Are wet scrubbers used at Poolbeg?**

*Yes. As previously outlined to the committee by Covanta and explained in detail by the CDM Smith document 'Report on Flue Gas Treatment System' dated March 2017, there are several different processes within the*

system including Selective Non-Catlytic Reaction System (SNCR), Semi-Dry Reactor, Fabric Filter Baghouse and finally the Wet Scrubber.

**What is the source of the PAC?**

*Firstly, please note the experiments referred to in a 'footnote' to the question were at a hazardous waste incinerator and not an MSW facility. The activated carbon used in DWtE is made of a random structure of graphite platelets, formed from carbonaceous materials such as coal. It is produced by high temperature steam activation giving it a very large surface area and porosity. The particular material used has a surface area (using the N<sub>2</sub>BET method) of 800 m<sup>2</sup>/g.*

Three main questions were raised by Mr McCarthy and I now address these questions.

**Steady rate, how much carbon will be used?**

*Firstly, the plant is still in the Testing & Commissioning Phase and is only now reaching a steady state to allow optimisation of emission levels. That being said, the carbon usage for each line will be the same and the dosage rate is planned at 90 – 100 mg/Nm<sup>3</sup> for each line. Current normal practice within the industry is for carbon volumes used to be calculated as the concentration in the volumetric flow in the exhaust gasses and not based on per tonne of MSW processed.*

**How much carbon has been used so far?**

28,780 Kg.

**What is the percentage recirculation?**

*The current dosage rate mentioned above (90 – 100 mg/Nm<sup>3</sup> for each line) are for 'fresh feed' in and therefore does not take into account any material recirculated. Therefore the quantity recirculated is an adjunct to the amount of fresh carbon continuously dosed to enable emission limit values to be met. The quantity recirculated is based on the differential pressure determination across the filters in the baghouse and current recirculation rates are between 80 – 90%.*

Hoping that our comments and responses will be to the satisfaction of the Committee. Finally, I attach a spreadsheet of the EPA emission limit values performance on the two lines to date since Testing & Commissioning resumption in mid-July, and covering the period of turbine synchronisation and Eirgrid Code testing. These figures have been posted to the Covanta Dublin website on a weekly basis together with daily real-time figures on the half hour for furnace temperatures.

**Yours sincerely,**



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**John Daly**  
**General Manager**  
**Dublin Waste to Energy Limited**

### Commissioning & Testing Update

Stable\* Operations has been defined as operating satisfactorily for at least 90% of the 24 hour day and without auxiliary oil burners

		BOILER ONE										
Week No	Day	Date	Stable* Operations	Non-stable Operations	Not Operating	Maximum Continuous Rating	HCL Max 10 mg/Nm3	SO2 Max 50 mg/Nm3	CO Max 50 mg/Nm3	Nox Max 200 mg/Nm3	TOC Max 10 mg/Nm3	Dust Max 10 mg/Nm3
28	Mon	10-Jul			✓	0.0%	x	x	x	x	x	x
	Tues	11-Jul			✓	0.0%	x	x	x	x	x	x
	Wed	12-Jul			✓	0.0%	x	x	x	x	x	x
	Thurs	13-Jul			✓	0.0%	x	x	x	x	x	x
	Fri	14-Jul		✓		49.6%	0.00	7.08	55.99	159.43	10.81	3.82
	Sat	15-Jul			✓	0.0%	0.00	7.93	25.91	142.94	6.66	3.27
	Sun	16-Jul		✓		89.6%	0.00	10.32	5.77	131.54	2.78	3.24
29	Mon	17-Jul		✓		96.8%	0.00	9.86	2.25	149.60	1.45	3.47
	Tues	18-Jul		✓		92.2%	0.00	5.87	2.30	153.52	1.03	3.79
	Wed	19-Jul		✓		85.2%	0.01	4.33	2.83	156.60	0.76	3.99
	Thurs	20-Jul		✓		47.0%	0.00	3.78	4.05	147.47	0.61	4.38
	Fri	21-Jul			✓	0.0%	x	x	x	x	x	x
	Sat	22-Jul			✓	0.0%	x	x	x	x	x	x
	Sun	23-Jul		✓		84.8%	x	x	x	x	x	x
30	Mon	24-Jul		✓		77.8%	0.00	3.20	3.09	145.55	0.80	2.82
	Tues	25-Jul		✓		87.8%	0.00	3.60	3.34	155.31	0.39	2.99
	Wed	26-Jul		✓		79.8%	0.00	4.55	2.59	146.77	0.28	3.49
	Thurs	27-Jul		✓		85.6%	0.00	5.29	2.84	147.77	0.23	3.82
	Fri	28-Jul		✓		90.5%	0.00	3.95	2.33	162.58	0.21	4.18
	Sat	29-Jul			✓	18.3%	0.00	0.00	0.00	0.00	0.00	0.00
	Sun	30-Jul		✓		0.0%	x	x	x	x	x	x
31	Mon	31-Jul			✓	0.0%	x	x	x	x	x	x
	Tues	01-Aug			✓	0.0%	x	x	x	x	x	x
	Wed	02-Aug			✓	0.0%	x	x	x	x	x	x
	Thurs	03-Aug			✓	0.0%	x	x	x	x	x	x
	Fri	04-Aug			✓	0.0%	x	x	x	x	x	x
	Sat	05-Aug			✓	0.0%	x	x	x	x	x	x
	Sun	06-Aug			✓	0.0%	x	x	x	x	x	x
32	Mon	07-Aug			✓	89.7%	0.00	1.87	4.99	156.88	0.40	3.80
	Tues	08-Aug			✓	95.8%	0.00	2.58	1.89	162.83	0.10	2.89
	Wed	09-Aug			✓	81.6%	0.00	2.63	2.23	159.43	0.12	2.18
	Thurs	10-Aug			✓	82.4%	0.00	3.94	1.93	159.89	0.00	1.72
	Fri	11-Aug			✓	88.0%	0.00	3.85	2.37	159.81	0.00	1.64
	Sat	12-Aug			✓	83.2%	0.00	3.27	2.47	159.94	0.00	1.06
	Sun	13-Aug			✓	84.3%	0.00	3.39	1.53	159.65	0.00	0.89
33	Mon	14-Aug			✓	80.9%	0.01	2.21	1.60	160.47	0.01	0.66
	Tues	15-Aug			✓	84.1%	0.01	3.03	1.76	159.25	0.01	0.58
	Wed	16-Aug			✓	82.4%	0.00	2.88	1.50	158.77	0.00	0.58
	Thurs	17-Aug			✓	80.5%	0.00	6.70	1.27	160.11	0.00	0.61
	Fri	18-Aug			✓	83.7%	0.00	4.67	1.45	157.58	0.00	0.63
	Sat	19-Aug			✓	84.1%	0.00	4.02	0.89	160.06	0.00	0.58
	Sun	20-Aug			✓	84.0%	0.00	3.52	0.89	158.86	0.00	0.52
34	Mon	21-Aug			✓	83.8%	0.00	3.50	0.87	160.50	0.02	0.89
	Tues	22-Aug			✓	83.6%	0.00	4.33	0.90	159.95	0.00	0.51
	Wed	23-Aug			✓	80.5%	0.00	4.30	7.02	161.49	3.21	0.61
	Thurs	24-Aug			✓	81.9%	0.00	3.09	1.08	160.63	0.02	0.56
	Fri	25-Aug			✓	98.8%	0.03	2.73	2.59	156.74	0.01	0.71
	Sat	26-Aug			✓	78.6%	0.00	4.30	1.29	160.05	0.14	0.66
	Sun	27-Aug			✓	79.2%	0.00	5.49	0.78	163.43	0.01	0.56
35	Mon	28-Aug			✓	77.2%	0.00	4.87	0.68	164.25	0.01	0.61
	Tues	29-Aug			✓	84.4%	0.01	3.09	7.08	166.70	0.21	0.70
	Wed	30-Aug			✓	76.4%	0.01	3.17	1.29	147.46	0.07	0.57
	Thurs	31-Aug			✓	85.3%	0.02	4.42	1.09	167.17	0.04	0.61
	Fri	01-Sep			✓	90.0%	0.00	4.01	1.28	174.71	0.04	0.63
	Sat	02-Sep			✓	96.5%	0.00	4.59	1.71	157.54	0.04	0.66
	Sun	03-Sep			✓	95.0%	0.00	3.05	1.16	150.66	0.09	0.84
36	Mon	04-Sep			✓	98.0%	0.00	3.40	0.91	164.92	0.11	1.00
	Tues	05-Sep			✓	91.4%	0.00	3.93	2.18	166.62	0.14	0.87
	Wed	06-Sep			✓	80.4%	0.00	5.13	240.54	190.20	21.48	1.45
	Thurs	07-Sep			✓	77.1%	0.00	2.88	22.51	157.69	0.94	0.80
	Fri	08-Sep			✓	88.9%	0.00	4.75	1.54	156.05	0.06	0.74
	Sat	09-Sep			✓	88.3%	0.00	5.00	2.37	152.80	0.04	0.65
	Sun	10-Sep			✓	95.9%	0.00	3.76	1.83	155.14	0.04	0.70

		BOILER TWO										
Week No	Day	Date	Stable* Operations	Non-stable Operations	Not Operating	Maximum Continuous Rating	HCL Max 10 mg/Nm3	SO2 Max 50 mg/Nm3	CO Max 50 mg/Nm3	Nox Max 200 mg/Nm3	TOC Max 10 mg/Nm3	Dust Max 10 mg/Nm3
	Mon	10-Jul			✓	0.0%	x	x	x	x	x	x
	Tues	11-Jul			✓	0.0%	x	x	x	x	x	x
	Wed	12-Jul			✓	0.0%	x	x	x	x	x	x
	Thurs	13-Jul			✓	0.0%	x	x	x	x	x	x
	Fri	14-Jul		✓		49.6%	0.00	7.08	55.99	159.43	10.81	3.82
	Sat	15-Jul			✓	0.0%	x	x	x	x	x	x
	Sun	16-Jul		✓		89.6%	0.00	10.32	5.77	131.54	2.78	3.24
	Mon	17-Jul			✓	0.0%	x	x	x	x	x	x
	Tues	18-Jul			✓	0.0%	x	x	x	x	x	x
	Wed	19-Jul			✓	0.0%	x	x	x	x	x	x
	Thurs	20-Jul			✓	0.0%	x	x	x	x	x	x
	Fri	21-Jul			✓	0.0%	x	x	x	x	x	x
	Sat	22-Jul			✓	54.4%	0.01	3.78	89.39	150.56	6.55	2.02
	Sun	23-Jul			✓	0.0%	x	x	x	x	x	x
	Mon	24-Jul			✓	0.0%	x	x	x	x	x	x
	Tues	25-Jul			✓	0.0%	x	x	x	x	x	x
	Wed	26-Jul			✓	0.0%	x	x	x	x	x	x
	Thurs	27-Jul			✓	0.0%	x	x	x	x	x	x
	Fri	28-Jul			✓	0.0%	x	x	x	x	x	x
	Sat	29-Jul			✓	33.6%	x	x	x	x	x	x
	Sun	30-Jul			✓	81.6%	0.03	4.12	5.23	155.07	0.45	1.86
	Mon	31-Jul			✓	52.2%	0.12	3.06	30.60	137.42	0.81	3.66
	Tues	01-Aug			✓	91.1%	0.08	6.68	319.72	163.05	40.62	4.51
	Wed	02-Aug			✓	88.0%	0.01	5.10	3.58	150.95	0.07	2.98
	Thurs	03-Aug			✓	88.8%	0.03	4.78	3.45	148.80	0.02	3.13
	Fri	04-Aug			✓	98.4%	0.02	4.20	2.97	153.43	0.00	4.29
	Sat	05-Aug			✓	96.8%	0.04	3.63	1.92	155.27	0.00	4.37
	Sun	06-Aug			✓	101.6%	0.03	3.82	7.28	158.80	0.03	3.15
	Mon	07-Aug			✓	81.4%	0.00	3.06	3.93	154.52	0.00	3.60
	Tues	08-Aug			✓	95.9%	0.00	3.82	7.28	158.80	0.00	3.15
	Wed	09-Aug			✓	93.2%	0.00	3.25	2.91	145.69	0.00	2.75
	Thurs	10-Aug			✓	79.6%	0.00	3.04	0.93	156.28	0.00	1.62
	Fri	11-Aug			✓	83.6%	0.00	3.63	1.04	159.33	0.00	1.15
	Sat	12-Aug			✓	83.2%	0.00	4.05	1.38	159.55	0.00	0.94
	Sun	13-Aug			✓	83.8%	0.00	4.37	45.25	160.90	2.13	0.83
	Mon	14-Aug			✓	81.3%	0.03	3.60	0.79	158.48	0.01	0.70
	Tues	15-Aug			✓	84.0%	0.04	3.99	1.39	158.81	0.00	0.69
	Wed	16-Aug			✓	82.4%	0.04	4.29	1.17	157.45	0.00	0.65
	Thurs	17-Aug			✓	83.0%	0.04	13.86	1.25	159.21	0.00	1.03
	Fri	18-Aug			✓	84.1%	0.03	5.91	0.63	159.48	0.00	1.58
	Sat	19-Aug			✓	84.2%	0.01	5.44	0.52	160.34	0.00	1.04
	Sun	20-Aug			✓	83.9%	0.01	4.36	0.40	159.17	0.00	0.74
	Mon	21-Aug			✓	83.9%	0.02	3.84	0.34	159.63	0.02	0.62
	Tues	22-Aug			✓	81.6%	0.03	4.30	0.48	159.36	0.00	0.63
	Wed	23-Aug			✓	75.2%	0.03	4.47	10.30	144.89	0.18	0.65
	Thurs	24-Aug			✓	78.5%	0.03	4.17	0.51	157.14	0.04	0.52
	Fri	25-Aug			✓	91.6%	0.02	4.79	3.03	149.98	0.00	0.61
	Sat	26-Aug			✓	69.0%	0.02	4.07	3.75	152.16	0.08	0.72
	Sun	27-Aug			✓	81.6%	0.02	4.41	0.38	157.72	0.00	0.61
	Mon	28-Aug			✓	78.5%	0.01	4.75	0.95	155.11	0.00	0.58
	Tues	29-Aug			✓	85.7%	0.01	4.62	0.65	159.48	0.00	0.65
	Wed	30-Aug			✓	77.9%	0.02	4.28	1.01	144.17	0.00	0.53
	Thurs	31-Aug			✓	87.2%	0.01	4.07	0.73	161.67	0.00	0.82
	Fri	01-Sep			✓	90.4%	0.04	5.13	0.60	170.70	0.00	0.91
	Sat	02-Sep			✓	95.5%	0.02	4.88	1.38	154.29	0.02	0.66
	Sun	03-Sep			✓	95.2%	0.03	3.75	3.86	141.35	0.15	0.76
	Mon	04-Sep			✓	97.6%	0.03	4.38	0.43	162.62	0.01	1.38
	Tues	05-Sep			✓	91.2%	0.05	3.76	0.52	165.98	0.01	1.15
	Wed	06-Sep			✓	80.4%	0.04	3.19	241.00	176.18	17.54	1.66
	Thurs	07-Sep			✓	80.8%	0.03	4.11	40.03	153.28	1.51	0.85
	Fri	08-Sep			✓	86.4%	0.02					