

AWRP Response to dioxins exceedance H2 stack emission (23 to 28 September 2024).

Investigation information required:

1. Continuous Emission Monitoring (CEM) data for all half-hourly average results for the 24 hours prior to, during and after the dioxin spot sampling.

Combustion temperature information in terms of a trend also.

Where available gas flow data including moisture, hydrogen chloride, VOC, carbon monoxide and oxygen measurements to enable any referencing calculations to be verified

- WID Report Attached – [September to October 2024](#)

2. The operational status of the incinerator for a period of seven days prior to sampling. This must include the date and time of any startup / shutdowns.

- Midnight reading – Sampling date 23rd to 28 Sept 24 – [Operational data attached](#)
- STL log / Midnight Reading

No	Date	Problem Encountered 7 Days before Sampling	WID Report
1	16 Sep 24	L1 Full load except during soot blowing (High CV >13000, L2 Off due to Lime pipework blockage.	L1 ON L2 OFF
2	17 Sep 24	L1 Full load except during soot blowing (High CV >13000, L2 put back into service at 11:00	L1 ON L2 ON
3	18 Sep 24	L1 Full load except during soot blowing (High CV >13000.	L1 ON L2 ON
4	19 Sep 24	L1 full load except during soot blowing. 22 Load Reductions in 24h, all due to Bag House Filter - BHF high diff pressure, which cause combustion & emissions issues. L2 60t/h due to APCr PCV 24700 unavailable. Turbine on pressure governor, ACC high pressure & sub-cooling, impacting Turbine MW. Towns Water usage high due to Demin Plant in parallel mode. Incoming towns water supply sometimes unable to keep up.	L1 ON L2 ON
5	20 Sep 24	L1 at 62.5 unless soot blowing then 60T with BHF pressure Diff. Lr 60 with APCr limitation at 24700.	L1 ON L2 ON
6	21 Sep 24	EFW Air Dryer Smoke/Sparks / Fire Alarm meant all air systems off resulting in loss of both lines and turbine	L1 ON L2 ON
7	22 Sep 24	recharging air systems, controlling water systems, precoating line 1&2 for return to service. Line 1 tripping on High BHF Diffs Line to warming up to be on waste at 03:23 23/09/24	L1 OFF L2 OFF
No	Date	Problem Encountered During Sampling	
1	23 Sep 24	L1 warming, Line 2 at 55t/h	L1 OFF L2 ON
2	24 Sep 24	L1 at Full load except during soot blowing, L2 at 58 due to temps and APCr PCV	L1 ON L2 ON
3	25 Sep 24	No issues L1 and L2 Both ON	L1 ON L2 ON
4	26 Sep 24	Ram feeder blockage L2. L2 on for 30 mins only in the day	L1 ON L2 ON
5	27 Sep 24	L1 Load reductions BHF Diffs, L2 off	L1 ON

			L2 OFF
6	28 Sep 24	L1 Load reductions BHF Diffs, L2 off	L1 ON L2 OFF
No	Date	Problem Encountered 7 Days after Sampling	
1	29 Sep 24	L1 Poor Combustion 19:30 onwards multiple uncontrollable CO Breaches, Smoke from feeders, decided to come off waste to inspect furnace. L2 off for feeder blockage - Altrad onsite to clear but struggling to clear with inadequate tooling. Turbine offload at 23:45 due to low steam temps and Steam flow as both lines off	L1 ON L2 OFF
2	30 Sep 24	L1 cooled down, ready for isolations for grate inspection and clearing. L2 off to clear blockage in the Feeder letterbox & Roller 1 area. Work ongoing during day and night shifts.	L1 OFF L2 OFF
3	01 Oct 24	L1 and L2 off with Waste / Clinker blockages	L1 OFF L2 OFF
4	02 Oct 24	L1 and L2 off with Waste / Clinker blockages	L1 OFF L2 OFF
5	03 Oct 24	L1 and L2 off with Waste / Clinker blockages,	L1 ON L2 OFF
6	04 Oct 24	L1 work complete, de-isolated, precoating completed, warming up from 18:12. L2 off with waste blockage.	L1 ON L2 OFF
7	05 Oct 24	L1 on waste at 07:00. LHV ranging from 13,000 to 4,000 - combustion difficult to control. Unburnt coming off roller 6. L2 off with waste blockage. Turbine on at 11:36.	L1 ON L2 OFF

- Plant encountered issues prior, during and after the sampling dates. see details above.

3. A summary of the dates and times that the incinerator was operational since the last compliant result

- H1 2024 was carried out in 18th to 28th March 24 – [Operational data attached](#)

4. Details of the total cumulative time the incinerator was operational since the last compliant result. An estimation of the dioxin mass release based on the number of operational hours assuming the elevated emission result should be calculated

- Total cumulative time operational since – 18th to 28th March 24

Total cumulative time operational since – 18th to 28th March 24 to 23 Sep 24			
No	Lines	Operational (Hrs)	Non-Operational (hrs)
1	Line 1	8578.75	2101.25
2	Line 2	8212.21	2467.79

- Estimation of the dioxin mass release based on operational Hours since 28 Mar 24– Midnight Reading.

Estimation of the dioxin mass release based on operational Hours since 28 Mar 24					
No	Lines	Operational (Hrs)	Dioxin Limit (0.06ng/m ³)	Dioxin Exceedance (ng/m ³)	Estimation of the dioxin mass release (ng/m ³)/operation Hours
			Dioxin Test result		

1	Line 1	8578.75	0.6295ng/m3	0.57	6.6385E-05
2	Line 2	8212.21	0.1036ng/m3	0.04	5.30917E-06

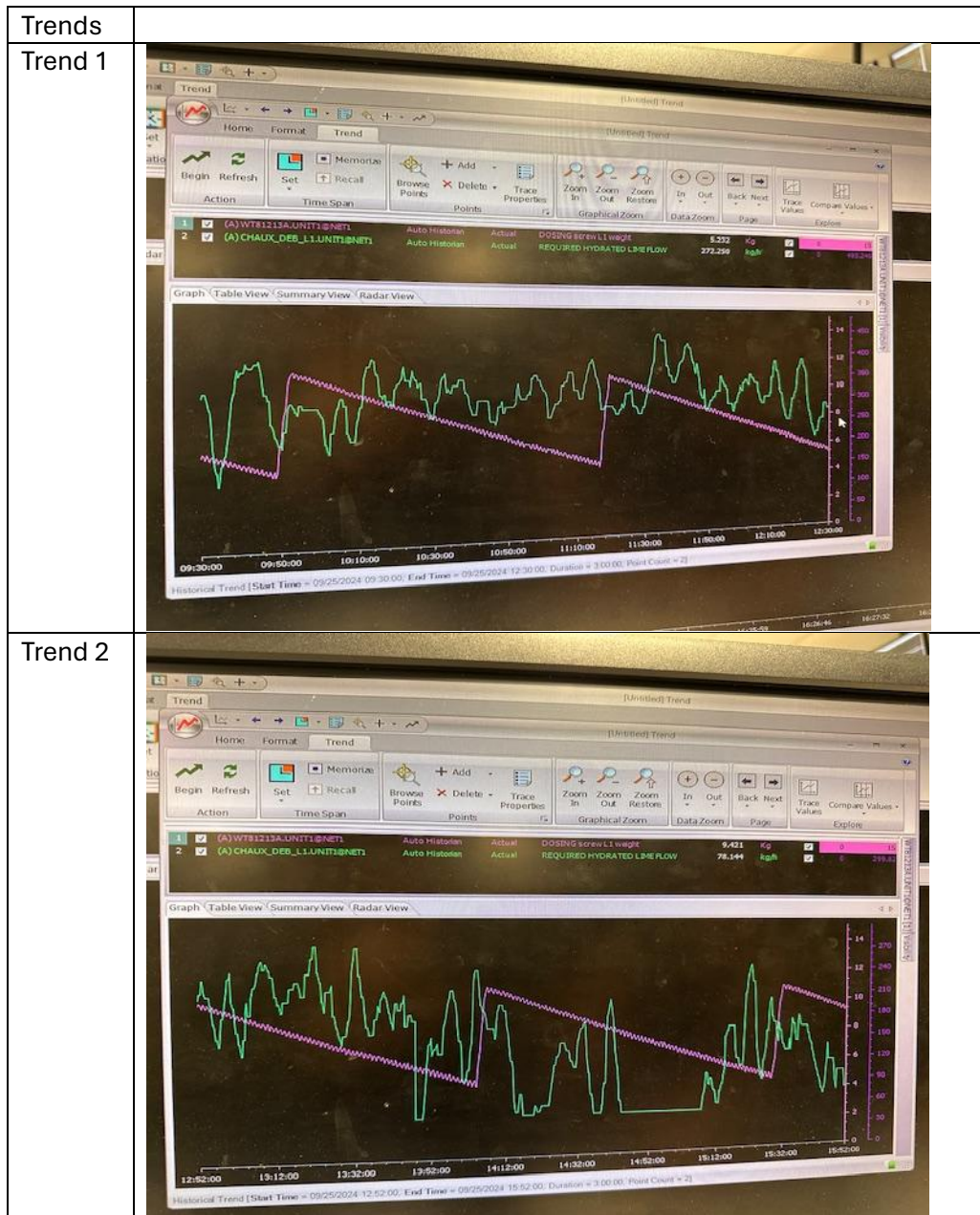
5. Evidence of the operational status of abatement equipment during the time of spot sampling e.g. carbon / lime abatement

- **AWRP Abatement Equipment performance** during the time of spot sampling – Incident under investigation to follow the Part B of the schedule 5 report submitted to the Environment Agency Site Regulator – [REDACTED]
- **Trend** – of our Carbon and Lime dosing within the sampling period – Dioxin and Furans – 24 and 25 Sept 24.

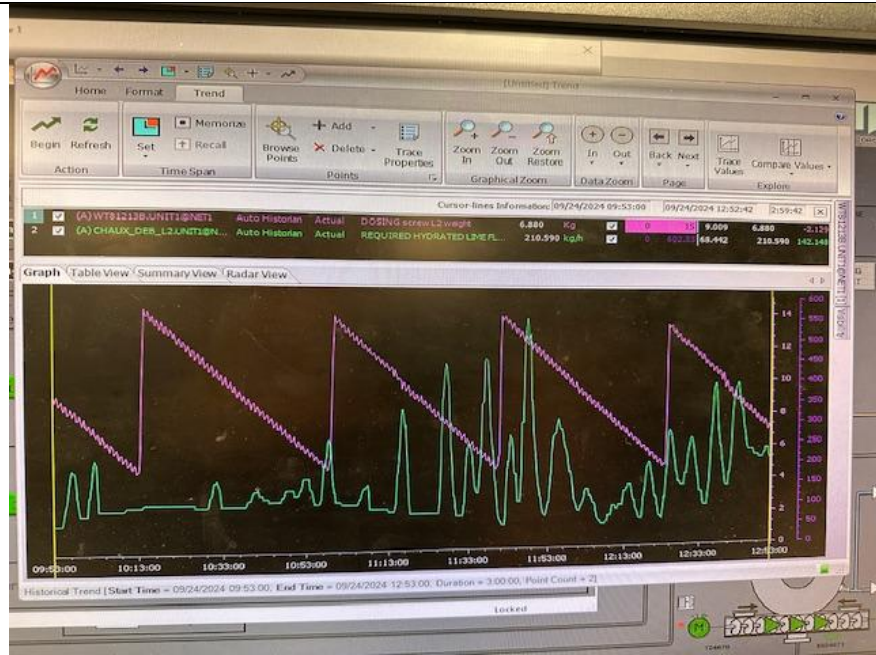
	Sampling Time	Duration (Mins)
Line 1: Dioxin and Furans – 25 Sep 24	9:37 - 12:37, 12:52 - 15:52	360
Line 1 25/09/24 09:30 - 2:30 Carbon Usage 12.6kg - Lime usage (average per hour) 307.92kg/h Line 1 25/09/24 12:52 - 15:52 Carbon usage 11.7kg - Lime usage (average per hour) 142.2kg/h		
Line 2: Dioxin and Furans - 24 Sep 24:	09:53 - 12:53, 13:04 - 16:04	360
Line 2 24/09/24 09:53 - 12:53 Carbon usage 37kg - Lime usage (average per hour) 157.1kg/h Line 2 24/09/24 13:04 - 16:04 carbon usage 37.1kg - Lime usage (average per hour) 159kg/h		

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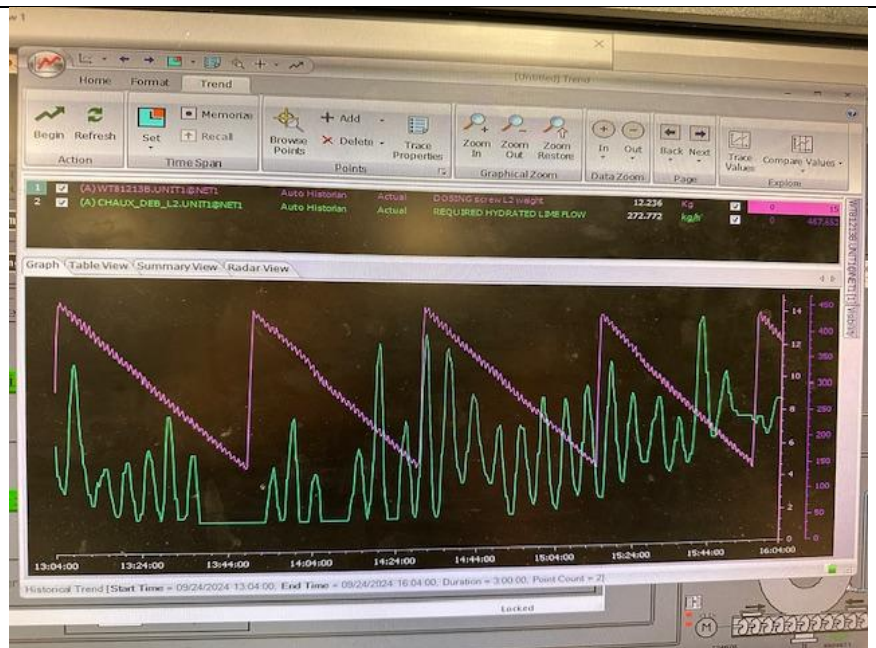
- There is no way to directly pull the figure for the amounts dosed at these times. Lime usage was taken at an average over the 3-hour periods.



Trend 3



Trend 4





Executive Summary

(Page 4 of 8)



MONITORING DATE(S) & TIMES

Thalia Waste Management, Knaresborough

A2 - Line 1

23rd - 26th September 2024

Parameter	Units	Concentration	Units	Mass Emission	Sampling Date(s)	Sampling Times	Duration mins
Cadmium & Thallium	R1 mg/m³	0.00092	g/hr	0.11	26/09/2024	9:17 - 9:47, 10:00 - 10:30	60
Cadmium & Thallium	R2 mg/m³	0.00097	g/hr	0.11	26/09/2024	10:45 - 11:15, 11:30 - 12:00	60
Cadmium & Thallium	R3 mg/m³	0.0012	g/hr	0.10	26/09/2024	12:20 - 12:50, 13:10 - 13:40	60
Heavy Metals	R1 mg/m³	0.043	g/hr	5.2	26/09/2024	9:17 - 9:47, 10:00 - 10:30	60
Heavy Metals	R2 mg/m³	0.063	g/hr	6.9	26/09/2024	10:45 - 11:15, 11:30 - 12:00	60
Heavy Metals	R3 mg/m³	0.093	g/hr	8.3	26/09/2024	12:20 - 12:50, 13:10 - 13:40	60
Mercury	R1 mg/m³	0.00057	g/hr	0.067	26/09/2024	9:20 - 9:50, 9:55 - 10:25	60
Mercury	R2 mg/m³	0.00055	g/hr	0.062	26/09/2024	10:49 - 11:19, 11:25 - 11:55	60
Mercury	R3 mg/m³	0.00053	g/hr	0.048	26/09/2024	12:25 - 12:55, 13:05 - 13:35	60
Dioxins & Furans (NATO)	R1 ng/m³	0.6295	µg/hr	74.8	25/09/2024	9:37 - 12:37, 12:52 - 15:52	360
Brominated Dioxins & Furans (NATO)	R1 ng/m³	0.0075	µg/hr	0.89	25/09/2024	9:37 - 12:37, 12:52 - 15:52	360
PCBs	R1 ng/m³	0.0344	µg/hr	4.1	25/09/2024	9:37 - 12:37, 12:52 - 15:52	360
PAHs (DEFRA 16)	R1 µg/m³	0.69	g/hr	0.080	25/09/2024	9:40 - 12:40, 12:50 - 15:50	360
Oxygen	R1 % v/v	9.3			25/09/2024	9:37 - 15:52	360
Oxygen	R2 % v/v	9.4			25/09/2024	9:17 - 13:40	360
Velocity Traverse	R1				24/09/2024	15:30 - 15:47	

All results are expressed at the respective reference conditions.



Executive Summary

(Page 4 of 8)



MONITORING DATE(S) & TIMES

Thalia Waste Management, Knaresborough

A3 - Line 2

23rd - 26th September 2024

Parameter	Units	Concentration	Units	Mass Emission	Sampling Date(s)	Sampling Times	Duration mins
Cadmium & Thallium	R1 mg/m³	0.0010	g/hr	0.10	23/09/2024	12:55 - 13:25, 13:29 - 13:59	60
Cadmium & Thallium	R2 mg/m³	< 0.0010	g/hr	< 0.10	23/09/2024	14:10 - 14:40, 14:44 - 15:14	60
Cadmium & Thallium	R3 mg/m³	< 0.0010	g/hr	< 0.10	23/09/2024	15:23 - 15:53, 15:57 - 16:27	60
Heavy Metals	R1 mg/m³	0.024	g/hr	2.5	23/09/2024	12:55 - 13:25, 13:29 - 13:59	60
Heavy Metals	R2 mg/m³	0.064	g/hr	6.5	23/09/2024	14:10 - 14:40, 14:44 - 15:14	60
Heavy Metals	R3 mg/m³	0.024	g/hr	2.4	23/09/2024	15:23 - 15:53, 15:57 - 16:27	60
Mercury	R1 mg/m³	< 0.00023	g/hr	< 0.025	23/09/2024	13:05 - 13:35, 13:39 - 14:09	60
Mercury	R2 mg/m³	< 0.00022	g/hr	< 0.024	23/09/2024	14:10 - 14:40, 14:44 - 15:14	60
Mercury	R3 mg/m³	0.00027	g/hr	0.029	23/09/2024	15:23 - 15:53, 15:57 - 16:27	60
Dioxins & Furans (NATO)	R1 ng/m³	0.1036	µg/hr	12.4	24/09/2024	09:53 - 12:53, 13:04 - 16:04	360
Brominated Dioxins & Furans (NATO)	R1 ng/m³	0.0017	µg/hr	0.21	24/09/2024	09:53 - 12:53, 13:04 - 16:04	360
PCBs	R1 ng/m³	0.0089	µg/hr	1.1	24/09/2024	09:53 - 12:53, 13:04 - 16:04	360
PAHs (DEFRA 16)	R1 µg/m³	0.48	g/hr	0.061	24/09/2024	09:53 - 12:53, 13:04 - 16:04	360
Oxygen	R1 % v/v	9.0			23/09/2024	12:55 - 16:27	90
Oxygen	R2 % v/v	8.5			24/09/2024	09:53 - 16:04	360
Velocity Traverse	R1				23/09/2024	12:13 - 12:37	

All results are expressed at the respective reference conditions.

- **Element Monitoring Procedure for handling a high Dioxin Reading:** Just to confirm our procedure for handling a high dioxin reading:

Element Monitoring confirmed that their equipment and analysis was not compromised – verbal and email confirmation received from Element

First, we inform the client of the potential breach of the limit and then double-check the data against the blank sample. The blank has been exposed to the same conditions but without stack gas passing over it, allowing us to rule out any contamination caused by the equipment.

We then request the lab to check and rerun the sample to ensure that the results are replicable, and no error have occurred at this point. This includes a check on recovers from the spiked samples

At this point, we will contact you, issue a report confirming the exceedance, and give you the opportunity to investigate any process issues on your end.

Following that, I assume yourself will inform the controlling authority and arrange a retest without delay. I hope this clarifies our approach.

- provide information of any alterations or process change, known or unknown, suspected failures should be mentioned – [Details of plant issues captured above](#)

6. Details of any abnormal processing or trials that could have affected the composition of the waste feed – 23rd to 28th Sep 24. - [No Trial during the test period](#)

7. Any other information the operator considers relevant that may have led to, or caused, the breach of the permitted limit and / or affected the monitoring equipment.

Sampling period 23-28th Sept 24:

- Line 1 was in load reduction quite a lot due to BHF Diffs
- Line 2 was in load reduction quite a lot due to temps post evaporator bundle
- Line 2 was taken offline due to the large blockage in the letterbox

Quite an unstable operational period. In addition,

- 23rd September – UREA panel did go into fault; this was rectified and didn't see us exceed any daily / half-hourly ELV.
- The Carbon dosing standby system was brought into service as requested by EC&I (it says for testing) – Element was onsite.

8. Details of any planned additional dioxin monitoring

- Results of repeat testing conducted 7 and 8 November 2024 received and Dioxins and Furans within limit (0.06ng/m³) for line 1 and 2.
- External monitoring company – Element Materials Technology
- Quote Reference: EMT-QKG-534276v2

Stack monitoring retest conducted 7 and 8 November 24 L1 and L2. (Report date 6 Dec 24)		
No	Lines	Dioxin Limit (0.06ng/m ³)
		Dioxin Test result

1	Line 1	0.0133 ng/m3
2	Line 2	0.0089 ng/m3

9. Proposed communications plan.

- To be discussed with EA Site regulator during AWRP Visit – 20 No 24.
- The responses provided to the EA, 3rd parties not to be notified at this time.
- Further exceedances of Dioxin and Furans will require communication to 3rd parties

10. **Further Investigation and Lesson Learnt**

- Improvement in Communication during Stack testing.
- Understanding of the implications of sampling during an unstable plant operation
- Training of key persons to EN 14181 – CEMS Management