Annual Performance Report for: Equitix ESI CHP (Nottingham) Limited;
Widmerpool Biomass Power Plant

Permit Number: EPR/QP3936AX

Year: 2022

This report is required under the Industrial Emissions Directive's Article 55(2) requirements on reporting and public information on waste incineration plants and co-incineration plants, which require the operator to produce an annual report on the functioning and monitoring of the plant and make it available to the public.

1. Introduction

Name and address of plant	Widmerpool Biomass Power Plant Fosse Way Widmerpool Nottingham NG12 5PS
Description of waste input	Waste wood
Operator contact details if members of the public have any questions	Mr Gregor Carfrae Equitix ESI CHP (Nottingham) Ltd. Unit G1 Ash Tree Court Nottingham Business Park Nottingham NG8 6PY

2. Plant Description

The installation is located on the John Brook Sawmill (Waring Waste) site, adjacent to the A46 Fosse Way near Widmerpool, Nottinghamshire. The installation is surrounded on all sides by agricultural land. The nearest residential properties are a farmhouse situated approximately 200m to the south and west of the development site. There are a number of local wildlife sites within 2 km of the installation.

The biomass plant incinerates waste wood, using moving grate technology. There is one release point to air (A1) via a 37 m stack. Emissions released from this point will undergo the following gas abatement prior to discharge: -

- SNCR (Selective Non-Catalytic Reduction) for reduction of NOx (Oxides of Nitrogen) using urea,
- Acid Gas Abatement (injection of dry lime),
- Activated Carbon (injected upstream of the fabric filter) for metals and dioxins, and
- Advanced bag (fabric) filter for particulate matter (and air pollution control (APC) residues).

Effluent from the process (made up of boiler blowdown and effluent from the reverse osmosis system) will be treated on site then transferred to the surface water drainage system that drains to the Fairham Brook. There will also be a discharge of uncontaminated surface water from roofs, roadways and hardstanding areas.

The biomass plant is designed to generate 6.7 MW_e of electricity of which 5.7 MW_e will be available for export to the grid. In addition, the plant has the capability to provide 4.5 MW_{th} of process heat. The infrastructure to supply this process heat is installed, however it is currently not in operation. The installation will burn waste wood and is limited to 70,000 tonnes per year.

3. Summary of Plant Operation

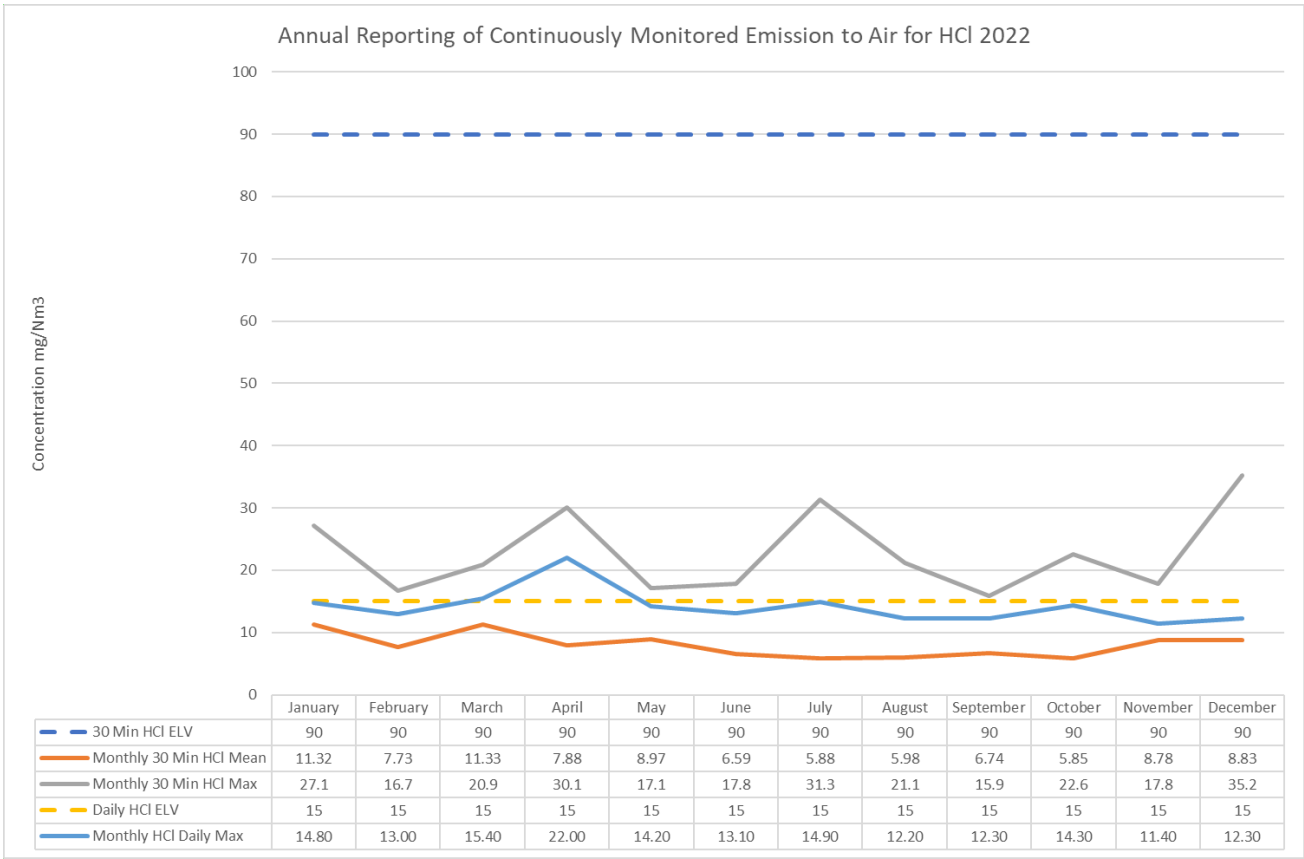
Waste wood (biomass) received	49,134.64 tonnes
Total waste received	49,134.64 tonnes
Total plant operational hours	6716.49 hours
Total hours of “abnormal operation” (see permit for definition)	0 hours
Total quantity of incinerator bottom ash (IBA) produced	2145.69 tonnes
Disposal or recovery route for IBA	Landfilled (D1)
Did any batches of IBA test as hazardous? If yes, state quantity	All (12 of 12 samples)
Total quantity of air pollution control (APC) residues produced	599.95 tonnes
Disposal or recovery route for APC residues	Landfilled (D1)
Total electricity generated for export to the National Grid	34,379.26 MWh

4. Summary of Plant Emissions

4.1 Summary of continuous emissions monitoring results for emissions to air

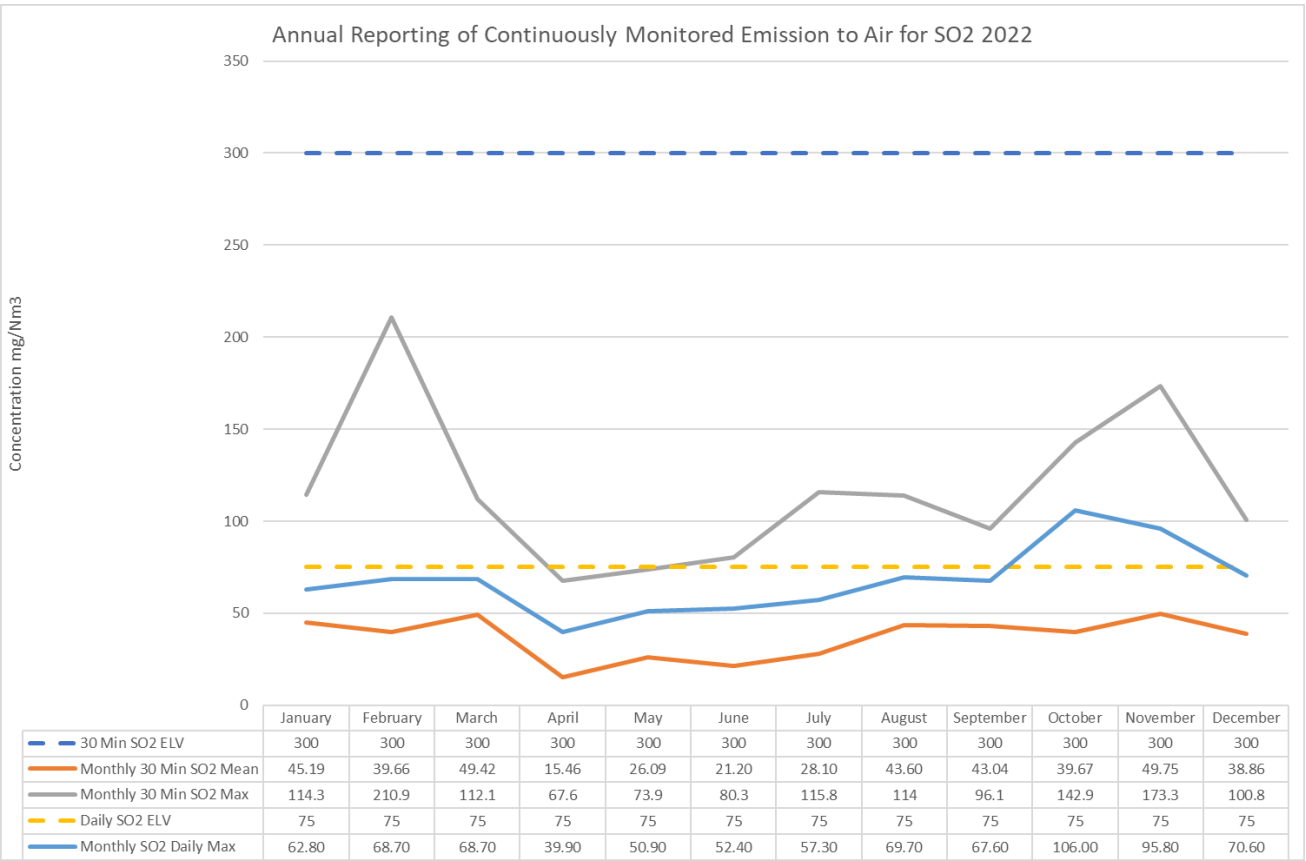
The following charts show the performance of the plant against its emission limit values (ELVs) for substances that are continuously monitored.

Line 1 - Hydrogen Chloride



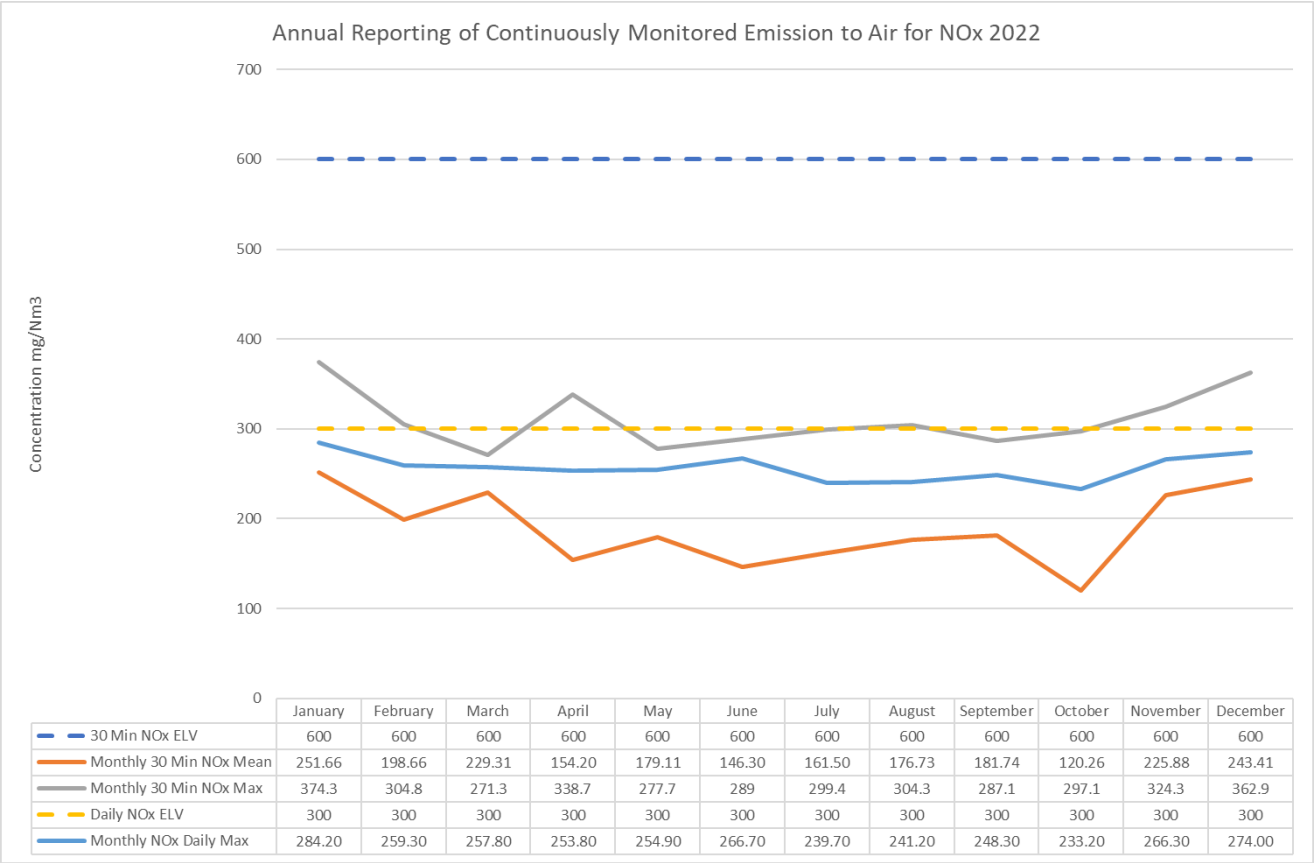
	January	February	March	April	May	June	July	August	September	October	November	December
30 Min HCl ELV	90	90	90	90	90	90	90	90	90	90	90	90
Monthly 30 Min HCl Mean	11.32	7.73	11.33	7.88	8.97	6.59	5.88	5.98	6.74	5.85	8.78	8.83
Monthly 30 Min HCl Max	27.1	16.7	20.9	30.1	17.1	17.8	31.3	21.1	15.9	22.6	17.8	35.2
Daily HCl ELV	15	15	15	15	15	15	15	15	15	15	15	15
Monthly HCl Daily Max	14.80	13.00	15.40	22.00	14.20	13.10	14.90	12.20	12.30	14.30	11.40	12.30

Line 1 – Sulphur Dioxide



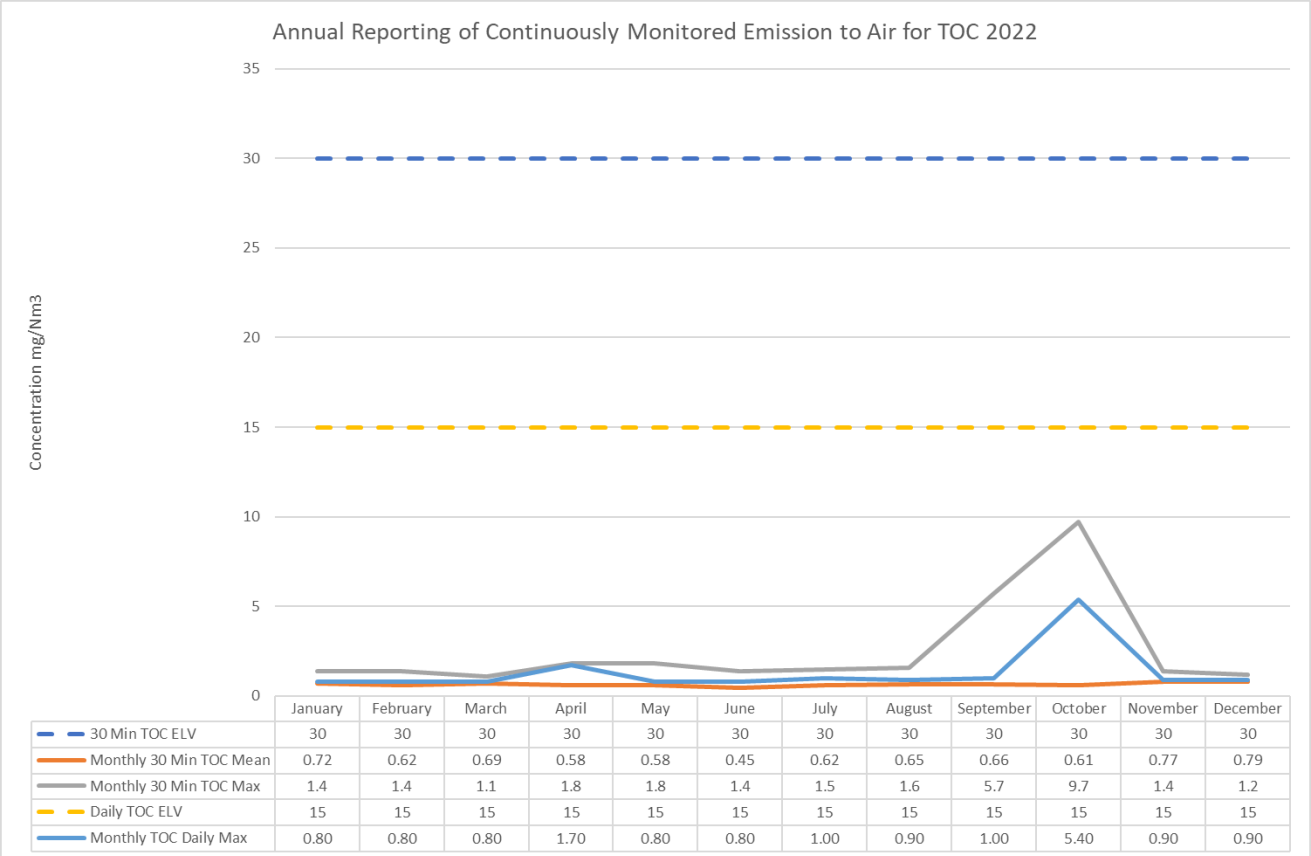
	January	February	March	April	May	June	July	August	September	October	November	December
30 Min SO2 ELV	300	300	300	300	300	300	300	300	300	300	300	300
Monthly 30 Min SO2 Mean	45.19	39.66	49.42	15.46	26.09	21.20	28.10	43.60	43.04	39.67	49.75	38.86
Monthly 30 Min SO2 Max	114.3	210.9	112.1	67.6	73.9	80.3	115.8	114	96.1	142.9	173.3	100.8
Daily SO2 ELV	75	75	75	75	75	75	75	75	75	75	75	75
Monthly SO2 Daily Max	62.80	68.70	68.70	39.90	50.90	52.40	57.30	69.70	67.60	106.00	95.80	70.60

Line 1 – Oxides of Nitrogen



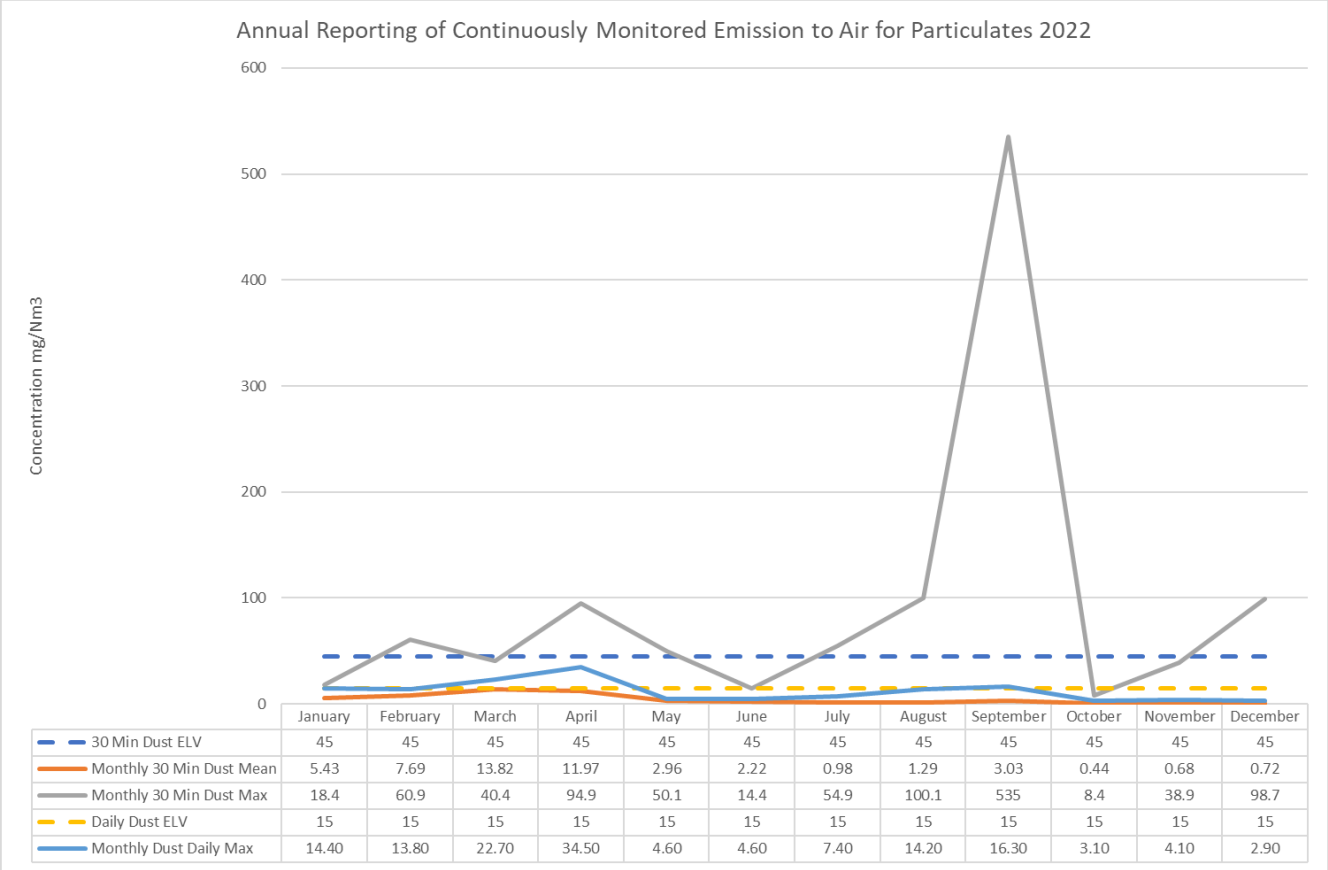
	January	February	March	April	May	June	July	August	September	October	November	December
30 Min NOx ELV	600	600	600	600	600	600	600	600	600	600	600	600
Monthly 30 Min NOx Mean	251.66	198.66	229.31	154.20	179.11	146.30	161.50	176.73	181.74	120.26	225.88	243.41
Monthly 30 Min NOx Max	374.3	304.8	271.3	338.7	277.7	289	299.4	304.3	287.1	297.1	324.3	362.9
Daily NOx ELV	300	300	300	300	300	300	300	300	300	300	300	300
Monthly NOx Daily Max	284.20	259.30	257.80	253.80	254.90	266.70	239.70	241.20	248.30	233.20	266.30	274.00

Line 1 – Total Organic Carbon



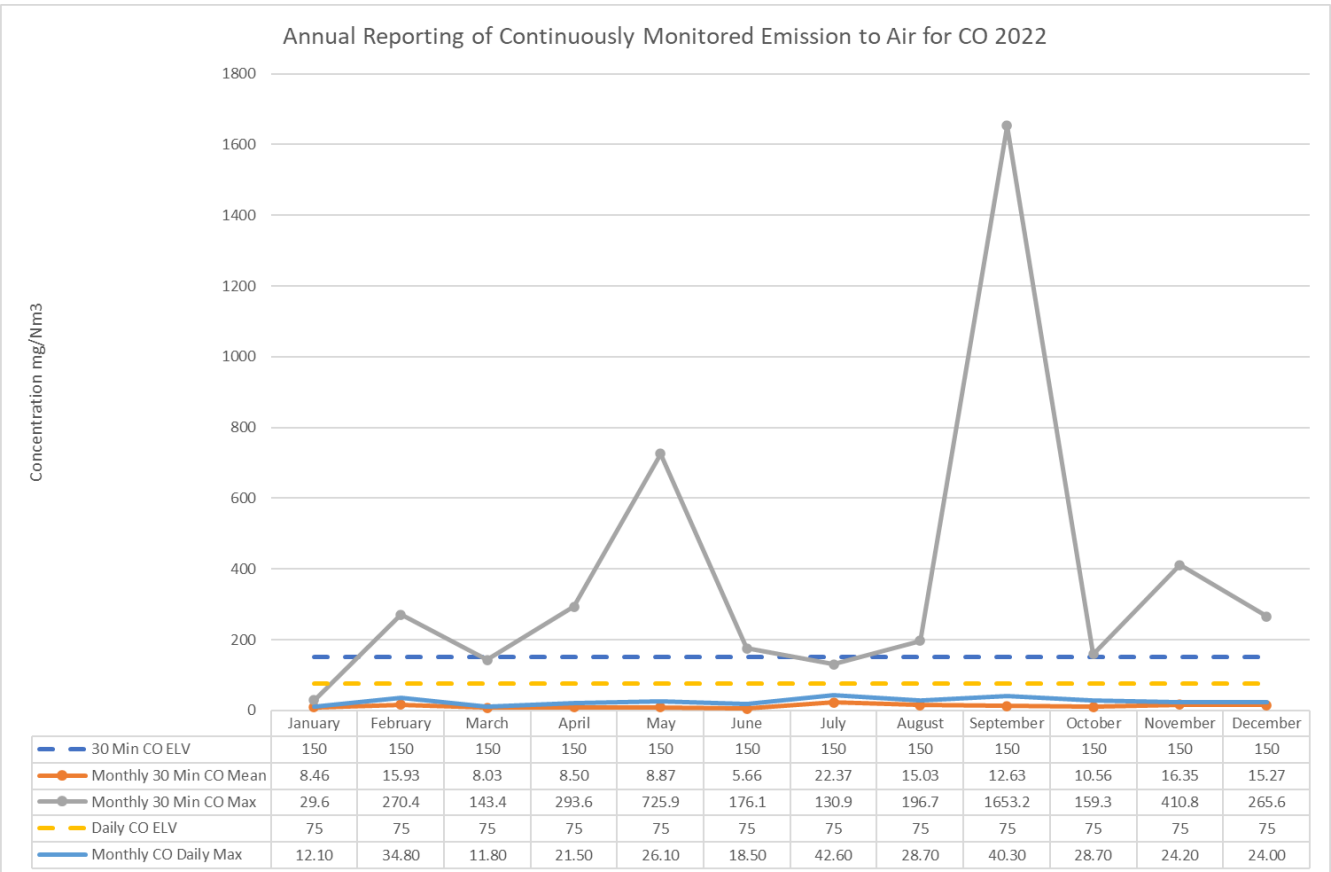
	January	February	March	April	May	June	July	August	September	October	November	December
30 Min TOC ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 30 Min TOC Mean	0.72	0.62	0.69	0.58	0.58	0.45	0.62	0.65	0.66	0.61	0.77	0.79
Monthly 30 Min TOC Max	1.4	1.4	1.1	1.8	1.8	1.4	1.5	1.6	5.7	9.7	1.4	1.2
Daily TOC ELV	15	15	15	15	15	15	15	15	15	15	15	15
Monthly TOC Daily Max	0.80	0.80	0.80	1.70	0.80	0.80	1.00	0.90	1.00	5.40	0.90	0.90

Line 1 – Particulates



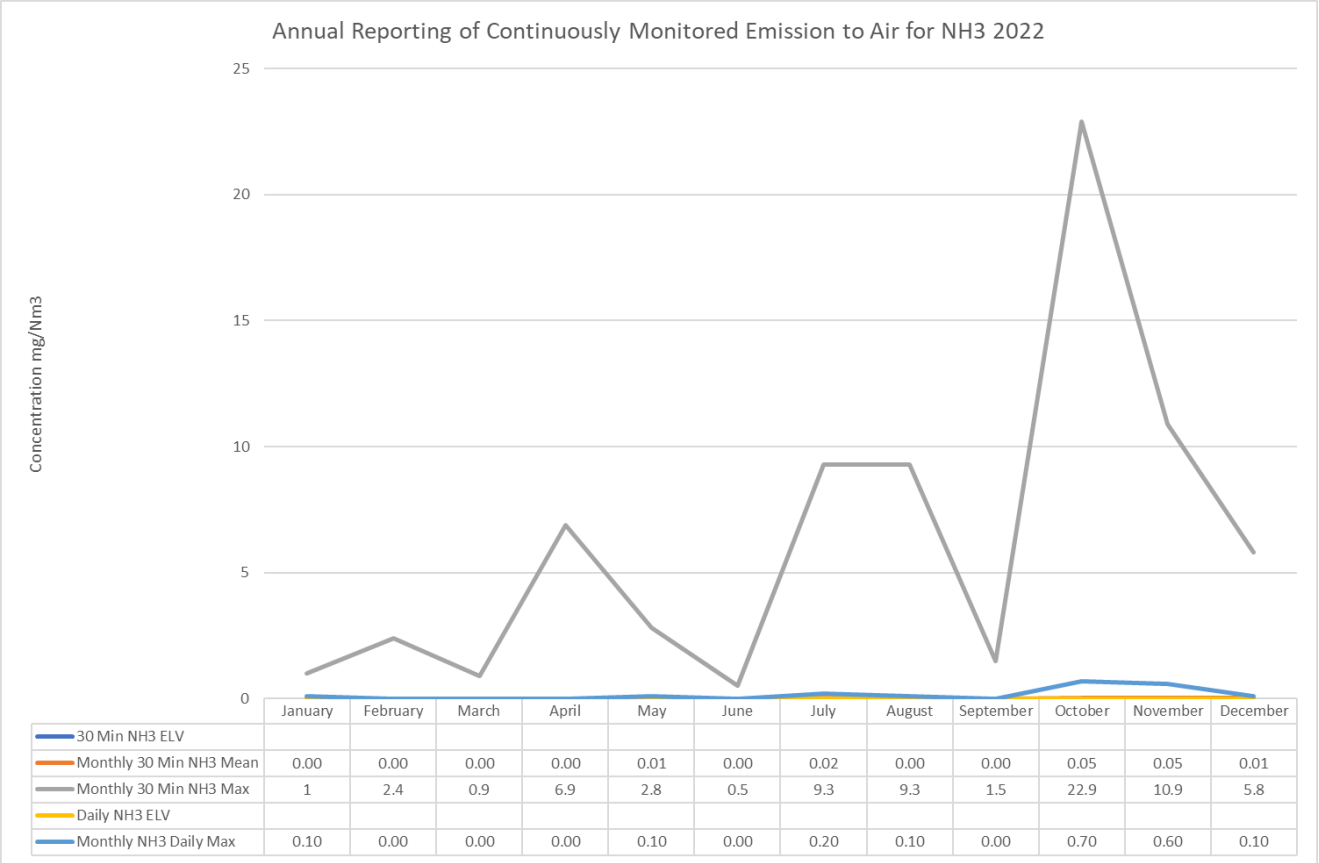
	January	February	March	April	May	June	July	August	September	October	November	December
30 Min Dust ELV	45	45	45	45	45	45	45	45	45	45	45	45
Monthly 30 Min Dust Mean	5.43	7.69	13.82	11.97	2.96	2.22	0.98	1.29	3.03	0.44	0.68	0.72
Monthly 30 Min Dust Max	18.4	60.9	40.4	94.9	50.1	14.4	54.9	100.1	535	8.4	38.9	98.7
Daily Dust ELV	15	15	15	15	15	15	15	15	15	15	15	15
Monthly Dust Daily Max	14.40	13.80	22.70	34.50	4.60	4.60	7.40	14.20	16.30	3.10	4.10	2.90

Line 1 – Carbon Monoxide



	January	February	March	April	May	June	July	August	September	October	November	December
30 Min CO ELV	150	150	150	150	150	150	150	150	150	150	150	150
Monthly 30 Min CO Mean	8.46	15.93	8.03	8.50	8.87	5.66	22.37	15.03	12.63	10.56	16.35	15.27
Monthly 30 Min CO Max	29.6	270.4	143.4	293.6	725.9	176.1	130.9	196.7	1653.2	159.3	410.8	265.6
Daily CO ELV	75	75	75	75	75	75	75	75	75	75	75	75
Monthly CO Daily Max	12.10	34.80	11.80	21.50	26.10	18.50	42.60	28.70	40.30	28.70	24.20	24.00

Line 1 – Ammonia



	January	February	March	April	May	June	July	August	September	October	November	December
30 Min NH3 ELV												
Monthly 30 Min NH3 Mean	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.05	0.05	0.01
Monthly 30 Min NH3 Max	1	2.4	0.9	6.9	2.8	0.5	9.3	9.3	1.5	22.9	10.9	5.8
Daily NH3 ELV												
Monthly NH3 Daily Max	0.10	0.00	0.00	0.00	0.10	0.00	0.20	0.10	0.00	0.70	0.60	0.10

4.2 Summary of periodic monitoring results for emissions to air

The table below shows the results of periodically monitored substances.

Substance	Emission limit value	Results	
		Q2	Q4
Mercury and its compounds	0.05 mg/m³	0.003 mg/m³ (± 0.002)	0.0014 mg/m³ (± 0.0016)
Cadmium & Thallium and their compounds (total)	0.05 mg/m³	0.002 mg/m³ (± 0.004)	0.0018 mg/m³ (± 0.0032)
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m³	0.16 mg/m³ (± 0.02)	0.22 mg/m³ (± 0.02)
Dioxins and Furans (I-TEQ)	0.1 ng/m³	0.04 ng/m³ (±0.007)	0.0283 ng/m³ (±0.0042)
Hydrogen Fluoride	3 mg/m³	0.21 mg/m³ (± 0.06)	0.11 mg/m³ (± 0.04)

4.3 Summary of monitoring results for emissions to water

The following table summarises the available spot sample results of monitoring of emissions to water for each month.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily/monthly ELV (mg/m^3)	30 mg/l Suspended Solids (monthly spot sample)											
Monthly maximum	<5	<5	12	<5	<5	<5	7	7	8	<5	<5	<5

5. Summary of Permit Compliance

5.1 Compliance with permit limits for continuously monitored pollutants

The plant met its emission limits as shown in the table below.

Substance	Percentage time compliant during operation	
	Half-hourly Limit	Daily Limit
Particulates	99.26 %	94.64 %
Oxides of Nitrogen	100 %	100 %
Sulphur Dioxide	100 %	96.43 %
Carbon Monoxide	99.89 %	100 %
Total Organic Carbon	100 %	100 %
Hydrogen Chloride	100 %	99.29 %
Hydrogen Fluoride	N/A – HF is not required to be continuously monitored in the permit conditions	

5.2 Summary of any notifications or non-compliances under the permit

Date & Time	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
11/02/2022 @ 15:59	30-Minute Particulate – 60.9 mg/Nm^3	FGT filter bags degraded	A programme of filter bag replacement was undertaken to replace all degraded bags. The site lifecycle plan has been updated. Annual analysis of filter bags is to be carried out going forward. A greater stock of spare bags will be held on site. An extensive report was issued to the EA covering this.
14/02/2022 @ 04:29	30-Minute Particulate – 46.9 mg/Nm^3		
22/02/2022 @ 07:29	30-Minute CO – 270.4 mg/Nm^3	One of the combustion grate hydraulic rams tripped but the biomass pushers continued to push fuel onto the grate. This excess fuel ignited causing an elevated level of CO for a short period of time. Load was dropped and the grate reset.	The combustion grate hydraulic ram trip was investigated and the fault was rectified.
09/03/2022	Daily Particulate – 15.4 mg/Nm^3	FGT Filter bags degraded	A programme of filter bag replacement was undertaken to replace all degraded bags. The site lifecycle plan has been updated. Annual analysis of filter bags is to be carried out going forward. A greater stock of spare bags will be held on site. An extensive report was issued to the EA covering this.
19/03/2022	Daily Particulate – 16.82 mg/Nm^3		
19/03/2022	Daily HCl – 15.40 mg/Nm^3	High concentration of both HCl and SO2 in fuel stock (as measured on raw gas analyser). Plant reduced to minimum stable load in an attempt to reduce HCl emissions. Lime dosing @ 100%. Lime abatement system checked to ensure working correctly.	This appeared to be an isolated batch of fuel.
20/03/2022	Daily Particulate – 21.71 mg/Nm^3	FGT filter bags degraded	A programme of filter bag replacement was undertaken to replace all degraded bags. The site lifecycle plan has been updated. Annual analysis of filter bags is to be carried out going forward. A greater stock of spare bags will be held on site. An extensive report was issued to the EA covering this.
21/03/2022	Daily Particulate – 22.7 mg/Nm^3		
28/03/2022	Daily Particulate – 16.43 mg/Nm^3		
04/04/2022	Daily Particulate – 15.05 mg/Nm^3		
05/04/2022	Daily Particulate – 19.52 mg/Nm^3		
07/04/2022	Daily Particulate – 19.69 mg/Nm^3		
08/04/2022	Daily Particulate – 16.97 mg/Nm^3		
10/04/2022 @ 03:59	30-Minute CO – 209.4 mg/Nm^3	A faulty positional sensor on one of the combustion grate hydraulic rams tripped the combustion grate. The biomass	The fault with the positional sensor on the combustion grate hydraulic ram was rectified.

Date & Time	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
		pushers continued to push fuel onto the grate. This excess fuel ignited causing an elevated level of CO for a short period of time.	
14/04/2022	Daily Particulate – 15.4 mg/Nm^3 2 x 30-Minute Particulate: 05:59 – 94.9mg/Nm^3 07:59 – 75.3 mg/Nm^3	Following the exchange of approximately 200 filter bags the plant was restarted. There were residual particulates in the system that caused elevated particulate readings. The levels dropped below the ELV but there were insufficient periods remaining in the 24-hour period to recover below the ELV.	This was following a maintenance activity to rectify the issues with the FGT filter bags.
17/04/2022 @ 06:29	30-Minute Particulate – 46.9 mg/Nm^3	The ID fan tripped causing a master fuel trip which drops all combustion air fans to minimum load. This caused a very slight negative pressure on the recirc line which allowed a small amount of particulates to short circuit the FGT plant.	The plant was brought offline immediately for a full boiler gas path clean. This reduced the load on the ID fan preventing a reoccurrence.
22/04/2022	30-Minute Particulate: 15:59 – 48.1 mg/Nm^3	A sudden increase in load on the ID fan caused it to trip. This instantly caused a master fuel trip which drops all combustion air fans to minimum load. This caused a very slight negative pressure on the recirc line which allowed a small amount of particulates to short circuit the FGT plant.	The master fuel trip was quickly reset and the recirc fan speed increased to create a positive pressure. There was a small delay whilst the shift team leader stabilised the plant.
22/04/2022 @ 13:59 to 14:29	2 x 30-Minute CO: 13:59 – 177 mg/Nm^3 14:29 – 293.6 mg/Nm^3	The plant was in restart and experienced a sudden increase in steam temperature which caused a master fuel trip. This was as a result of the boiler cleaning works which creates increased heat transfer for a period of time. The master fuel trip drops all combustion air fans to minimum load. This caused a significant reduction in combustion air which is required to provide the correct combustion conditions to control levels of CO.	The master fuel trip was quickly reset and all the combustion fans returned to normal operating levels. This stabilised the combustion and resultant emissions but unfortunately there was not enough time left in the 30-minute period for the CO emission to drop below the ELV.

Date & Time	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
22/04/2022 @ 15:59	30-Minute CO – 253.3 mg/Nm^3	A sudden increase in load on the ID fan caused it to trip. This instantly caused a master fuel trip which drops all combustion air fans to minimum load. This caused a significant reduction in combustion air which is required to provide the correct combustion conditions to control levels of CO.	The master fuel trip was quickly reset and all the combustion fans returned to normal operating levels. This stabilised the combustion and resultant emissions but unfortunately there was not enough time left in the 30-minute period for the CO emission to drop below the ELV.
23/04/2022	Daily Particulate – 22.03 mg/Nm^3 2 x 30-Minute Particulate: 11:29 – 52.1 mg/Nm^3 21:29 – 52.4 mg/Nm^3	FGT filter bags degraded	Following a further offline dye test a number of defective filter bags were identified. The defective filter bags were replaced and particulate levels dropped below ELV levels. A second phase of filter bag replacement is anticipated in the upcoming annual outage June 2022. All remaining worn bags will be replaced with new. Please see detailed report issued to EA for more information.
23/04/2022	Daily HCl – 22.03 mg/Nm^3	High concentration of both HCl and SO2 in fuel stock (as measured on raw gas analyser). Plant reduced to minimum stable load in an attempt to reduce HCl emissions. Lime dosing @ 100%. Lime abatement system checked to ensure working correctly.	This appeared to be an isolated batch of fuel.
24/04/2022	Daily Particulate – 26.86 mg/Nm^3 1 x 30-Minute Particulate: 08:29 – 55.1 mg/Nm^3	FGT filter bags degraded	Following a further offline dye test a number of defective filter bags were identified. The defective filter bags were replaced and particulate levels dropped below ELV levels. A second phase of filter bag replacement is anticipated in the upcoming annual outage June 2022. All remaining worn bags will be replaced with new. Please see detailed report issued to EA for more information.
25/04/2022	Daily Particulate – 34.52 mg/Nm^3 11 x 30-Minute Particulate: 01:59 – 47.3 mg/Nm^3 02:29 – 48.6 mg/Nm^3 13:59 – 51.5 mg/Nm^3 14:29 – 57.4 mg/Nm^3 15:29 – 65.3 mg/Nm^3 15:59 – 55.9 mg/Nm^3 16:29 – 45.2 mg/Nm^3 16:59 – 47.4 mg/Nm^3 17:29 – 64.5 mg/Nm^3 18:29 – 50.9 mg/Nm^3 18:59 – 48.8 mg/Nm^3		
26/04/2022	Daily Particulate – 30.3 mg/Nm^3		

Date & Time	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
	3 x 30-Minute Particulate: 00:59 – 47.7 mg/Nm^3 09:59 – 57.9 mg/Nm^3 12:59 – 56.2 mg/Nm^3		
27/04/2022	14 x 30-Minute Particulate: 04:59 – 52.2 mg/Nm^3 05:59 – 54.4 mg/Nm^3 06:29 – 55.6 mg/Nm^3 06:59 – 53.1 mg/Nm^3 07:59 – 46.1 mg/Nm^3 08:59 – 46.7 mg/Nm^3 17:29 – 69.5 mg/Nm^3 17:59 – 53.8 mg/Nm^3 18:29 – 53.3 mg/Nm^3 18:59 – 65.0 mg/Nm^3 22:29 – 55.0 mg/Nm^3 22:59 – 66.9 mg/Nm^3 23:29 – 85.3 mg/Nm^3 23:59 – 75.2 mg/Nm^3		
28/04/2022	19 x 30-Minute Particulate: 01:29 – 74.3 mg/Nm^3 01:59 – 69.8 mg/Nm^3 02:59 – 51.2 mg/Nm^3 03:59 – 52.3 mg/Nm^3 04:29 – 60.4 mg/Nm^3 04:59 – 54.8 mg/Nm^3 05:29 – 79.1 mg/Nm^3 05:59 – 82.5 mg/Nm^3 06:29 – 68.0 mg/Nm^3 06:59 – 67.2 mg/Nm^3 07:29 – 67.9 mg/Nm^3 07:59 – 67.2 mg/Nm^3 08:29 – 67.1 mg/Nm^3 08:59 – 79.9 mg/Nm^3 09:29 – 90.5 mg/Nm^3 09:59 – 78.7 mg/Nm^3 10:29 – 48.6 mg/Nm^3 10:59 – 52.0 mg/Nm^3 11:29 – 57.2 mg/Nm^3		
06/05/2022 @ 03:59	30-Minute Particulate – 50.1 mg/Nm^3	The recirc fan did not ramp up as anticipated as biomass was introduced to the grate during the plant restart. This caused a very slight negative pressure on the recirc line which allowed a small amount of particulates to short circuit the FGT plant.	The recirc fan controller was in manual whereas it should have been in auto control. This was quickly rectified and communicated to the rest of the operations team.
06/05/2022 @ 03:59	30-Minute CO – 315 mg/Nm^3	Post combustion burner tripped out multiple times during plant start-up. This caused combustion	The burner was overhauled as soon as the plant was online and stable.

Date & Time	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
		instability which resulted in increased level of CO.	
17/05/2022 @ 17:59	30-Minute CO – 725.9 mg/Nm^3	The combustion grate tripped. The start-up burner tripped out a number of times during the restart until it stabilised. Once stable emissions were back to normal levels,	A combustion grate position sensor was faulty. It was replaced to prevent a re-occurrence. The start-up burner was stripped and overhauled.
03/06/2022 @ 00:59	30-Minute CO – 176.1 mg/Nm^3	On the plant start-up the biomass hoppers were filled prior to discharge onto the grate. The high level of fines in the biomass ignited very quickly before the requisite combustion air could be added. This caused a spike in CO which unfortunately did not recover before the end of the 30-Minute period.	The biomass fuel stock had an abnormally high level of fines.
06/07/2022 @ 05:59	30-Minute Particulate – 54.9 mg/Nm^3	The plant was being brought online when damage to a communication cable occurred which caused an instant unexpected master fuel trip. The master fuel trip drops all combustion air fans to minimum load. This allowed a negative pressure in the recirc line which allowed a small amount of particulates to short circuit the FGT plant.	The plant was immediately brought offline and the damaged cable replaced. An area of lagging was replaced and the cable re-routed to prevent a reoccurrence of this issue.
01/08/2022 @ 21:59 to 22:59	2 x 30-Minute Particulate: 21:59 – 47.0 mg/Nm^3 22:59 – 56.4 mg/Nm^3	All FGT baghouse filters had been replaced in the June annual planned outage. The failure of bags was not anticipated. The plant was shutdown for further investigation. A dye test was performed which highlighted failures in a small quantity of bags.	The defective bags were replaced and the plant restarted.
02/08/2022	18 x 30-Minute Particulate: 02:29 – 60.4 mg/Nm^3 03:29 – 54.5 mg/Nm^3 03:59 – 59.9 mg/Nm^3 05:59 – 49.0 mg/Nm^3 06:29 – 49.4 mg/Nm^3 06:59 – 51.5 mg/Nm^3 07:29 – 48.7 mg/Nm^3 07:59 – 51.0 mg/Nm^3 08:29 – 54.6 mg/Nm^3 08:59 – 46.5 mg/Nm^3 09:29 – 64.5 mg/Nm^3 10:59 – 51.2 mg/Nm^3 11:29 – 69.3 mg/Nm^3 11:59 – 58.3 mg/Nm^3		

Date & Time	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
	12:29 – 90.6 mg/Nm^3 12:59 – 98.7 mg/Nm^3 13:29 – 100.1 mg/Nm^3 13:59 – 97.9 mg/Nm^3		
03/08/2022 @ 13:29	30-Minute Particulate – 48.5 mg/Nm^3	Plant was restarted after offline dye test and the replacement of all highlighted defective filter bags. The plant was allowed to stabilise to assess particulate levels. The plant was promptly shutdown once elevated readings were detected.	A further dye test was performed and the highlighted defective bags replaced.
16/08/2022 @ 12:29	30-Minute CO – 196.7 mg/Nm^3	The forced draft fan invertor tripped without warning which caused a master fuel trip. This starved the grate of combustion air for a short period which resulted in the elevated level of CO. The plant was removed from service and the invertor drive fault investigated.	An intermittent fault was located on the invertor feedback relay. This was changed and the plant restarted.
03/09/2022 @ 10:59	30-Minute Particulate – 61.4 mg/Nm^3	Corrosion around the FGT baghouse allowed cold tramp air to be pulled into the filter compartments. APCr contains a high quantity of hydrated lime which is hygroscopic and as such draws in the moisture from the cold air. This causes a build-up of APCr to form which blocked the filter compartment outlet. The APCr dust level built up in the compartment and submerged the bottom of the filter bags. This in effect baked the bags causing them to go brittle and split.	The areas of corrosion were repaired to prevent the ingress of cold tramp air. The build-up in the compartment was cleared. A dye test was performed and all defective bags were replaced. Operational checks are in place to ensure that this does not happen again. Level switches are being installed in each filter compartment to detect a build-up of APCr should there be a future issue.
04/09/2022 @ 02:29	30-Minute Particulate – 47.7 mg/Nm^3		
06/09/2022	Daily Particulate – 16.25 mg/Nm^3 3 x 30-Minute Particulate: 03:59 – 55.4 mg/Nm^3 14:59 – 49.3 mg/Nm^3 20:29 – 54.4 mg/Nm^3		
07/09/2022	3 x 30-Minute Particulate: 01:29 – 88.8 mg/Nm^3 01:59 – 57.7 mg/Nm^3 06:59 – 84.9 mg/Nm^3		
08/09/2022	12 x 30-Minute Particulate: 03:29 – 56.3 mg/Nm^3 03:59 – 58.7 mg/Nm^3 04:29 – 49.4 mg/Nm^3 05:29 – 68.6 mg/Nm^3 05:59 – 70.5 mg/Nm^3 06:29 – 73.6 mg/Nm^3 06:59 – 66.6 mg/Nm^3 07:29 – 92.2 mg/Nm^3 07:59 – 86.8 mg/Nm^3 08:29 – 74.3 mg/Nm^3 08:59 – 148.5 mg/Nm^3 09:29 – 535 mg/Nm^3		

Date & Time	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
08/09/2022	2 x 30-Minute CO: 08:59 – 1653.2 mg/Nm^3 09:29 – 1263.5 mg/Nm^3	Plant removed to investigate particulate issues. The shift team leader taking the plant off reduced the total combustion air by error which caused very poor combustion whilst the remnants of biomass were being burnt off the grate.	The shift team leader was relatively new to the role. Even after extensive training it is difficult to train out all scenarios. This was a scenario that was unfamiliar to them and an error was made. This has been clearly communicated to the operator in question.
16/10/2022 @ 07:59	30-Minute CO – 159.3 mg/Nm^3	As biomass was introduced, the forced draft (FD) fan did not ramp up to provide the correct amount of combustion air called for by the system. This was a result of the FD fan PID controller being left in 'internal' mode rather than the correct 'external' mode on the DCS. This was quickly rectified, but unfortunately the CO 30-minute did not recover in time.	This was acknowledged by the shift team leader as human error. The details of this error will be shared throughout the team to ensure that all controllers are checked on restart.
18/10/2022	Daily SO2 – 76.38 mg/Nm^3	After extensive analysis of the fuel, it has been determined that high levels of chlorine were present in the fuel stock. The flue gas treatment is based on dosing of hydrated lime and at the temperature profile of dosing, the elevated chlorine emissions have been abated, consuming the majority of free lime, and there was insufficient free lime to abate sulphur emissions adequately.	An alternative fuel source was secured and the fuel causing the issue was quarantined and removed. The EMS was reviewed to include greater checking of fuel. An extensive report covering this issue was supplied to the EA and is available as required.
25/10/2022	Daily SO2 – 78.7 mg/Nm^3		
26/10/2022	Daily SO2 – 97.18 mg/Nm^3		
27/10/2022	Daily SO2 – 87.75 mg/Nm^3		
28/10/2022	Daily SO2 – 100.91 mg/Nm^3		
29/10/2022	Daily SO2 – 106.04 mg/Nm^3		
30/10/2022	Daily SO2 – 81.84 mg/Nm^3		
31/10/2022	Daily SO2 – 88.47 mg/Nm^3		
01/11/2022	Daily SO2 – 90.64 mg/Nm^3		
02/11/2022	Daily SO2 – 95.79 mg/Nm^3		
18/11/2022 @ 05:59	30-Minute CO – 410.8 mg/Nm^3	Whilst the plant was being stabilised, the forced draft (FD) fan was stopped in error which caused a plant master fuel trip. The sudden drop in combustion air created a spike in the CO which, despite the FD fan being restarted quickly, did not have sufficient time left in the 30-minute period to recover below the ELV.	This was acknowledged by the shift team leader as human error. The details of this error will be shared throughout the team.

Date & Time	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
03/12/2022 @ 23:59	30-Minute Particulate – 48.5 mg/Nm^3	The plant was tripped without warning by a WPD 33KV grid overvoltage event. The resulting instability caused by the loss of the recirc fan allowed a very small amount of particulates to short circuit the FGT plant. Normal operating conditions were quickly restored.	This was an abnormal trip condition caused by a grid issue.
12/12/2022 @ 12:29	30-Minute CO – 211.5 mg/Nm^3	The main biomass feed conveyor belt tripped. This caused low low biomass hopper levels which necessitated the introduction of the post combustion burner. The steam load dropped off very quickly before the combustion air could adjust.	The shift team leader on duty had not experienced this scenario before. A more experienced operator would have avoided this breach. This has been communicated to the team.
30/12/2022 @ 17:59	30-Minute CO – 265.6 mg/Nm^3	This breach occurred during a WPD forced shutdown. The plant had to be shutdown without normal electrical supplies.	This was an abnormal condition caused by a grid issue.

5.3 Summary of any complaints received and actions to taken to resolve them

No complaints were received by the regulator or by any other means during the 2022 reporting period.

6. Summary of Plant Improvements

Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.

Improvement condition 4
The residence time testing was completed by Socotec in Q4 2021 and the subsequent report issued to the EA on 11/03/2022. This improvement condition has now been completed.

Environmental Benefits
The testing demonstrated and supported the design CFD modelling to ensure compliance with legislative requirements.

Improvement Condition 7
If a suitable CHP scheme is identified, this Improvement Condition will be re-explored. A suitable plan will be submitted to the EA in line with the requirements of this Improvement Condition. To date, no such suitable scheme has been identified.

Environmental Benefits
A suitable CHP scheme would further increase the sites overall efficiency and ensure that all effective energy is being utilised.

Summary of any changes to the plant or operating techniques which required a variation to the permit and a summary of the resulting environmental impact.

None.

Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits.

Improvement 1
Continued investigation into minor modifications for the lime abatement system. Better preventative maintenance measures are in place to detect and prevent any potential blockages in the dosing system.

Environmental Benefits
Increased efficiency in the Lime dose system and reduction in the number of potential blockages.

Improvement 2
Proposal put forward to the EA for a trial on a lime/magnesium product being injected directly into the combustion zone to work as a pre-abatement system in order to reduce the SO2 and HCl emissions and to help prevent the build-up of ash on the boiler tubes.

Environmental Benefits
This system will improve SO2 and HCl abatement and will ease the load on the existing FGT abatement system. Softening the ash deposits will potentially extend operational running hours which will reduce the plant cycling (start/stops) This will reduce the consumption of fossil fuel used in the plant start-up (burners).

Improvement 3
Continue to improve personnel awareness about the boiler fluctuation events and counter measures to be taken to avoid emission exceedances.

Environmental Benefits
Improvement in the daily operations of the plant resulting in less potential emission exceedances.

Improvement 4
STC are planning to engage with local Universities and Colleges to arrange educational site tours.

Environmental Benefits
Environmental awareness creation and opportunities for students to gain practical understandings on the operation of a biomass boiler plant.

Annual assessment of production / treatment and performance parameters (Permit Tables S4.2 and S4.3)

Table S4.2: Annual production / treatment		
Parameter	**Total - 2022**	**Units**
Total wood waste co-incinerated	49,134.64	tonnes
Electrical energy produced	39,434,231.00	kWhrs
Thermal energy produced e.g. steam for export	0	-
Electrical energy exported	34,379,264.00	kWhrs
Electrical energy used on installation	5,662,807.50	kWhrs
Waste heat utilised by the installation	0	-

Table S4.3 Performance parameters		
Parameter	**Specific consumption / production in 2022**	**Units**
Electrical energy exported from the installation	699.70	kWhrs / tonne of waste incinerated
Electrical energy imported / used at the installation	115.251	kWhrs / tonne of waste incinerated
Fuel oil consumption	5.27	litres / tonne of waste incinerated
Mass of Bottom Ash produced	0.04367	tonnes / tonne of waste incinerated
Mass of APCR produced	0.01221	tonnes / tonne of waste incinerated
Mass of Other solid residues produced	No other process waste was produced.	
Urea consumption	0.00834	tonnes / tonne of waste incinerated
Activated Carbon consumption	0.00016	tonnes / tonne of waste incinerated
Lime consumption	0.00469	tonnes / tonne of waste incinerated
Water consumption	0.3380	m^3 / tonne of waste incinerated
Periods of abnormal operation	0	Number and cumulative hours