Eskom

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13 August 2020

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Ref: (12/4/12L-W4/A3)

Dear Mrs Thivhafuni

MATIMBA POWER STATION'S MONTHLY EMISSIONS REPORT FOR THE MONTH OF MAY 2020

This serves as the monthly report required in terms of Section 7.7.1 in Matimba Power Station's Atmospheric Emission License 12/4/12L-W4/A3.

Raw Materials and Products

Table 1: Quantity of Raw Materials and Products used/produced for the month.

Raw Materials and Products used	Raw Material Type	Unit	Maximum Permitted Consumption Rate (Quantity)	Consumption Rate
	Coal	Tons/month	1 500 000	1 017 571
	Fuel Oil	Tons/month	1 200	563.351
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	2 183.111

Abatement Technology

Table 2: Abatement Equipment Control Technology utilise.

Associated Unit	Technology Type	Actual Utilisation (%)
Unit 1	Electrostatic Precipitator	99.960
Unit 2	Electrostatic Precipitator	99.945
Unit 3	Electrostatic Precipitator	99.920
Unit 4	Electrostatic Precipitator	99.938
Unit 5	Electrostatic Precipitator	99.976
Unit 6	Electrostatic Precipitator	99.935

Associated Unit	Technology Type	Actual Utilisation (%)
Unit 1	SO_3 Plant	96.7
Unit 2	SO_3 Plant	90.3
Unit 3	SO_3 Plant	96.7
Unit 4	SO_3 Plant	80.6
Unit 5	SO_3 Plant	96.7
Unit 6	SO_3 Plant	93.5

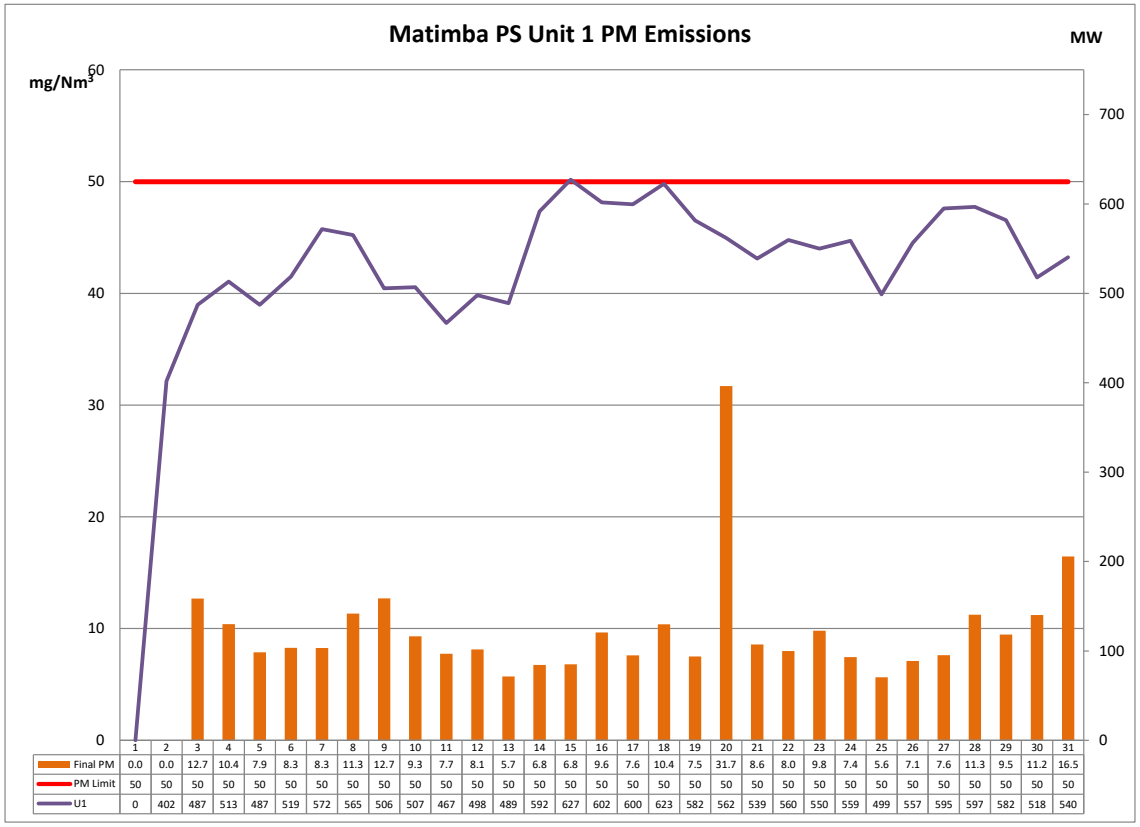
Energy Source Characteristics

Table 3: Energy Source Material Characteristics.

	Characteristic	Stipulated Range (Unit)	Monthly Average Content
Coal burned	**Sulphur Content**	0.8-1.6%	1.286
	Ash Content	30-40%	31.981

Emissions Reporting

Unit 1 particulate emissions

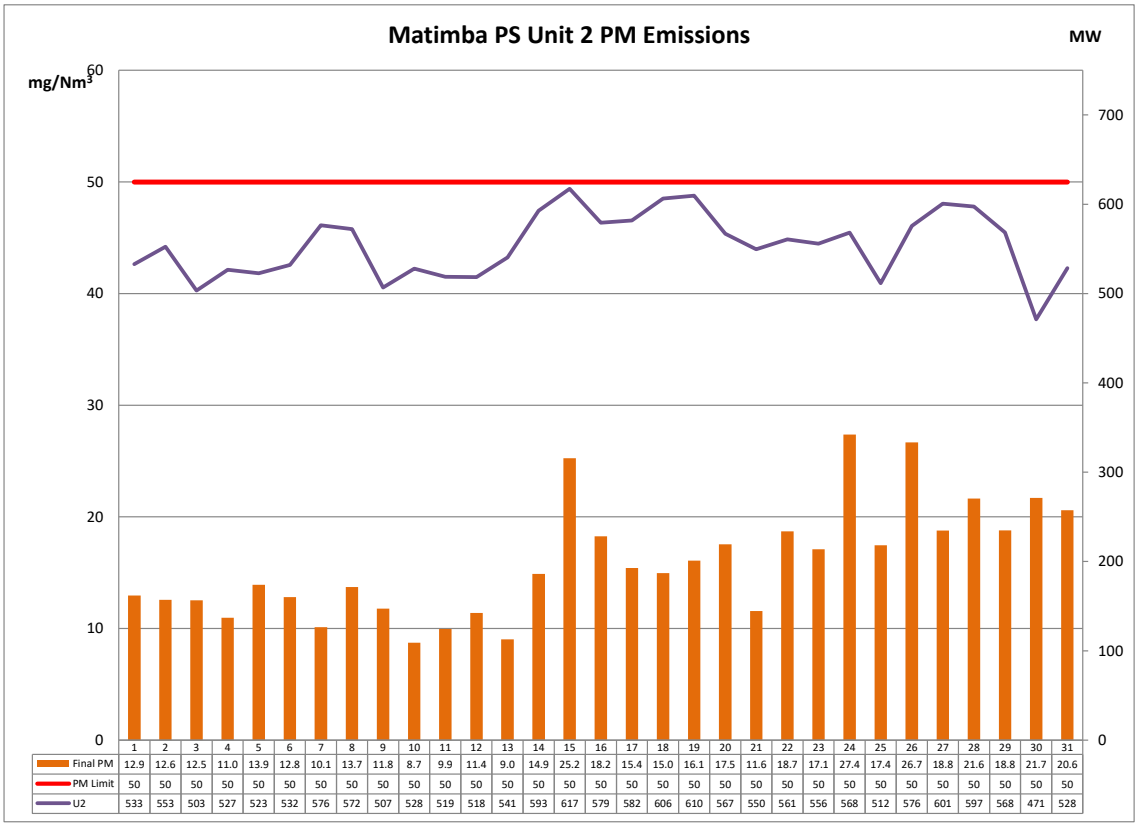


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final PM	0.0	0.0	12.7	10.4	7.9	8.3	8.3	11.3	12.7	9.3	7.7	8.1	5.7	6.8	6.8	9.6	7.6	10.4	7.5	31.7	8.6	8.0	9.8	7.4	5.6	7.1	7.6	11.3	9.5	11.2	16.5
PM Limit	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
U1	0	402	487	513	487	519	572	565	506	507	467	498	489	592	627	602	600	623	582	562	539	560	550	559	499	557	595	597	582	518	540

Graph 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of May 2020

Interpretation:
All daily averages below particulate emission limit of 50 mg/Nm^3.

Unit 2 particulate emissions

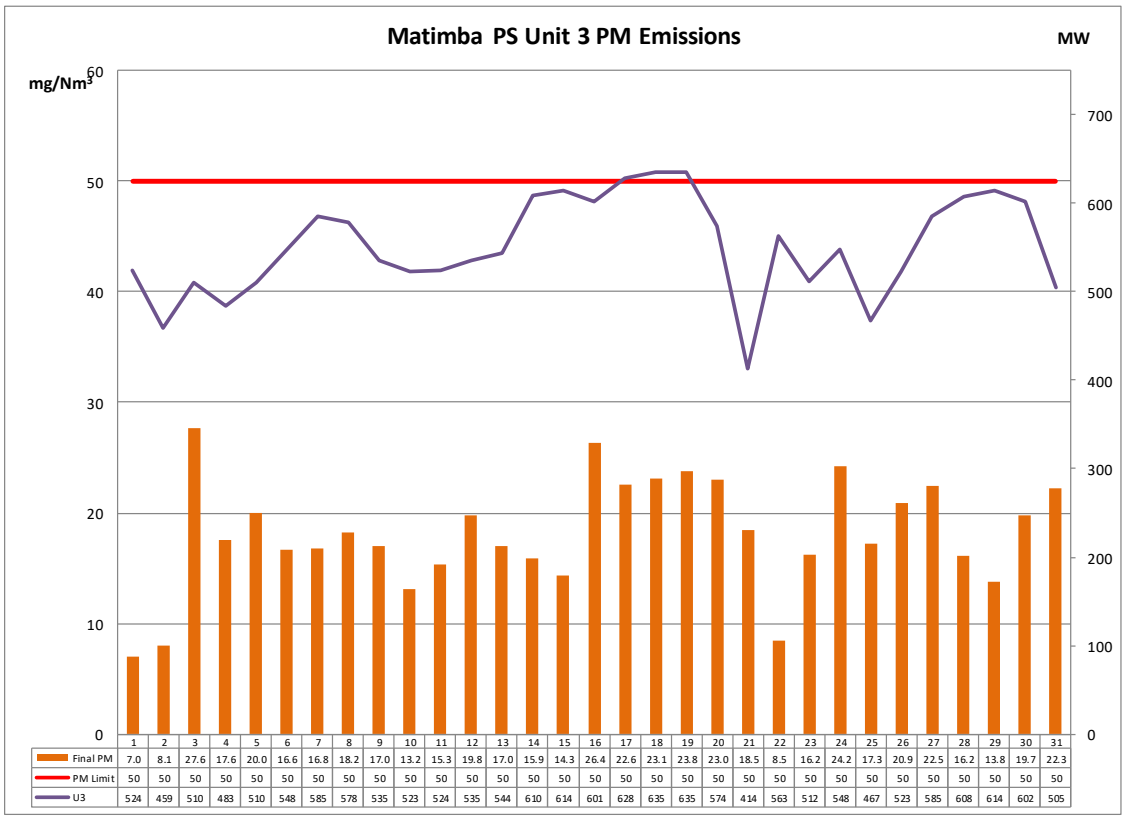


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final PM	12.9	12.6	12.5	11.0	13.9	12.8	10.1	13.7	11.8	8.7	9.9	11.4	9.0	14.9	25.2	18.2	15.4	15.0	16.1	17.5	11.6	18.7	17.1	27.4	17.4	26.7	18.8	21.6	18.8	21.7	20.6
PM Limit	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
U2	533	553	503	527	523	532	576	572	507	528	519	518	541	593	617	579	582	606	610	567	550	561	556	568	512	576	601	597	568	471	528

Graph 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of May 2020

Interpretation:
All daily averages below particulate emission limit of 50 mg/Nm^3.

Unit 3 particulate emissions

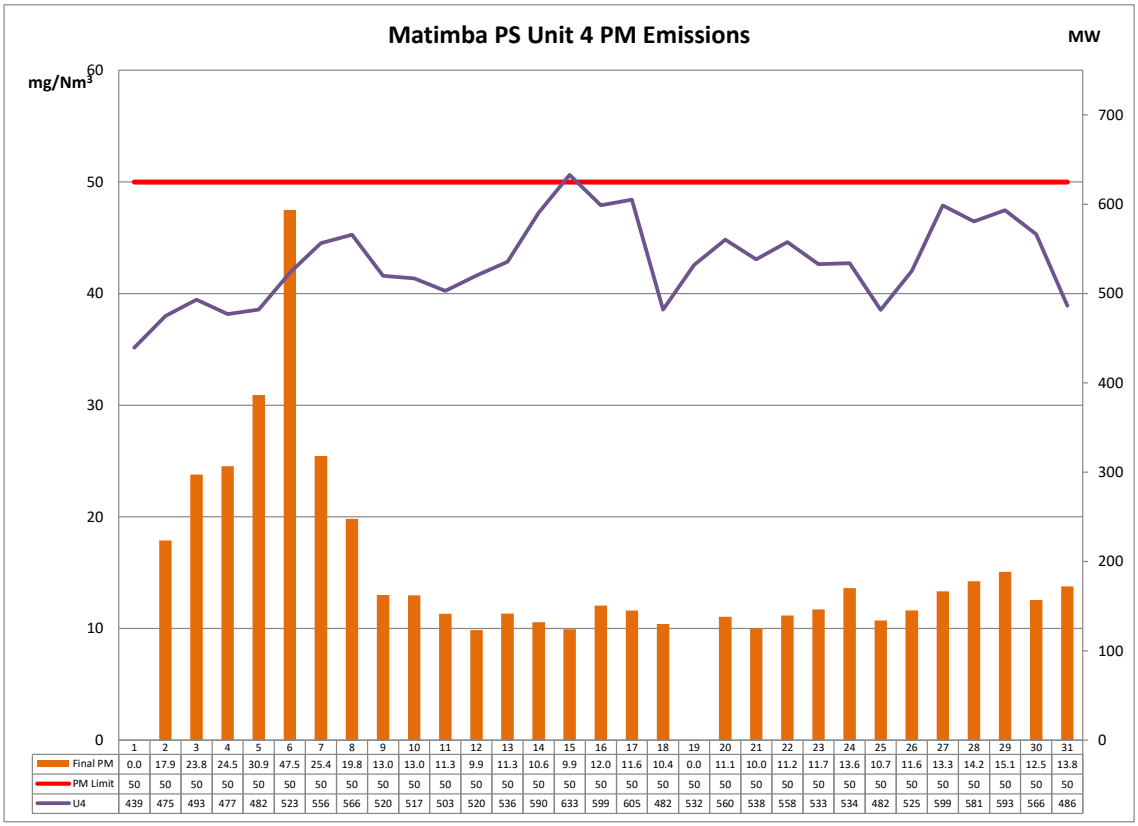


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final PM	7.0	8.1	27.6	17.6	20.0	16.6	16.8	18.2	17.0	13.2	15.3	19.8	17.0	15.9	14.3	26.4	22.6	23.1	23.8	23.0	18.5	8.5	16.2	24.2	17.3	20.9	22.5	16.2	13.8	19.7	22.3
PM Limit	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
U3	524	459	510	483	510	548	585	578	535	523	524	535	544	610	614	601	628	635	635	574	414	563	512	548	467	523	585	608	614	602	505

Graph 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of May 2020

Interpretation:
All daily averages below particulate emission limit of 50 mg/Nm^3.

Unit 4 particulate emissions

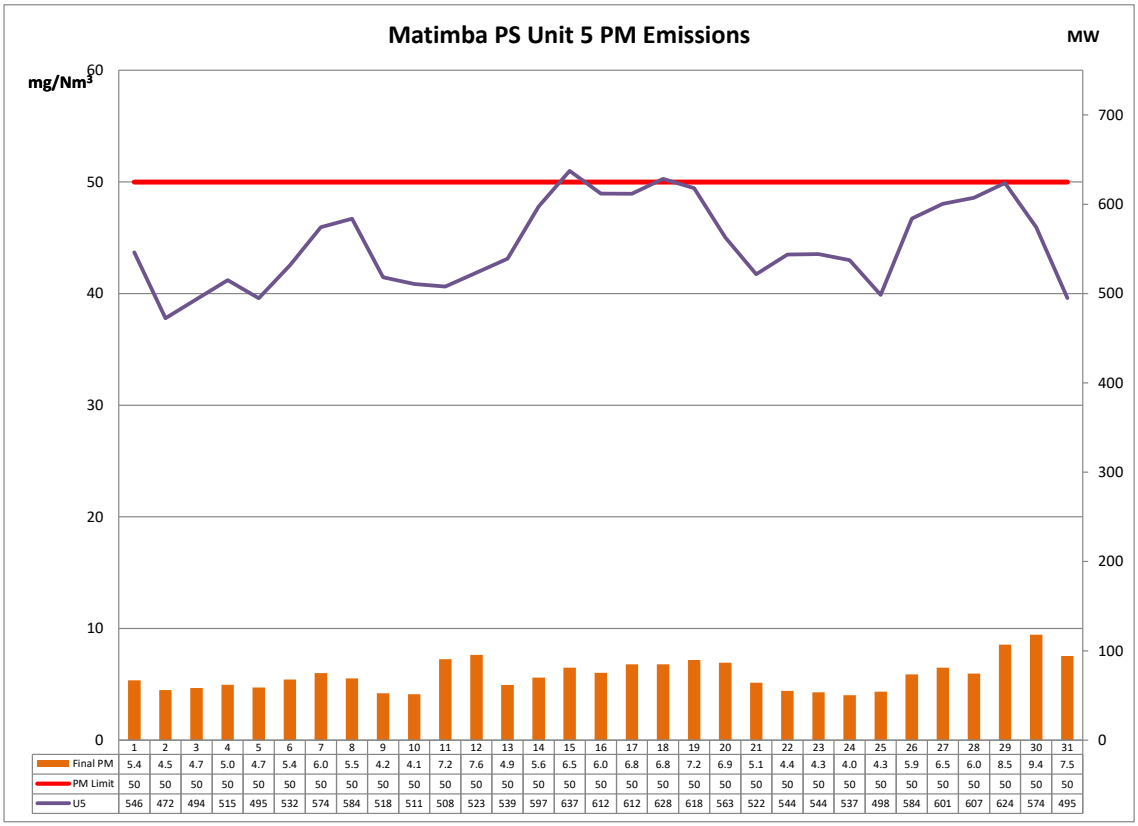


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final PM	0.0	17.9	23.8	24.5	30.9	47.5	25.4	19.8	13.0	13.0	11.3	9.9	11.3	10.6	9.9	12.0	11.6	10.4	0.0	11.1	10.0	11.2	11.7	13.6	10.7	11.6	13.3	14.2	15.1	12.5	13.8
PM Limit	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
U4	439	475	493	477	482	523	556	566	520	517	503	520	536	590	633	599	605	482	532	560	538	558	533	534	482	525	599	581	593	566	486

Graph 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of May 2020

Interpretation:
All daily averages below particulate emission limit of 50 mg/Nm^3.

Unit 5 particulate emissions

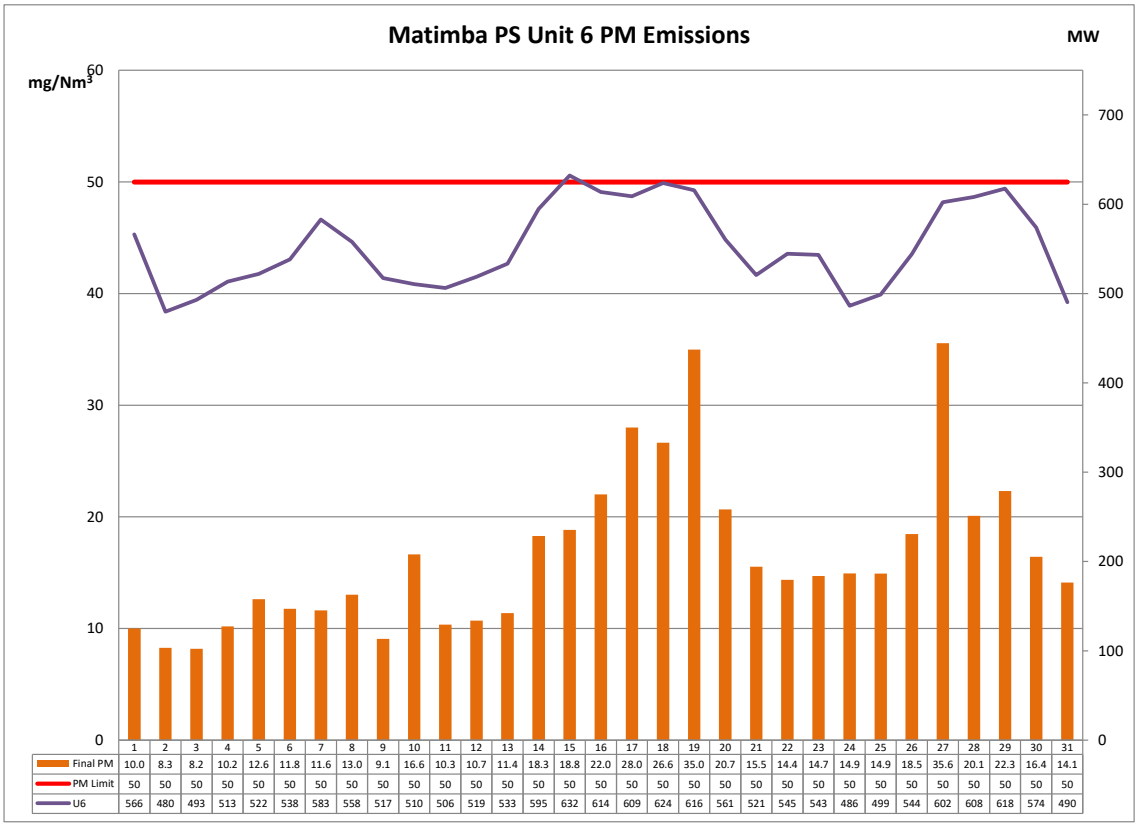


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final PM	5.4	4.5	4.7	5.0	4.7	5.4	6.0	5.5	4.2	4.1	7.2	7.6	4.9	5.6	6.5	6.0	6.8	6.8	7.2	6.9	5.1	4.4	4.3	4.0	4.3	5.9	6.5	6.0	8.5	9.4	7.5
PM Limit	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
U5	546	472	494	515	495	532	574	584	518	511	508	523	539	597	637	612	612	628	618	563	522	544	544	537	498	584	601	607	624	574	495

Graph 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of May 2020

Interpretation:
All daily averages below particulate emission limit of 50 mg/Nm^3.

Unit 6 particulate emissions

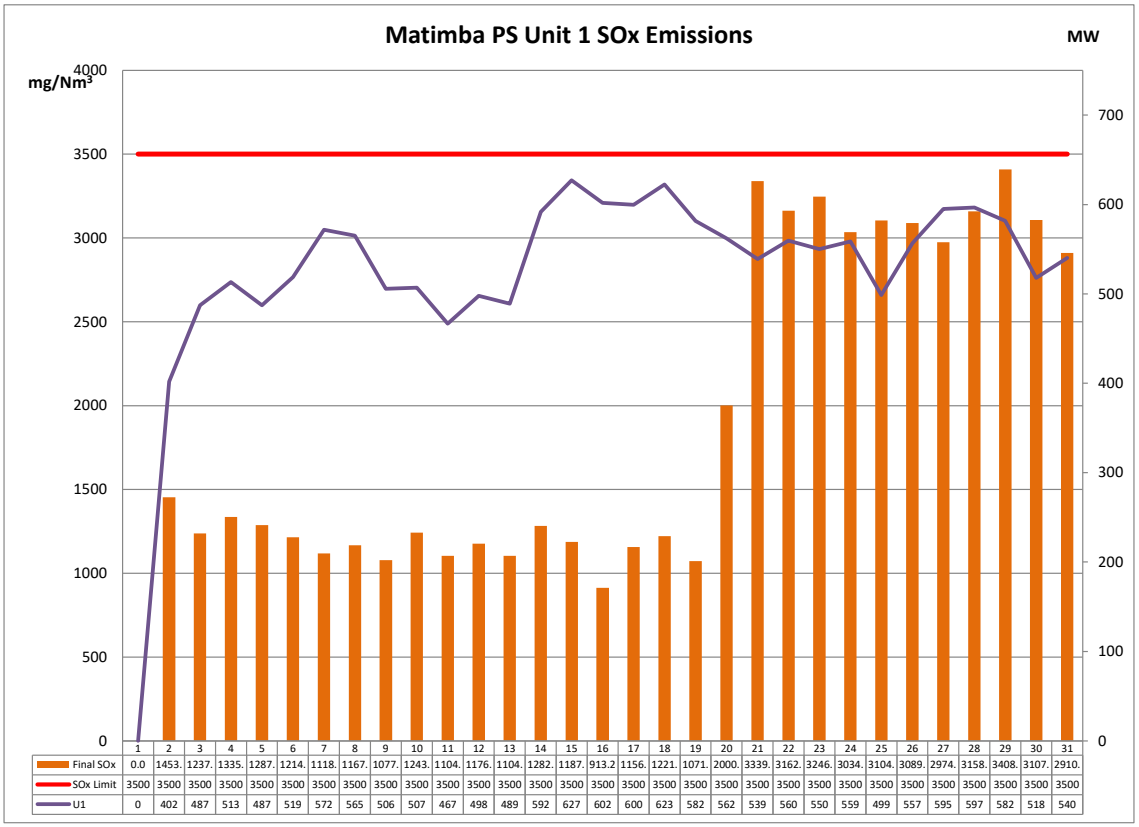


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final PM	10.0	8.3	8.2	10.2	12.6	11.8	11.6	13.0	9.1	16.6	10.3	10.7	11.4	18.3	18.8	22.0	28.0	26.6	35.0	20.7	15.5	14.4	14.7	14.9	14.9	18.5	35.6	20.1	22.3	16.4	14.1
PM Limit	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
U6	566	480	493	513	522	538	583	558	517	510	506	519	533	595	632	614	609	624	616	561	521	545	543	486	499	544	602	608	618	574	490

Graph 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of May 2020

Interpretation:
All daily averages below particulate emission limit of 50 mg/Nm^3.

Unit 1 SO_2 emissions

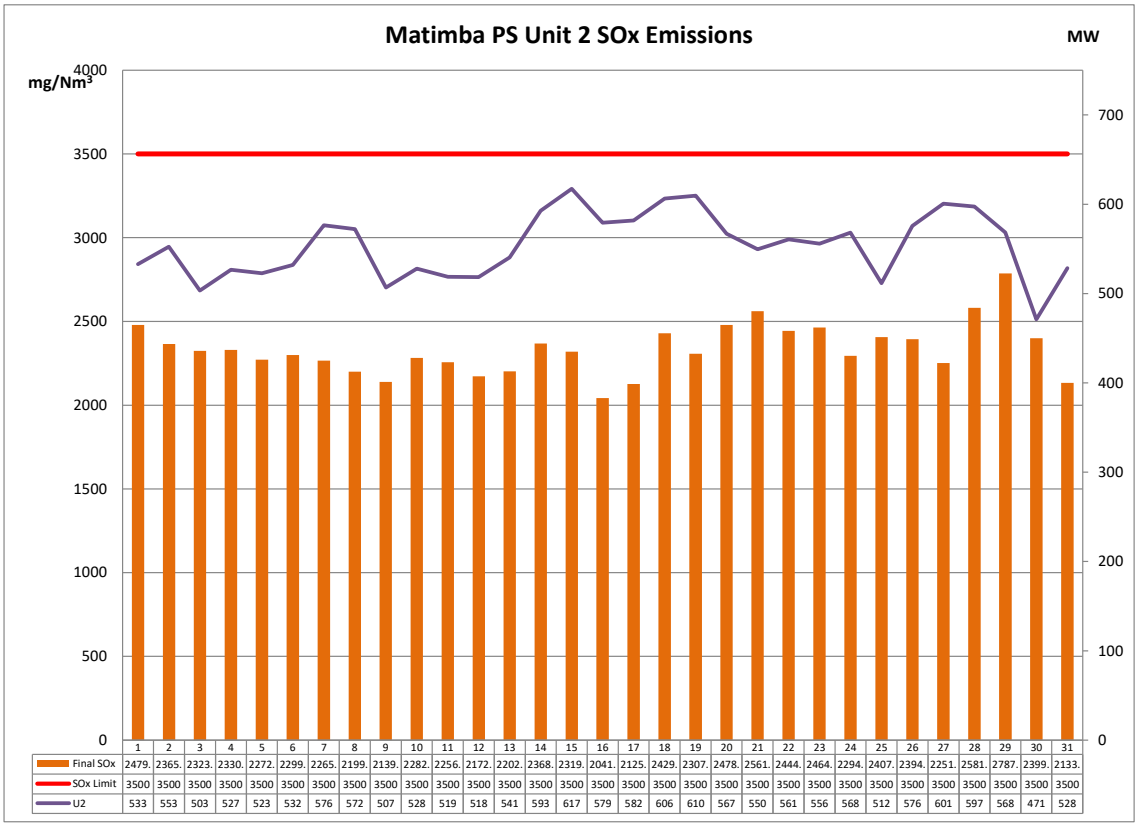


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final SOx	0.0	1453.	1237.	1335.	1287.	1214.	1118.	1167.	1077.	1243.	1104.	1176.	1104.	1282.	1187.	913.2	1156.	1221.	1071.	2000.	3339.	3162.	3246.	3034.	3104.	3089.	2974.	3158.	3408.	3107.	2910.
SOx Limit	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
U1	0	402	487	513	487	519	572	565	506	507	467	498	489	592	627	602	600	623	582	562	539	560	550	559	499	557	595	597	582	518	540

Graph 7: SO_2 daily average emissions against emission limit for unit 1 for the month of May 2020

Interpretation:
All daily averages below SO2 emission limit of 3500 mg/Nm3.

Unit 2 SO_2 emissions

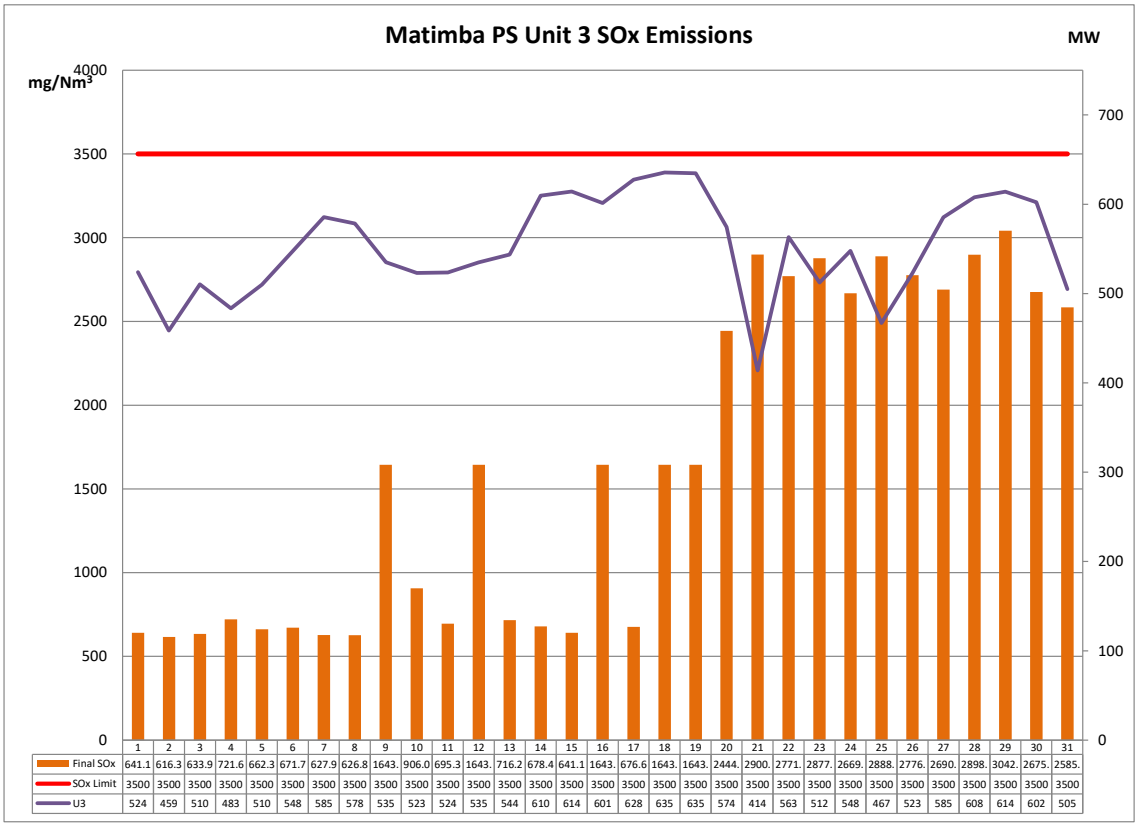


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final SOx	2479.	2365.	2323.	2330.	2272.	2299.	2265.	2199.	2139.	2282.	2256.	2172.	2202.	2368.	2319.	2041.	2125.	2429.	2307.	2478.	2561.	2444.	2464.	2294.	2407.	2394.	2251.	2581.	2787.	2399.	2133.
SOx Limit	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
U2	533	553	503	527	523	532	576	572	507	528	519	518	541	593	617	579	582	606	610	567	550	561	556	568	512	576	601	597	568	471	528

Graph 8: SO_2 daily average emissions against emission limit for unit 2 for the month of May 2020

Interpretation:
All daily averages below SO2 emission limit of 3500 mg/Nm3.

Unit 3 SO_2 emissions

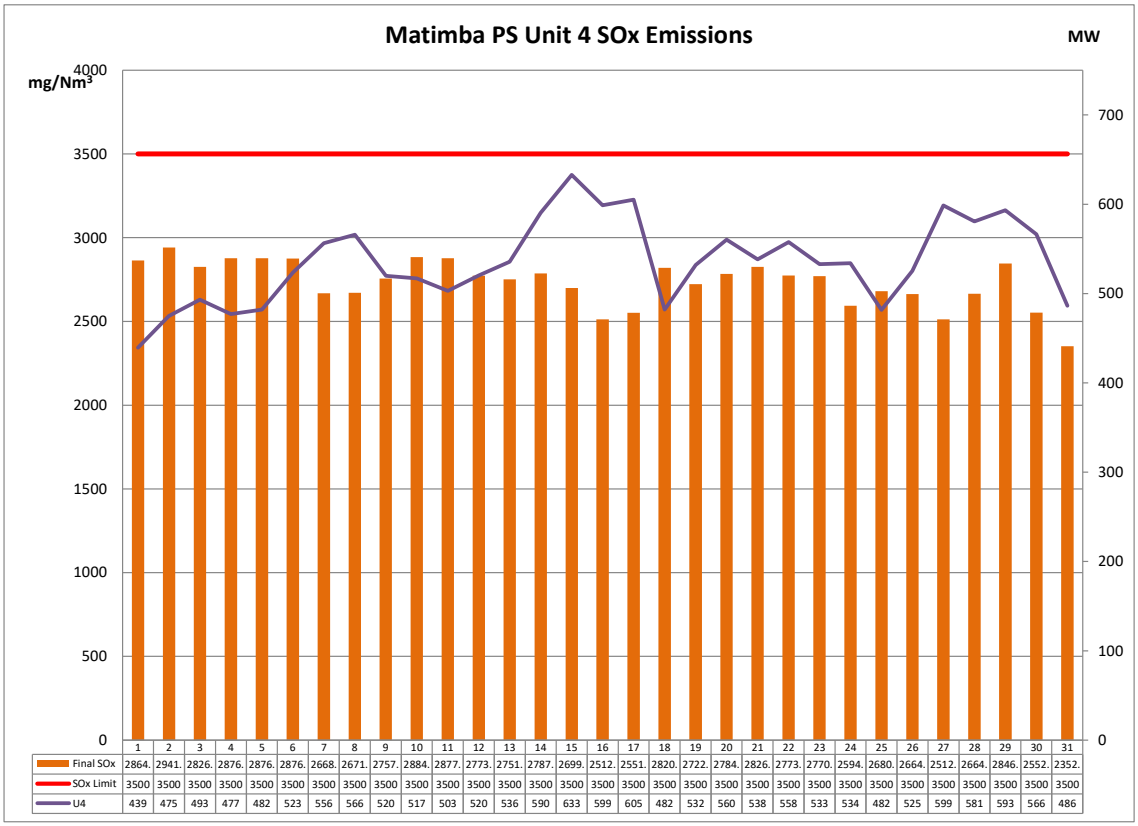


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final SOx	641.1	616.3	633.9	721.6	662.3	671.7	627.9	626.8	1643.	906.0	695.3	1643.	716.2	678.4	641.1	1643.	676.6	1643.	1643.	2444.	2900.	2771.	2877.	2669.	2888.	2776.	2690.	2898.	3042.	2675.	2585.
SOx Limit	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
U3	524	459	510	483	510	548	585	578	535	523	524	535	544	610	614	601	628	635	635	574	414	563	512	548	467	523	585	608	614	602	505

Graph 9: SO_2 daily average emissions against emission limit for unit 3 for the month of May 2020

Interpretation:
All daily averages below SO2 emission limit of 3500 mg/Nm3.

Unit 4 SO_2 emissions

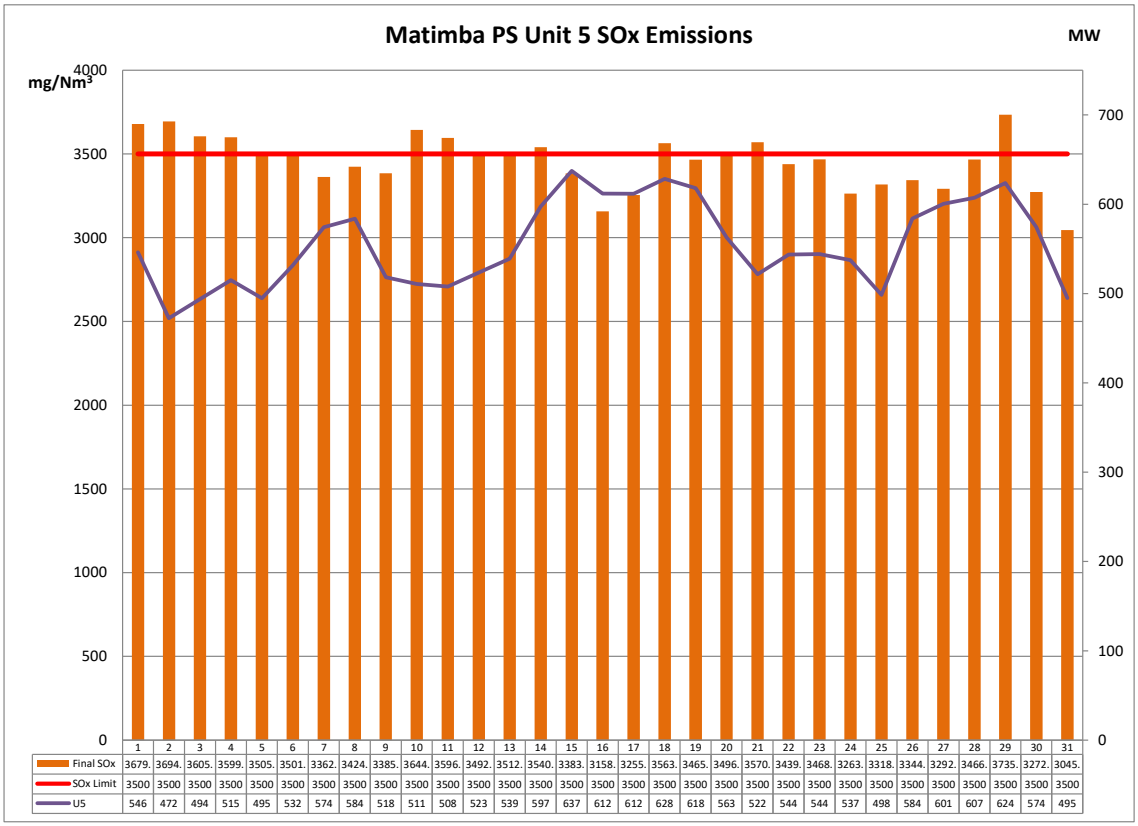


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final SOx	2864.	2941.	2826.	2876.	2876.	2876.	2668.	2671.	2757.	2884.	2877.	2773.	2751.	2787.	2699.	2512.	2551.	2820.	2722.	2784.	2826.	2773.	2770.	2594.	2680.	2664.	2512.	2664.	2846.	2552.	2352.
SOx Limit	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
U4	439	475	493	477	482	523	556	566	520	517	503	520	536	590	633	599	605	482	532	560	538	558	533	534	482	525	599	581	593	566	486

Graph 10: SO_2 daily average emissions against emission limit for unit 4 for the month of May 2020

Interpretation:
All daily averages below SO2 emission limit of 3500 mg/Nm3.

Unit 5 SO_2 emissions

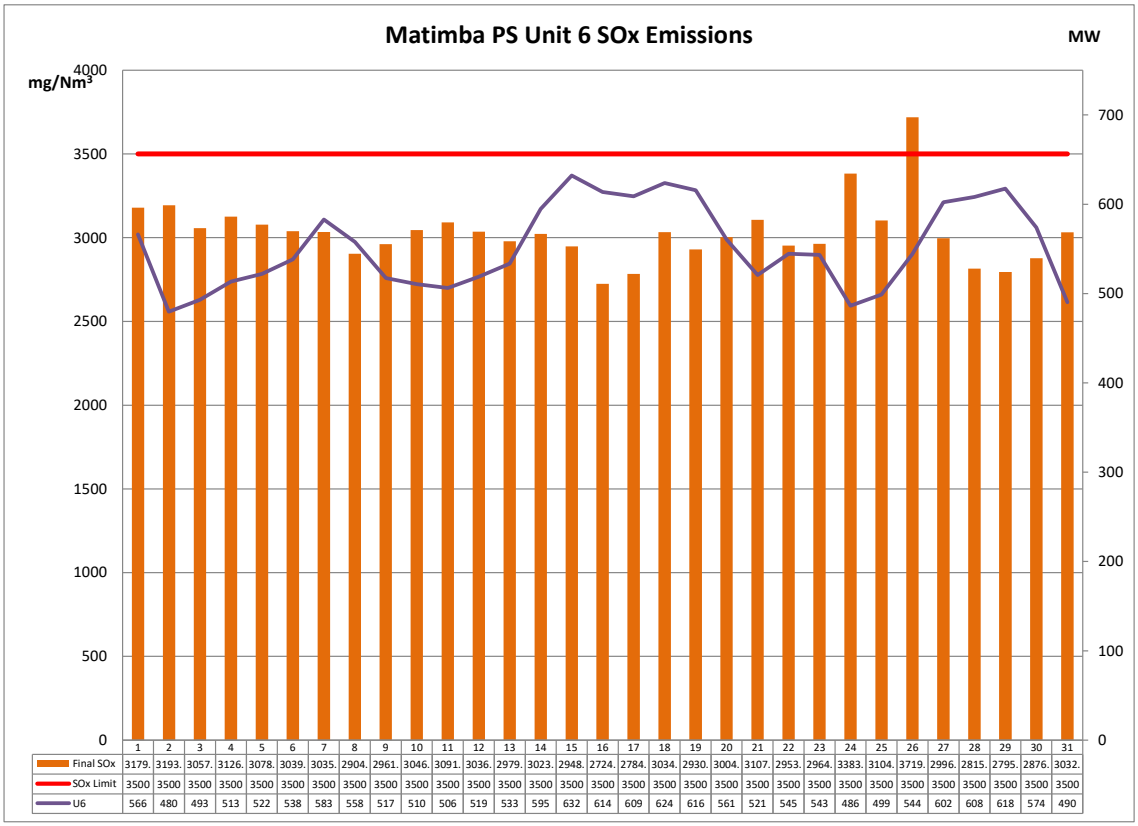


Graph 11: SO_2 daily average emissions against emission limit for unit 5 for the month of May 2020

Interpretation:
SO_2 emissions increased on the 1st to the 6th of May 2020, 10th and 11th of May 2020, 13th and 14th of May 2020, 18th of May 2020, 21st of May 2020 and 29th of May 2020. The monthly average emissions remained below the monthly limit of 3500mg/Nm^3 with the monthly average SO_2 emissions for May 2020 recorded as 3454mg/Nm^3.

It is suspected that the increases in SO_2 emissions are due to an increase in the sulphur content of the coal used in the combustion process.

Unit 6 SO_2 emissions



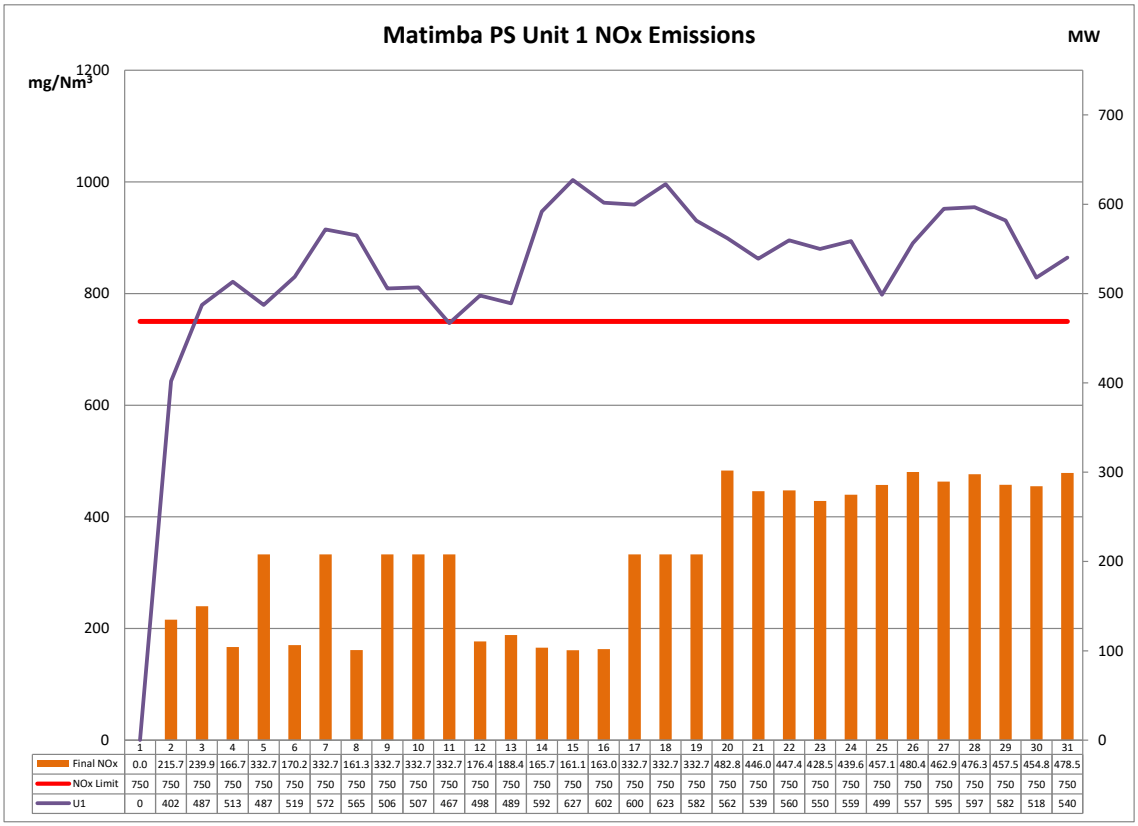
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final SOx	3179.	3193.	3057.	3126.	3078.	3039.	3035.	2904.	2961.	3046.	3091.	3036.	2979.	3023.	2948.	2724.	2784.	3034.	2930.	3004.	3107.	2953.	2964.	3383.	3104.	3719.	2996.	2815.	2795.	2876.	3032.
SOx Limit	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
U6	566	480	493	513	522	538	583	558	517	510	506	519	533	595	632	614	609	624	616	561	521	545	543	486	499	544	602	608	618	574	490

Graph 12: SO_2 daily average emissions against emission limit for unit 6 for the month of May 2020

Interpretation:
Average emission data for the month of May 2020 for Unit 6 SO_2 emissions was used for emissions from the 24th of May 2020 until the 31st of May 2020. Averages was used from the 24th of May 2020 to the 31st of May 2020 due to a defective monitor causing incorrect readings.

An increase in emissions were recorded on the 26th of May 2020. The monthly average emissions remained below the monthly limit of 3500mg/Nm^3 with the monthly average SO_2 emissions for May 2020 recorded as 3030mg/Nm^3.

Unit 1 NO_x emissions

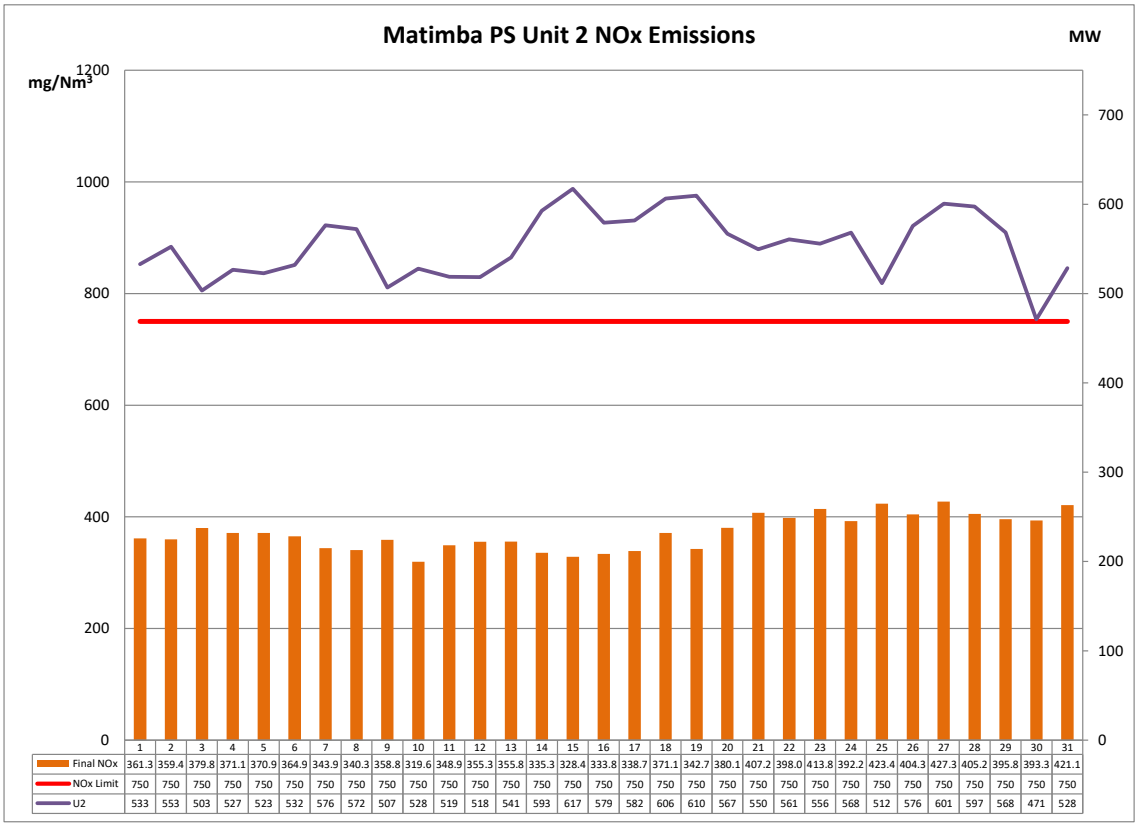


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final NOx	0.0	215.7	239.9	166.7	332.7	170.2	332.7	161.3	332.7	332.7	332.7	176.4	188.4	165.7	161.1	163.0	332.7	332.7	332.7	482.8	446.0	447.4	428.5	439.6	457.1	480.4	462.9	476.3	457.5	454.8	478.5
NOx Limit	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
U1	0	402	487	513	487	519	572	565	506	507	467	498	489	592	627	602	600	623	582	562	539	560	550	559	499	557	595	597	582	518	540

Graph 13: NO_x daily average emissions against emission limit for unit 1 for the month of May 2020

Interpretation:
All daily averages below NO_x emission limit of 750 mg/Nm^3.

Unit 2 NO_x emissions

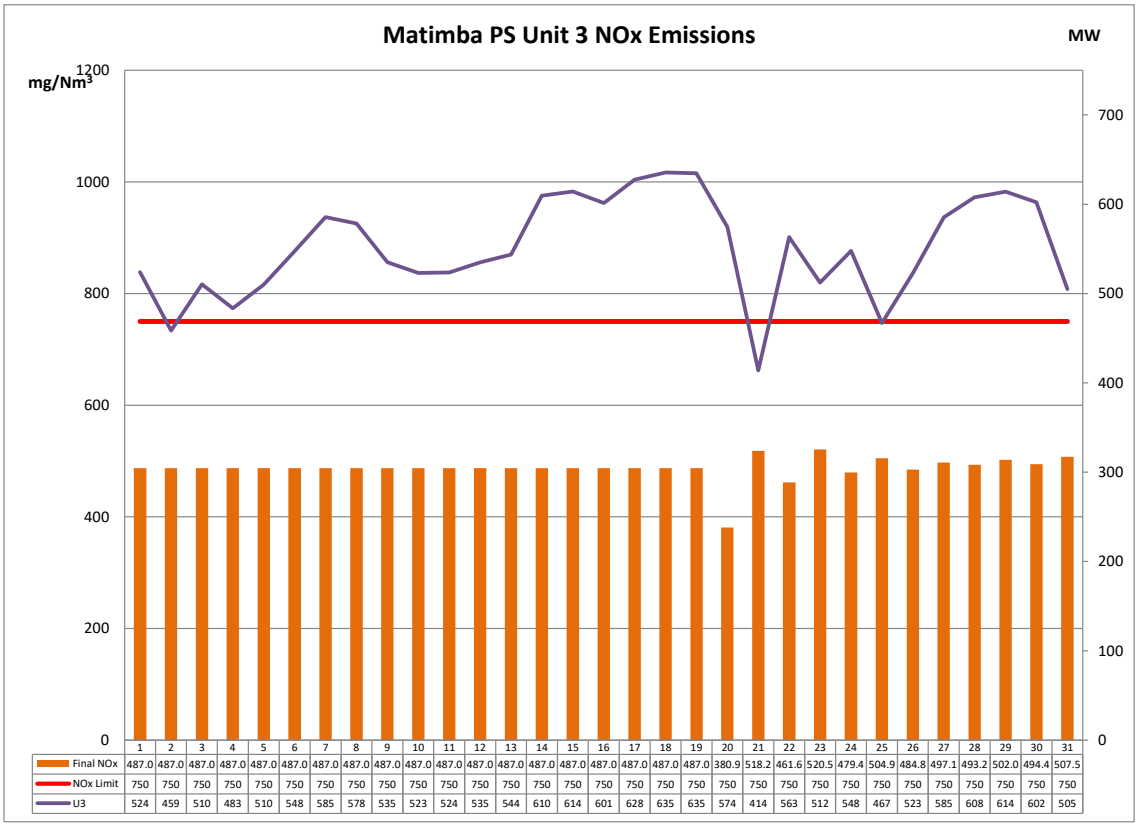


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final NOx	361.3	359.4	379.8	371.1	370.9	364.9	343.9	340.3	358.8	319.6	348.9	355.3	355.8	335.3	328.4	333.8	338.7	371.1	342.7	380.1	407.2	398.0	413.8	392.2	423.4	404.3	427.3	405.2	395.8	393.3	421.1
NOx Limit	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
U2	533	553	503	527	523	532	576	572	507	528	519	518	541	593	617	579	582	606	610	567	550	561	556	568	512	576	601	597	568	471	528

Graph 14: NO_x daily average emissions against emission limit for unit 2 for the month of May 2020

Interpretation:
All daily averages below NO_x emission limit of 750 mg/Nm^3.

Unit 3 NO_x emissions

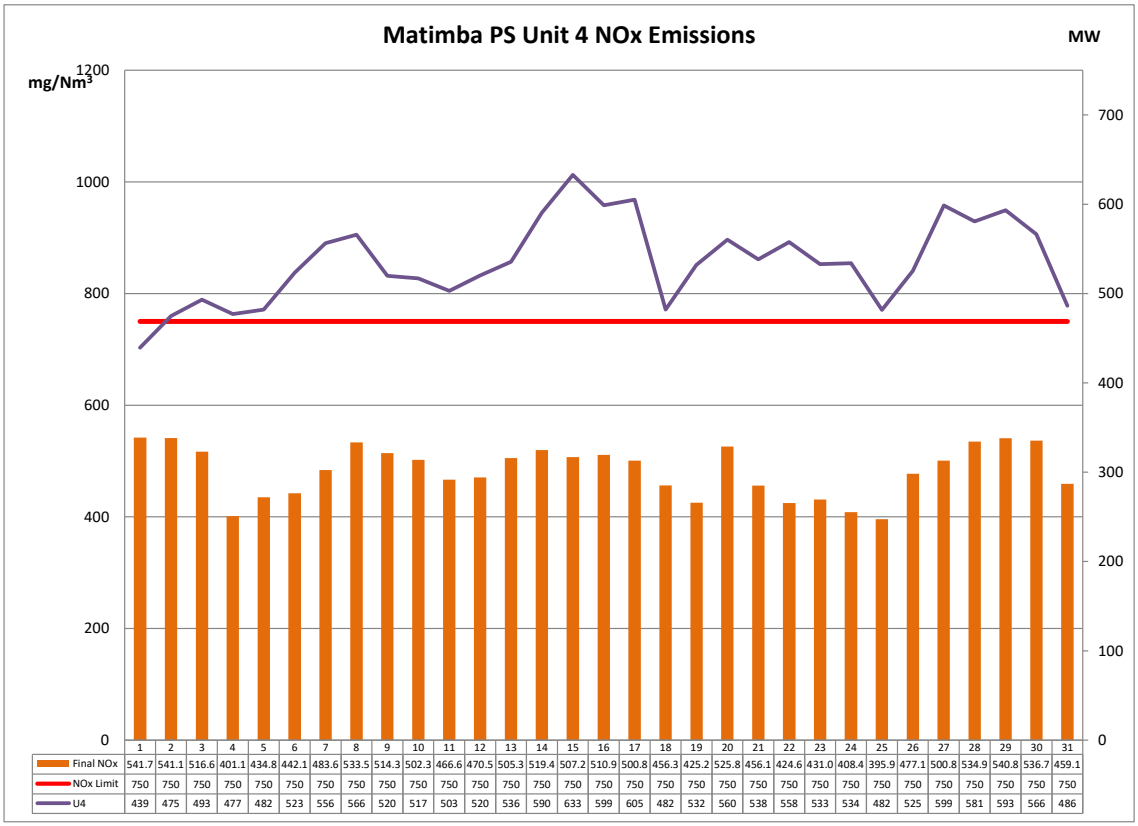


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final NOx	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	380.9	518.2	461.6	520.5	479.4	504.9	484.8	497.1	493.2	502.0	494.4	507.5
NOx Limit	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
U3	524	459	510	483	510	548	585	578	535	523	524	535	544	610	614	601	628	635	635	574	414	563	512	548	467	523	585	608	614	602	505

Graph 15: NO_x daily average emissions against emission limit for unit 3 for the month of May 2020

Interpretation:
All daily averages below NO_x emission limit of 750 mg/Nm^3.

Unit 4 NO_x emissions

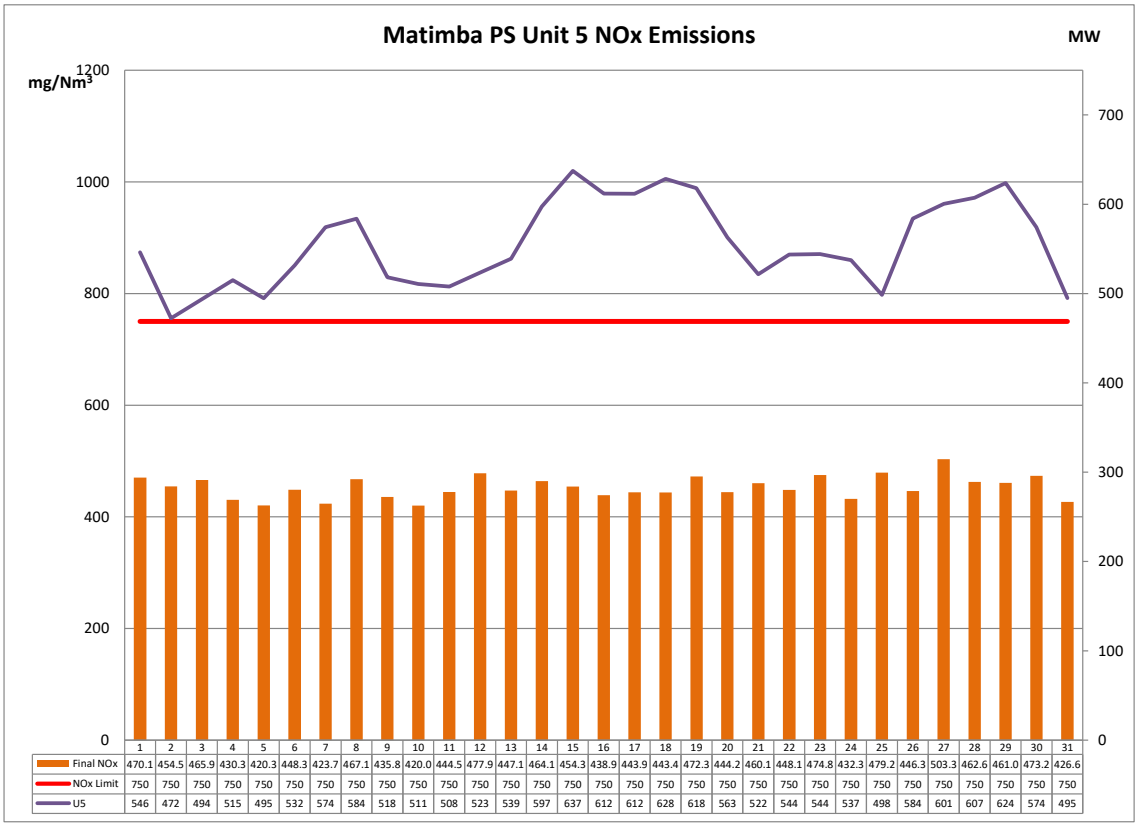


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final NOx	541.7	541.1	516.6	401.1	434.8	442.1	483.6	533.5	514.3	502.3	466.6	470.5	505.3	519.4	507.2	510.9	500.8	456.3	425.2	525.8	456.1	424.6	431.0	408.4	395.9	477.1	500.8	534.9	540.8	536.7	459.1
NOx Limit	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
U4	439	475	493	477	482	523	556	566	520	517	503	520	536	590	633	599	605	482	532	560	538	558	533	534	482	525	599	581	593	566	486

Graph 16: NO_x daily average emissions against emission limit for unit 4 for the month of May 2020

Interpretation:
All daily averages below NO_x emission limit of 750 mg/Nm^3.

Unit 5 NO_x emissions

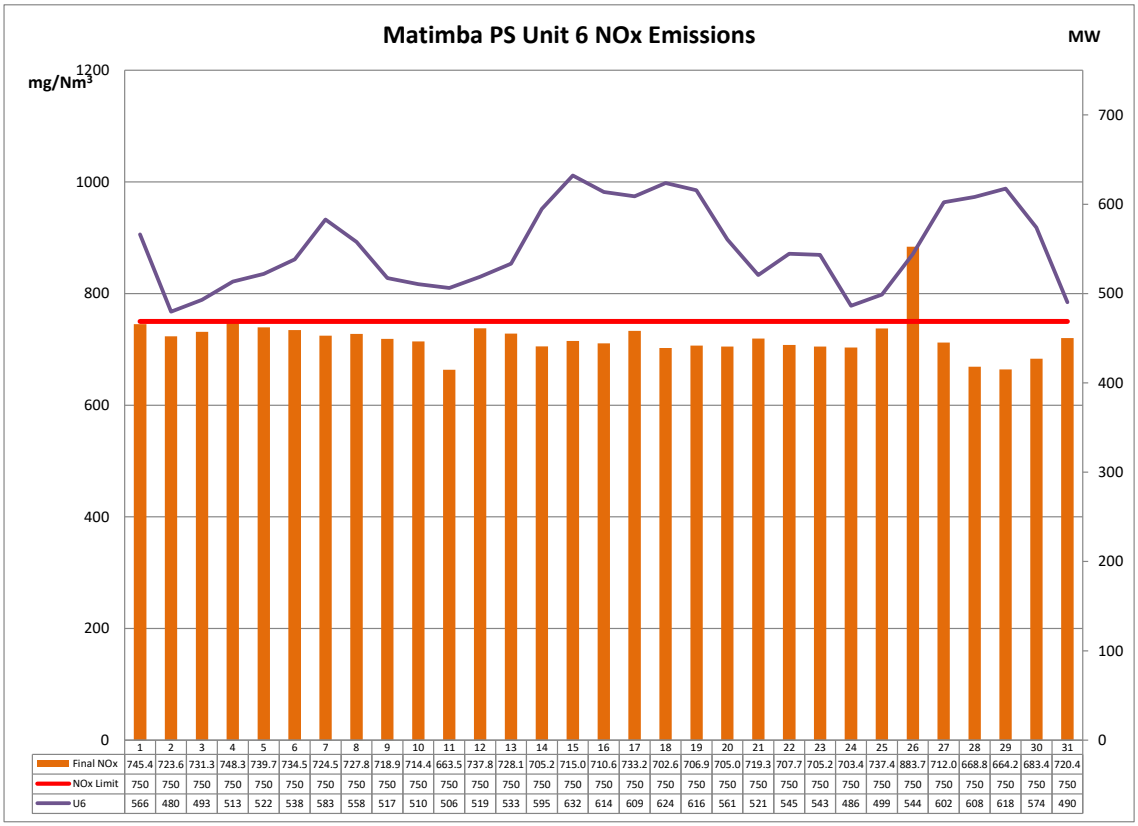


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final NOx	470.1	454.5	465.9	430.3	420.3	448.3	423.7	467.1	435.8	420.0	444.5	477.9	447.1	464.1	454.3	438.9	443.9	443.4	472.3	444.2	460.1	448.1	474.8	432.3	479.2	446.3	503.3	462.6	461.0	473.2	426.6
NOx Limit	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
U5	546	472	494	515	495	532	574	584	518	511	508	523	539	597	637	612	612	628	618	563	522	544	544	537	498	584	601	607	624	574	495

Graph 17: NO_x daily average emissions against emission limit for unit 5 for the month of May 2020

Interpretation:
All daily averages below NO_x emission limit of 750 mg/Nm^3.

Unit 6 NO_x emissions



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Final NOx	745.4	723.6	731.3	748.3	739.7	734.5	724.5	727.8	718.9	714.4	663.5	737.8	728.1	705.2	715.0	710.6	733.2	702.6	706.9	705.0	719.3	707.7	705.2	703.4	737.4	883.7	712.0	668.8	664.2	683.4	720.4
NOx Limit	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
U6	566	480	493	513	522	538	583	558	517	510	506	519	533	595	632	614	609	624	616	561	521	545	543	486	499	544	602	608	618	574	490

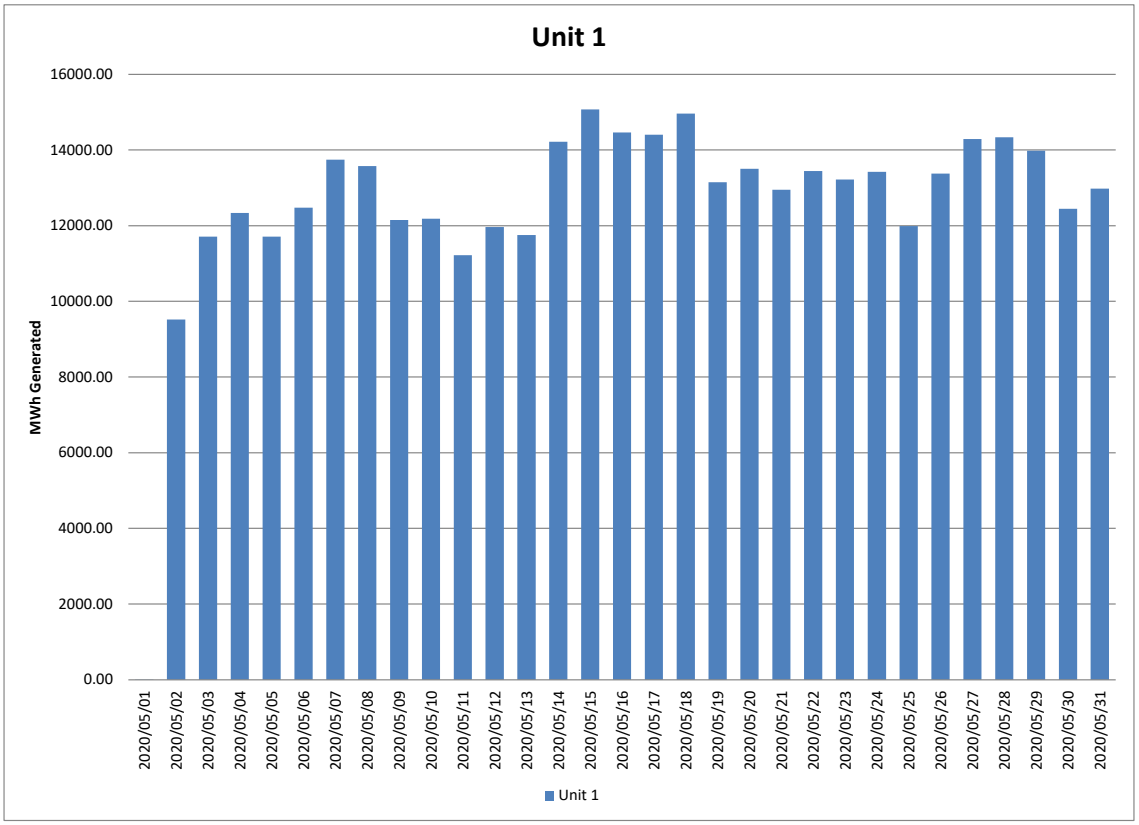
Graph 18: NO_x daily average emissions against emission limit for unit 6 for the month of May 2020

Interpretation:
Unit 6 exceeded the daily average NO_x limit on the 26th of May 2020. The exceedance has been investigated and was determined to be due to an incorrect setting on the gaseous monitor. The monitor has since been repaired and emission figures normalised.

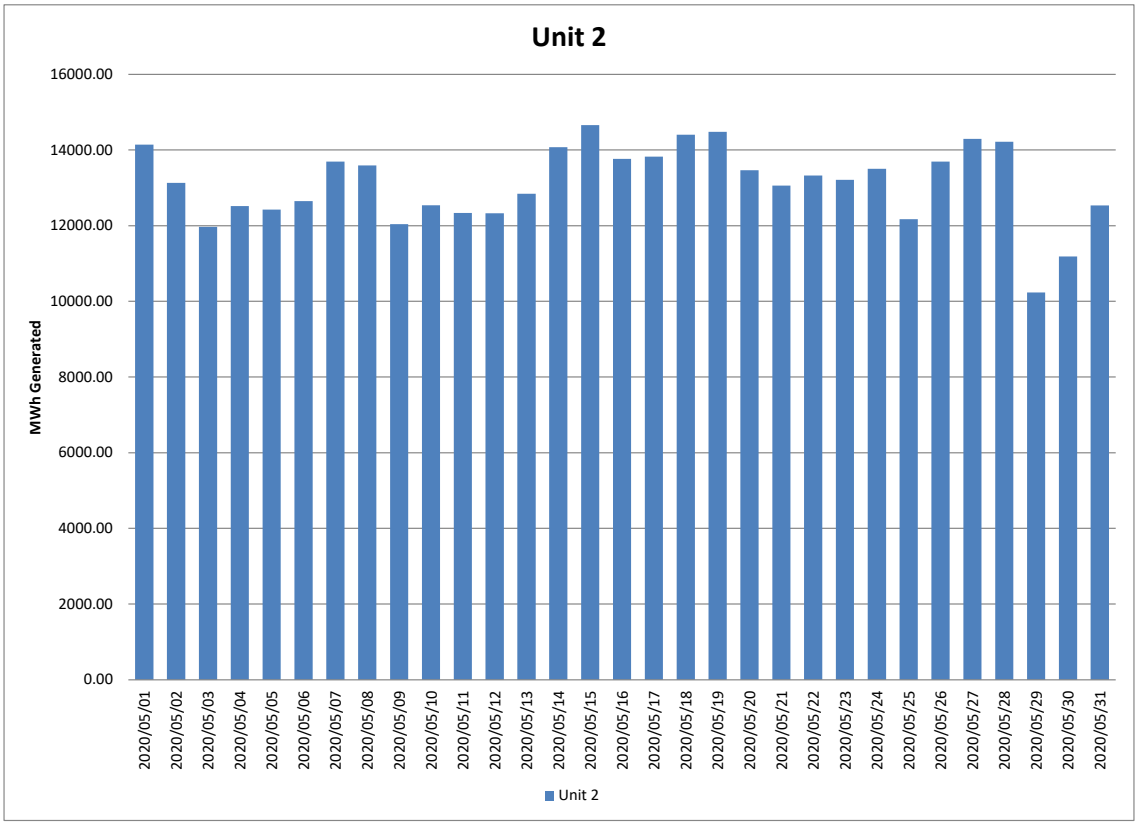
Table 4: Daily power generated per unit in MWh for the month of May 2020

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2020/05/01	1.07	14142.33	12252.53	9187.67	13000.60	13501.47
2020/05/02	9522.40	13129.47	10649.53	11359.73	11244.40	11406.40
2020/05/03	11713.00	11968.60	11884.33	11789.07	11751.10	11717.13
2020/05/04	12332.87	12519.73	11245.40	11402.33	12259.30	12220.53
2020/05/05	11710.73	12425.00	11862.07	11528.87	11779.90	12406.80
2020/05/06	12476.73	12647.60	12768.67	12511.67	12656.30	12802.13
2020/05/07	13744.73	13690.67	13674.93	13300.93	13669.40	13864.27
2020/05/08	13577.00	13592.27	13511.20	13524.27	13893.60	13288.67
2020/05/09	12153.07	12040.60	12475.60	12429.67	12340.80	12318.00
2020/05/10	12180.80	12540.67	12183.60	12357.47	12156.80	12138.40
2020/05/11	11221.00	12333.27	12201.93	12026.00	12093.20	12049.73
2020/05/12	11963.13	12328.93	12469.20	12438.87	12460.00	12341.60
2020/05/13	11750.40	12844.07	12675.67	12800.07	12828.10	12702.47
2020/05/14	14217.93	14076.87	14252.60	14110.33	14215.30	14168.13
2020/05/15	15070.47	14654.73	14366.73	15123.33	15167.00	15050.47
2020/05/16	14461.60	13764.07	14069.07	14314.87	14562.30	14606.40
2020/05/17	14405.53	13825.60	14686.27	14459.27	14564.80	14485.33
2020/05/18	14958.20	14405.00	14880.93	9172.27	14956.50	14832.60
2020/05/19	13147.27	14476.00	14866.20	4147.07	14707.40	14647.73
2020/05/20	13505.47	13466.20	13403.80	13391.27	13398.90	13323.13
2020/05/21	12948.73	13059.73	8978.00	12867.80	12418.70	12377.93
2020/05/22	13446.33	13322.73	13102.07	13326.80	12941.30	12944.93
2020/05/23	13218.20	13212.13	11895.47	12737.53	12956.80	12931.20
2020/05/24	13423.33	13502.07	12743.00	12764.67	12791.00	11554.20
2020/05/25	11991.40	12171.33	10808.13	11516.67	11868.60	11854.87
2020/05/26	13375.93	13692.53	12129.40	12557.93	13901.70	12939.60
2020/05/27	14291.93	14294.80	13649.67	14304.67	14294.90	14319.53
2020/05/28	14334.53	14216.60	14197.87	13878.80	14459.30	14486.20
2020/05/29	13981.93	10235.47	14330.73	14180.00	14845.30	14690.67
2020/05/30	12444.87	11185.20	14044.87	13539.13	13674.60	13643.47
2020/05/31	12977.33	12535.20	11705.47	11625.40	11783.00	11659.73

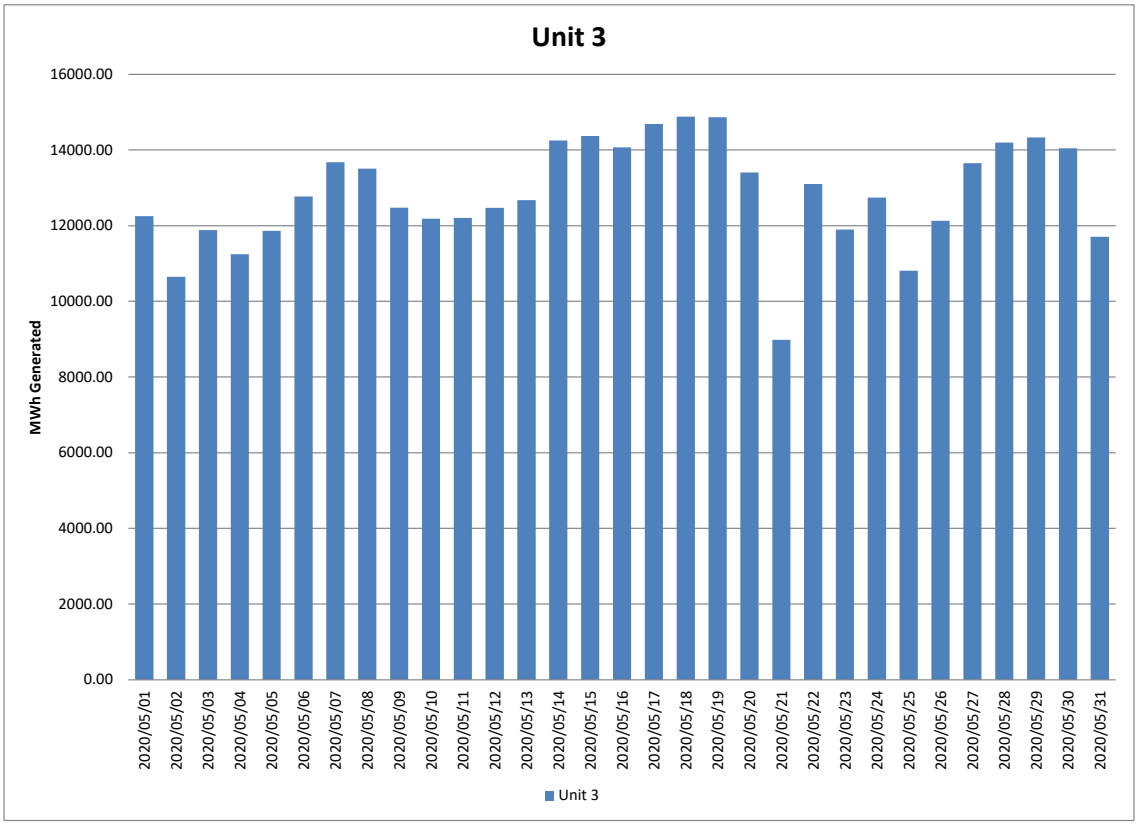
Graph 19: Unit 1 daily generated power in MWh for the month of May 2020



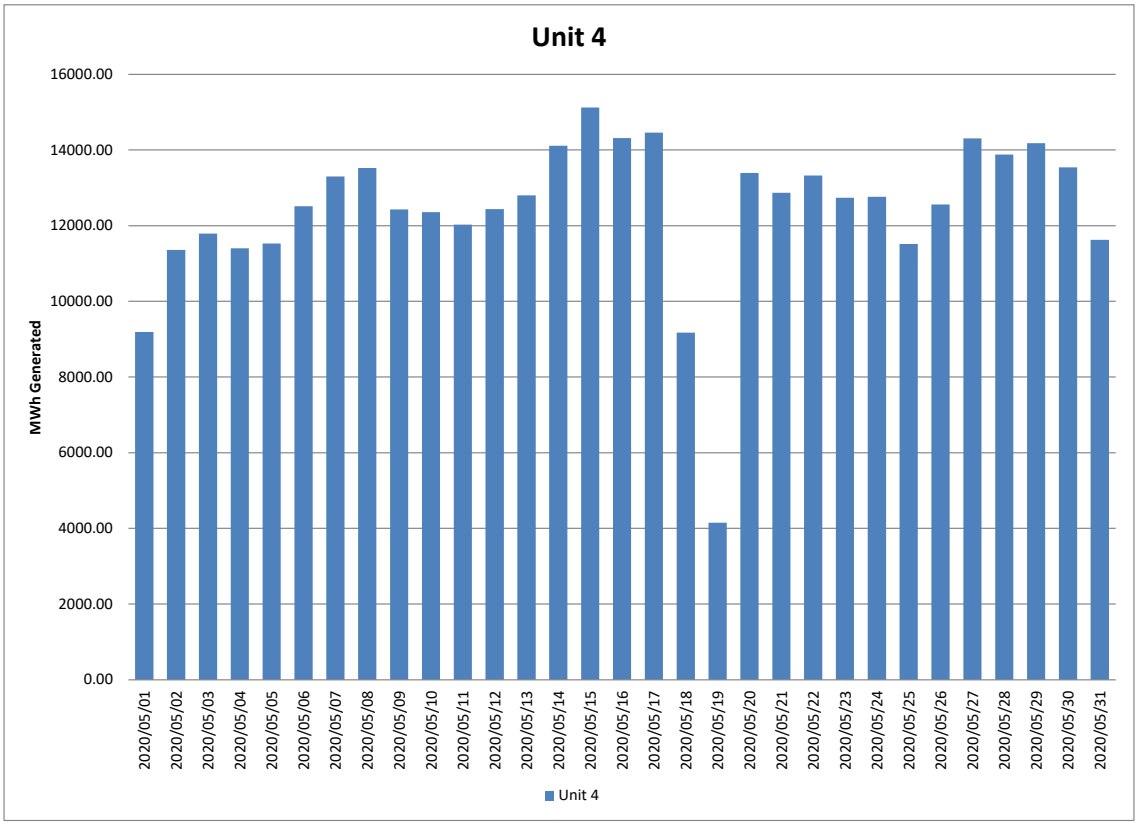
Graph 20: Unit 2 daily generated power in MWh for the month of May 2020



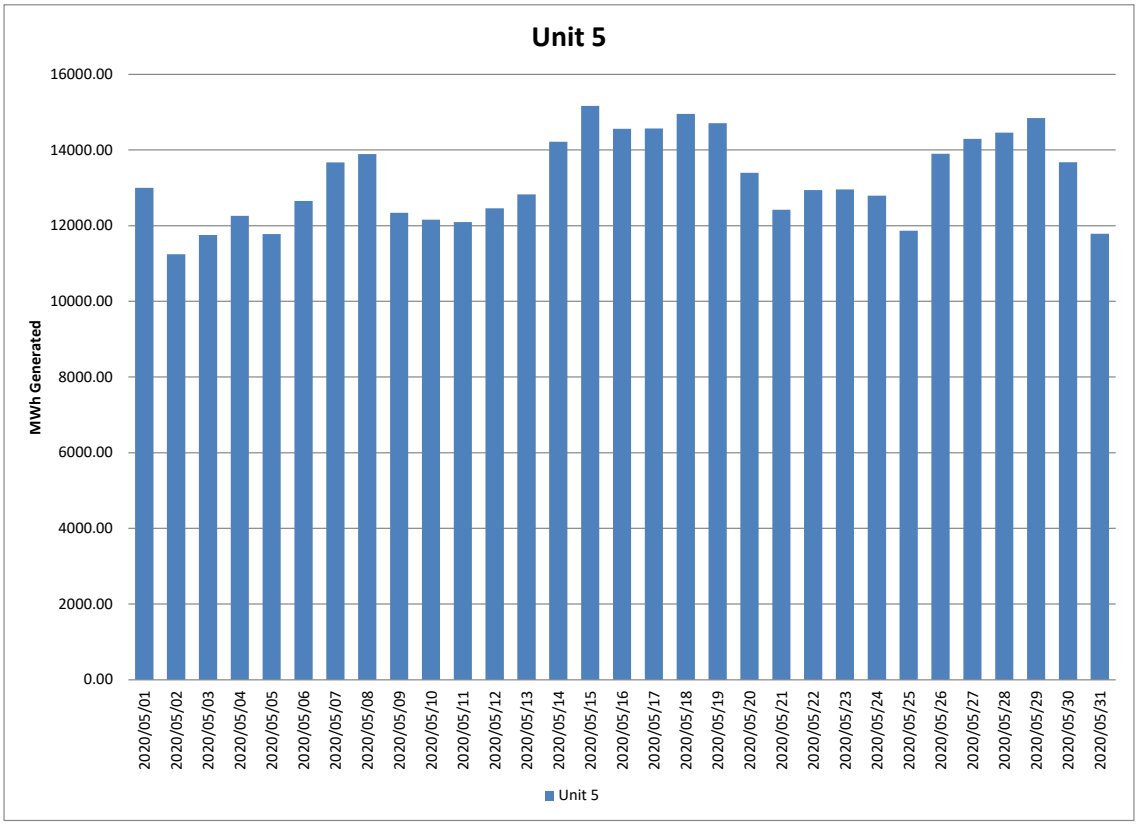
Graph 21: Unit 3 daily generated power in MWh for the month of May 2020



Graph 22: Unit 4 daily generated power in MWh for the month of May 2020



Graph 23: Unit 5 daily generated power in MWh for the month of May 2020



Graph 24: Unit 6 daily generated power in MWh for the month of May 2020

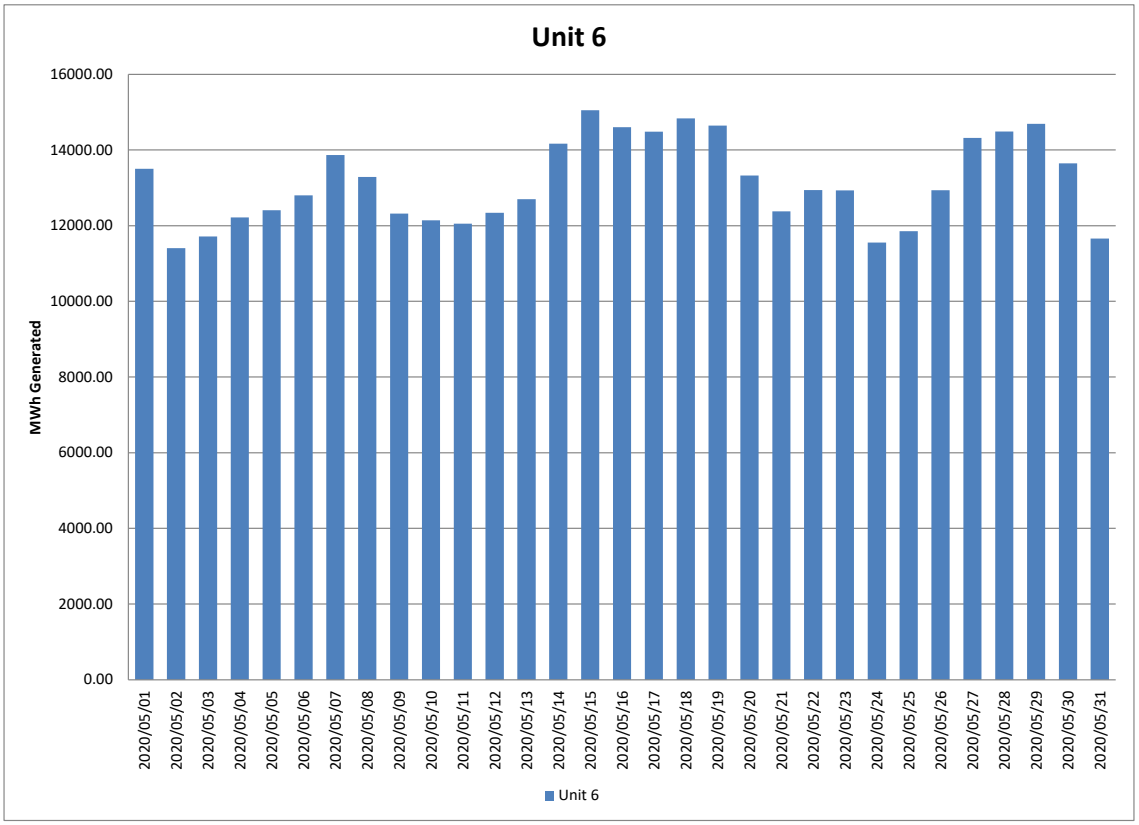


Table 5: Pollutant tonnages for the month of May 2020

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	18.7	3 914.8	682.4
Unit 2	27.5	5 791.5	921.4
Unit 3	40.3	3 031.9	936.8
Unit 4	28.6	5 732.1	1 021.1
Unit 5	12.0	6 755.2	886.6
Unit 6	32.4	5 933.1	1 412.3
SUM	159.4	31 158.6	5 860.6

Table 6: Reference values for data provided.

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	6.99	7.69	7.96	7.04	8.76	9.34
Moisture	%	2.76	3.67	2.54	5.19	3.95	4.70
Velocity	m/s	24.4	29.5	23.9	25.3	25.9	27.1
Temperature	°C	137.1	127.7	137.7	129.8	131.2	123.6
Pressure	mBar	937.1	942.2	932.6	934.0	931.5	926.2

Start-up information.

Table 7: Start-up information

Unit	4	
Fires in	19H19	2020-04-30
Synchronization with Grid	00H56	2020-05-01
Emissions below limit	02H00	2020-05-01
Fires in to synchronization	5.616	Hours
Synchronization to < Emission limit	1.067	Hours

Unit	4	
Fires in	01H59	2020-05-01
Synchronization with Grid	04H03	2020-05-01
Emissions below limit	04H03	2020-05-01
Fires in to synchronization	2.067	Hours
Synchronization to < Emission limit	0.000	Hours

Unit	1	
Fires in	16H50	2020-05-01
Synchronization with Grid	00H21	2020-05-02
Emissions below limit	08H20	2020-05-02
Fires in to synchronization	7.517	Hours
Synchronization to < Emission limit	7.983	Hours

Unit	1	
Fires in	14H21	2020-05-19
Synchronization with Grid	15H50	2020-05-19
Emissions below limit	15H50	2020-05-19
Fires in to synchronization	1.483	Hours
Synchronization to < Emission limit	0.000	Hours

Unit	4	
Fires in	13H22	2020-05-19
Synchronization with Grid	16H14	2020-05-19
Emissions below limit	16H14	2020-05-19
Fires in to synchronization	2.866	Hours
Synchronization to < Emission limit	0.000	Hours

Unit	3	
Fires in	19H54	2020-05-21
Synchronization with Grid	22H40	2020-05-21
Emissions below limit	23H00	2020-05-21
Fires in to synchronization	2.767	Hours
Synchronization to < Emission limit	0.333	Hours

Unit	2	
Fires in	12H37	2020-05-29
Synchronization with Grid	15H10	2020-05-29
Emissions below limit	16H13	2020-05-29
Fires in to synchronization	2.550	Hours
Synchronization to < Emission limit	1.050	Hours

Emergency Generation

Table 8: Emergency Generation.

	Unit 1	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**	**Unit 6**
Emergency Generation hours declared by national Control	121	129	133	130	139	139
Emergency Hours declared including hours after stand down	146	156	160	157	168	168
Days over the Limit during Emergency Generation	0	0	0	0	0	0

Complaints Register

Table 9: Complaints.

Source Code/ Name	**Root Cause Analysis**	**Calculation of Impacts/ emissions associated with the incident**	**Dispersion modeling of pollutants where applicable**	**Measures implemented to prevent reoccurrence**	**Date by which measure will be implemented**
None					

Table 10: Total volatile compound estimates.

Eskom

LATION OF EMISSIONS OF TOTAL VOLATILE COMPOUNDS FROM FUEL OIL STORAGE

Date:	Monday, 17 August 2020
Station:	Matimba Power Station
Province:	Limpopo Province
Tank no.	1-4
Description:	Outdoor fuel oil storage tank
Tank Type:	Vertical fixed roof (vented to atmosphere)
Material stored:	Fuel Oil 150

MONTHLY INPUT DATA FOR THE STATION

Please only insert relevant monthly data inputs into the *blue cells* below
Choose from a dropdown menu in the *green cells*
The total VOC emissions for the month are in the *red cells*

IMPORTANT: Do not change ***any*** other cells without consulting the AQ CoE

MONTH:	**May**	
GENERAL INFORMATION:	**Data**	**Unit**
Total number of fuel oil tanks:	4	NA
Height of tank:	13.34	m
Diameter of tank:	9.53	m
Net fuel oil throughput for the month:	***563.351***	tons/month
Molecular weight of the fuel oil:	166.00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	**Data**	**Unit**
Daily average ambient temperature	19.51	°C
Daily maximum ambient temperature	28.42	°C
Daily minimum ambient temperature	12.06	°C
Daily ambient temperature range	15.04	°C
Daily total insolation factor	3.91	kWh/m²/day
Tank paint colour	***Grey/medium***	NA
Tank paint solar absorbtance	0.68	NA
FINAL OUTPUT:	**Result**	**Unit**
Breathing losses:	0.54	kg/month
Working losses:	0.02	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	**0.56**	**kg/month**

*Calculations performed on this spreadsheet are taken from the USEPA AP-42- Section 7.1 Organic Liquid Storage Tanks - January 1996. This spreadsheet is derived from materials provided by Jimmy Peress, PE, Tritech Consulting Engineers, 85-93 Chevy Chase Street, Jamaica, NY 11432 USA, Tel - 718-454-3920, Fax - 718-454-6330, e-mail - PeressJ@nyc.rr.com.

Table 11: Average % availability of monitors for the month of May 2020.

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	*100,0*	*98,1*	*40,0*	*38,1*
Unit 2	*100,0*	*100,0*	*100,0*	*100,0*
Unit 3	*100,0*	*45,9*	*36,3*	*36,6*
Unit 4	*100,0*	*100,0*	*100,0*	*100,0*
Unit 5	*100,0*	*100,0*	*100,0*	*100,0*
Unit 6	*100,0*	*100,0*	*100,0*	*75,9*

Monitor availability below the target of 90% was experienced at the gaseous monitors of Unit 1, Unit 3 and Unit 6. Unit 1 and Unit 3 were repaired on the 20th of May 2020. Unit 6 became defective on the 24th of May 2020 and was repaired on the 2nd of June 2020.

Ambient Air quality Monitoring

Four exceedances of the SO_2 National 10-minute limit and three exceedances of the SO_2 national hourly limit were noted for the month of May 2020. No other exceedances were recorded.

Ambient CO, PM2.5, PM10 and NO2 concentrations at Marapong monitoring site show influence of emissions from low level sources in the area while ambient SO2 concentrations show influence of tall stack emitters.

The average data recovery for the period was 86.9% and the station availability was 99.5%.

Detailed results can be found in Attachment 1, “Marapong air quality monthly report for May 2020”.

General

Name and reference number of the monitoring method used:

1. Particulate and gas monitoring according to standards
    a. BS EN 14181:2004 - Quality Assurance of Automated Measuring Systems
    b. ESKOM internal standard 240-56242363 Emissions Monitoring and Reporting Standard

Sampling locations:

1. Stack one
    a. Particulates:
        i. S23^0 40' 2.8" E027^0 36' 34.8" 175m from ground level and 75m from the top.
    b. Gas:
        i. S23^0 40' 2.8" E027^0 36' 34.8" 100m from ground level and 150m from the top.
    c. Stack height
        i. 250 meter consist of 3 flues
2. Stack two
    a. Particulates:
        i. S23^0 40' 14.8" E027^0 36' 47.5" 175m from ground level and 75m from the top.
    b. Gas:
        i. S23^0 40' 14.8" E027^0 36' 47.5" 100m from ground level and 150m from the top.
    c. Stack height
        i. 250 meter consist of 3 flues

Unit 1

1. 0 out of 32 precipitator fields is out of service.
1. No abnormalities on the SO_3 plant. Preventative maintenance done during the month.

Unit 2

1. 4 out of 32 precipitator fields is out of service. Repairs will be done during the next opportunity outage.
2. No abnormalities on the SO_3 plant. Preventative maintenance done during the month.

Unit 3

1. 2 out of 32 precipitator fields is out of service. Repairs will be done during the next opportunity outage.
2. No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 4

1. All precipitator fields in service.
2. No abnormalities on the SO3 plant.

Unit 5

1. All precipitator fields in service.
2. No abnormalities on the SO_3 plant.

Unit 6

1. 3 out of 32 precipitator fields is out of service. Repairs will be done during the next opportunity outage.
2. No abnormalities on the SO_3 plant. Preventative maintenance done during the month.

SO3 common plant

1. No abnormalities on the sulphur storage plant.

CEMs

1. No adjustments done on the CEMs. Calibration is done every second week.

Particulate monitors

2. No downtime or repairs done on the particulate monitors.

Air quality improvements

1. None

Social responsibility conducted

No campaigns conducted in May 2020

Sampling dates and times

1. Continuous

Attachments

Marapong monthly Feedback May 2020

The rest of the information demonstrating compliance with the emission license conditions is supplied in the annual emission report sent to your office.

Hoping the above will meet your satisfaction.

I hereby declare that the information in this report is correct.

Yours sincerely

Mabotja O. Mabotja 2020/08/20

GENERAL MANAGER: MATIMBA POWER STATION

RESEARCH, TESTING AND DEVELOPMENT

SUSTAINABILITY DEPARTMENT

MARAPONG AIR QUALITY MONTHLY REPORT

MAY 2020

EXECUTIVE SUMMARY

This monthly report covers the ambient air quality data as monitored at Marapong monitoring site in May 2020.

The average data recovery for the monitoring period was 86.9% and the station availability was 99.5%.

There were four exceedances of the SO_2 national 10-minute limit and three exceedances of the SO_2 national hourly limit recorded during the monitoring period. There were no exceedances of the other national ambient air quality limits for the other parameters recorded during the period under review.

Ambient CO, $PM_{2.5}$, PM_{10} and NO_2 concentrations at Marapong monitoring site show influence of emissions from low level sources in the area while ambient SO_2 concentrations show influence of tall stack emitters.

DISCLAIMER

1. INTRODUCTION

At the request of Eskom Environmental Management, Research, Testing and Development Department (RT&D) commissioned an ambient air quality monitoring site at Marapong Township to assess impacts from Matimba Power Station and other pollution source emissions in the area.

The Marapong site is equipped for continuous monitoring of ambient concentrations of sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), mercury (Hg) and fine particulate matter (FPM) of particulate sizes <10µm and <2.5µm in diameter (PM_{10} and $PM_{2.5}$). In addition, meteorological parameters of wind velocity (WVL), wind direction (WDR) and ambient temperature (TMP) were also recorded.

Standard Specifications, Equipment/Techniques used for the measurement of SO_2, O_3 and NO_x conform to US-EPA equivalent method No EQSA-0486-060, EQOA-0880-047 and RFNA-1289-074 respectively.

This report has been compiled and submitted in accordance with the Conditional Authorisation issued in respect of The Construction of the Proposed Eskom Holdings Limited: Generation Division 4800MW Medupi Coal-Fired Power Station and Associated Infrastructure near Lephalale (Ref:12/12/20/695), especially in respect of condition 3.2.1 Air Quality Management. The results presented are compared to the National Air Quality Standards, as published in DEA discussion document, Ref: AQM&CC/24/10/07/4. In addition, this monitoring is undertaken as part of Eskom's Environmental Management Plan and to further validate the CALPUFF dispersion model that was utilized in the original EIA, but was consistently over predicting. The results of the study will be tested

for compliance against the national ambient air quality standards. The monitoring site is accredited by the South African National Accreditation System (SANAS).

2. SITE LOCATION

The monitoring site is located in Marapong at co-ordinates: S23° 39' 21.8" E27° 37' 41.3" and was commissioned in September 2006 (Figure 1).

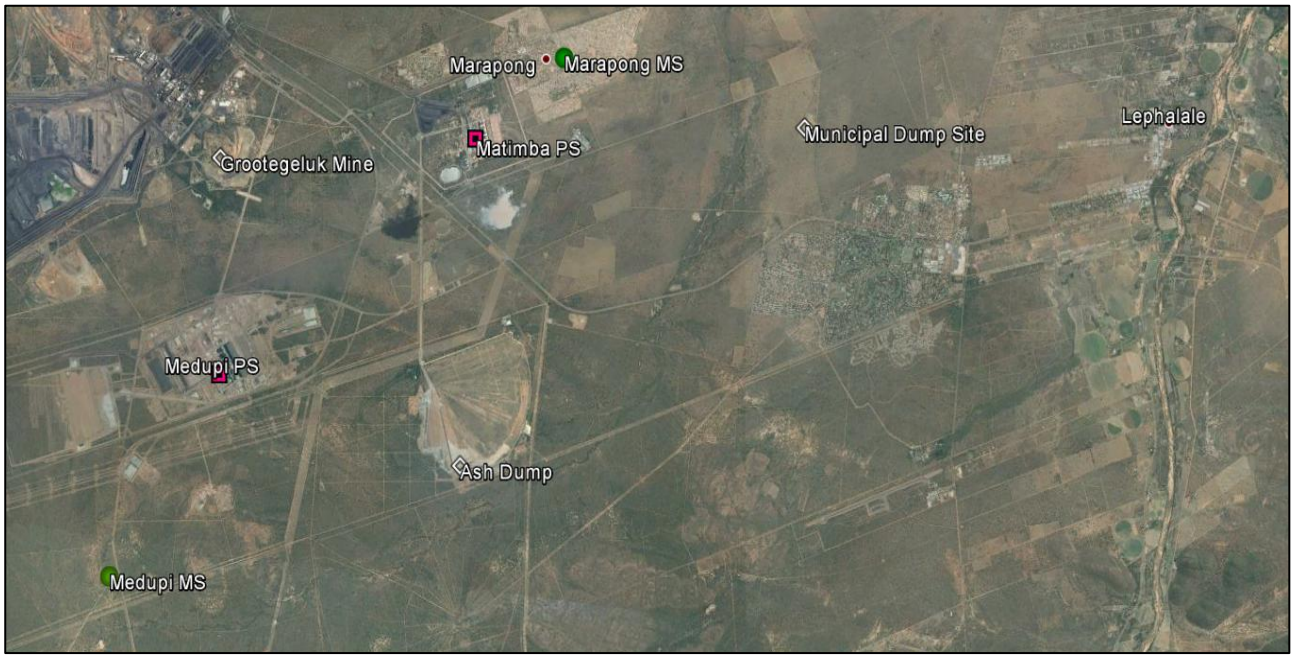


Figure 1: Marapong air quality monitoring site in relation to Matimba Power Station and other pollution sources.

3. DATA RECOVERY

The SANAS guideline figure of 90% per parameter monitored is used as a standard for representative data capture. This describes the required completeness of data set for the reporting of averages and is based on standard arithmetic calculations. The completeness calculations for data sets exclude zero and span data and times where service and/or maintenance is being conducted on the instruments in question.

Availability is a management definition related to system reliability. The availability target is not set in terms of data quality criteria and has no associated quality objectives. A target of 100% availability has been set for performance evaluation. Availability is reported as a measure of the percentage of time that electrical power was available to the monitoring station.

Table 1: Percentage Data Recovery for May 2020

Month	NO_1	NO_2	NO_X	O_3	SGT	SO_2	TMP	WDR	WSP	WVL	$PM_{2.5}$	PM_{10}	CO	HG	HUM	Data Rec	Station Avail.
May	99.3	99.5	99.5	0	99.9	99.5	99.9	99.9	99.9	99.9	30	30	99.3	96.2	99.9	86.9	99.5

The average data recovery for the period was 86.9% and the station availability was 99.5%. The low data capture of 30% recorded for both $PM_{2.5}$ and PM_{10} analysers was because the pumps of the analysers ceased after power interruptions. There were no data recorded for ozone since the analyser was removed for repairs.

4. SUMMARY OF RESULTS FOR REPORTED PERIOD

Table 2 presents the National Ambient Air Quality Standards and Table 3 is a summary report presenting the highest mean concentrations and the number of exceedances above the respective national air quality standards for each measured parameter.

Table 2: National Ambient Air Quality Standards

Pollutant	Unit	Period	Limit	Number of annual exceedances allowed	Source
Carbon Monoxide	ppm	1hr	26	88	DEA
Carbon Monoxide	ppm	8hr	8.7	11	DEA
PM_{10}	$\mu g/m^3$	24hr	75	4	DEA
PM_{10}	$\mu g/m^3$	1year	40	0	DEA
$PM_{2.5}$	$\mu g/m^3$	24hr	40	4	DEA
$PM_{2.5}$	$\mu g/m^3$	1year	20	0	DEA
Nitrogen dioxide	ppb	1year	21	0	DEA
Nitrogen dioxide	ppb	1hr	106	88	DEA
Ozone	ppb	8hr	61	11.	DEA
Sulphur dioxide	ppb	1hr	134	88	DEA
Sulphur dioxide	ppb	10min	191	526	DEA
Sulphur dioxide	ppb	24hr	48	4	DEA
Sulphur dioxide	ppb	1year	19	0	DEA

Table 3: Summary report of parameters at Marapong monitoring site for May 2020

Pollutant	Highest Hourly Mean	No of Hourly National Limit Exceedances	Highest Daily Mean	No of Daily National Limit Exceedances	No of 8hr Moving Average Limit	Highest 10min Mean	No of 10min National Limit Exceedances
FPM (PM-2.5) by Beta gauge [ug/m^3]	177.5		37.1	0		239.5	
FPM (PM-10) by Beta gauge [ug/m^3]	293.3		66.8	0		386.5	
Nitric oxide [ppb]	100.9		15.1			185.7	
Nitrogen dioxide [ppb]	47.4	0	13.9			55.1	
Nitrogen oxide [ppb]	125.1		27.2			208.4	
Ozone [ppb]					0		
Sigma theta [deg]	50.4		27.3			76.4	
Sulphur dioxide [ppb]	188.3	3	26.6	0		439.3	4
Ambient temperature [deg C]	32.9		24.2			33.3	
Wind speed [m/s]	4.9		1.9			6.	
Wind velocity [m/s]	4.7		1.7			5.9	

There were four exceedances of the SO_2 national 10-minute limit and three exceedances of the SO_2 national hourly limit recorded during the monitoring period. No other exceedances of the other parameters were recorded during the period under review.

Table 4: Exceedance table

SO_2 10-minute exceedances						
Pollutant	**Limit**	**Year**	**Month**	**Day**	**Time**	**Conc. (ppb)**
SO_2	191	2020	05	27	13:30	217.1
SO_2	191	2020	05	27	14:10	222.2
SO_2	191	2020	05	29	13:10	194.2
SO_2	191	2020	05	29	13:20	439.3

SO_2 hourly exceedances								
Pollutant	**Limit**	**Year**	**Month**	**Day**	**Time**	**Conc.**	**WSP**	**WDR**
SO_2	134	2020	05	27	14:00	143.9	0.79	WSW
SO_2	134	2020	05	27	15:00	137.5	0.72	W
SO_2	134	2020	05	29	13:00	188.3	0.93	SSW

Figure 2 shows the daytime and night-time wind roses for the reporting period. The centre of the wind rose depicts the position of the air quality monitoring station. The positions of the spokes in the polar diagram represent directions from which the wind was blowing. The length of the segment indicates the percentage of the time the wind blew from that direction and the speed in the various categories are denoted by colours and width.

The dominant wind directions during the daytime were north-east, east-north-east and north-north-east. During the night, the most frequent directions were east, south-south-east and south-south-west.

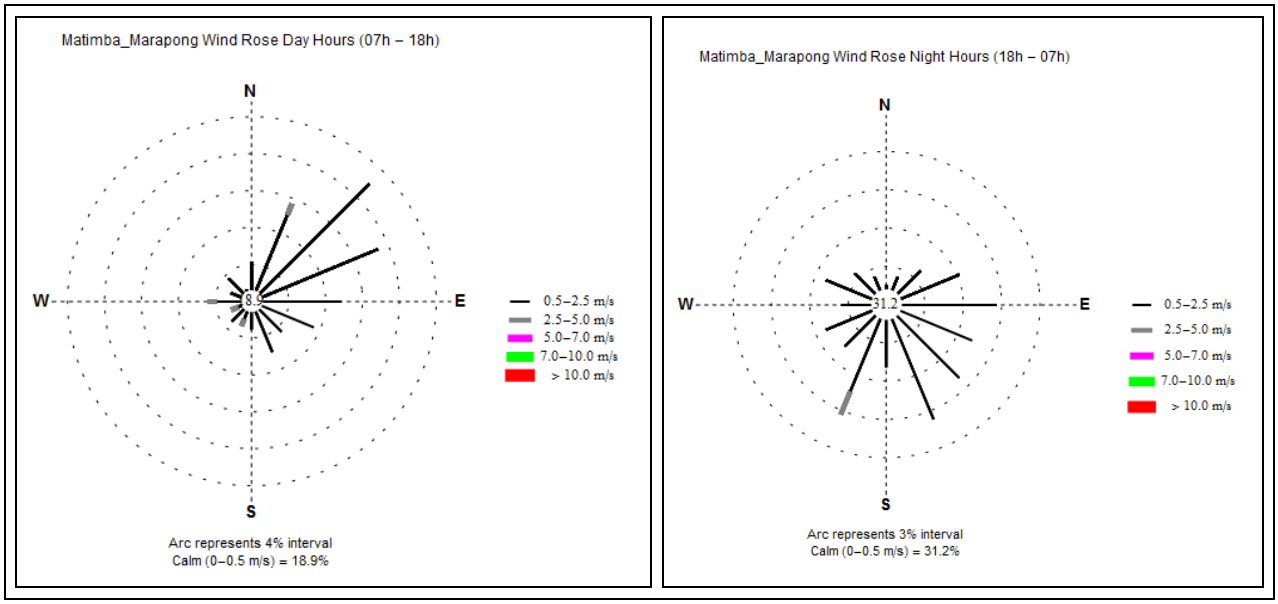


Figure 2: Wind roses at Marapong monitoring site during day and night hours

6. DISCUSSION OF POLLUTANTS

Emissions of primary pollutants such as PM_{10}, $PM_{2.5}$, SO_2 and NO_X from low level sources such as domestic combustion, motor vehicles and smouldering dumps are expected to impact at ground level more significantly during the evening and early morning hours as a result of temperature inversion. Emissions of such pollutants from tall stacks (power stations and other industries), are expected to have more significant impact at ground level during the day, due to atmospheric turbulence influences. O_3 and other oxidants are formed in polluted atmospheres as a result of a rather wide variety of photochemical reactions. A gradual increase of O_3 throughout the day is expected, peaking at mid-afternoon and then decaying once more during the night.

6.1. FINE PARTICULATE MATTER (PM_{10})

6.1.1 Source identification by PM_{10} diurnal variations

Figure 3 shows the PM_{10} hourly mean diurnal variation. Impact of emissions from low level sources such as motor vehicle emissions are shown in the morning and in the evening with peaks observed at 09:00 in the morning and at 20:00 and 23:00 at night.

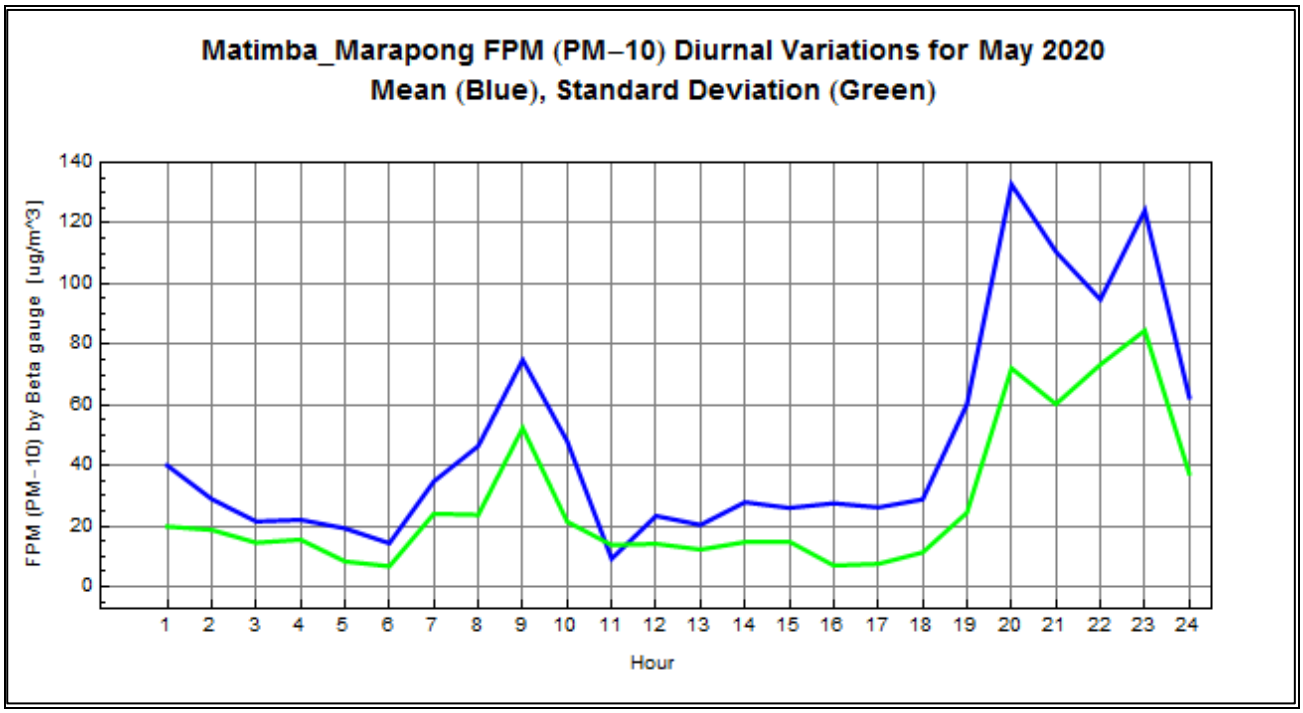


Figure 3: Diurnal variation by PM_{10} (Mean concentrations = Blue line, Standard Deviation = Green line)

6.1.2. PM_{10} hourly mean event roses and tables.

Due to the low data capture of 30%, the 98th percentile hourly mean event roses during the day and night times could not be generated and decisions cannot be made using the data.

6.2. FINE PARTICULATE MATTER ($PM_{2.5}$)

6.2.1 Source identification by $PM_{2.5}$ diurnal variations

Figure 4 shows the $PM_{2.5}$ hourly mean diurnal variation. $PM_{2.5}$ levels are shown to be lower during the day and rise sharply in the afternoon peaking at 20:00 and 23:00 in the evening. This suggests that there is a low-level source of $PM_{2.5}$ or $PM_{2.5}$ formation in the evening. Impact from low level sources is shown in the morning with a peak at 09:00.

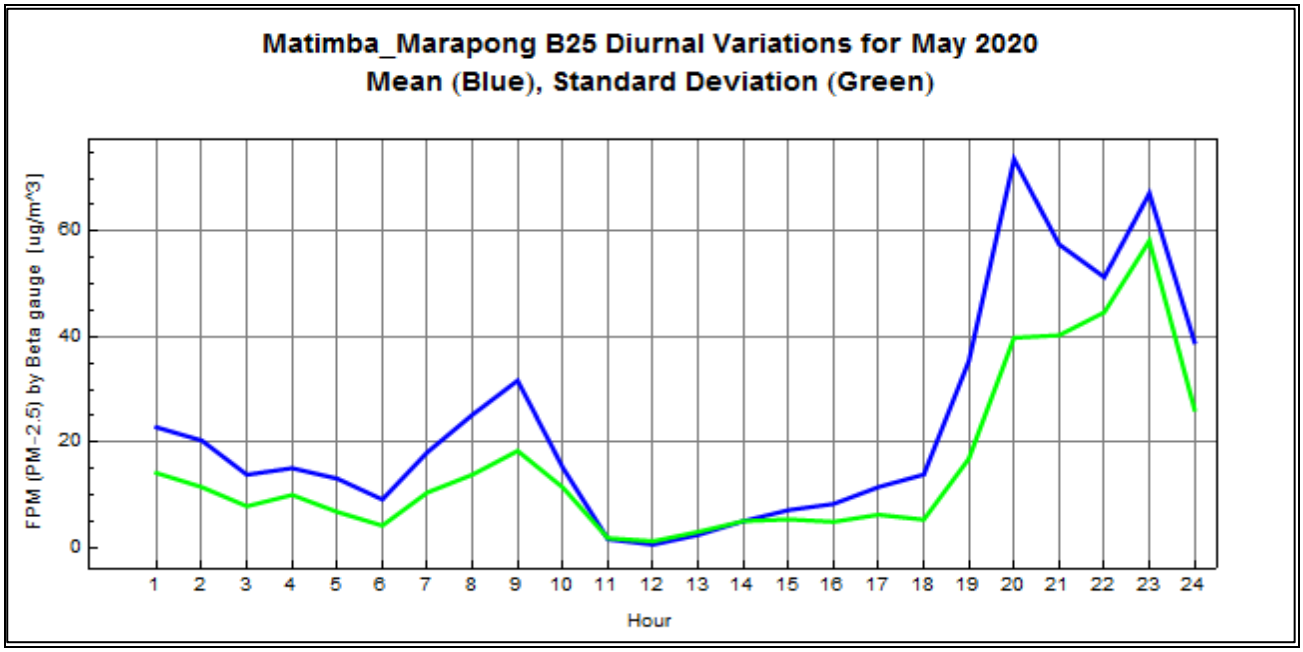


Figure 4: Diurnal variation by $PM_{2.5}$ (Mean concentrations = Blue line, Standard Deviation = Green line)

6.2.2. $PM_{2.5}$ hourly mean event roses and tables.

Due to the low data capture of 30%, the 98th percentile hourly mean event roses during the day and night times could not be generated and decisions cannot be made using the data.

6.3 CARBON MONOXIDE (CO)

6.3.1 Source identification by CO diurnal variations

Figure 5 shows the CO hourly mean diurnal variation. CO levels are generally low during the day and are elevated at night peaking at 20:00. Elevation in CO levels is also noticeable with a minor peak at 08:00 in the morning. Both elevations could be attributed to low level source emissions such as domestic combustion from coal stoves and motor vehicles during morning and evening commuting of workers to/from work.

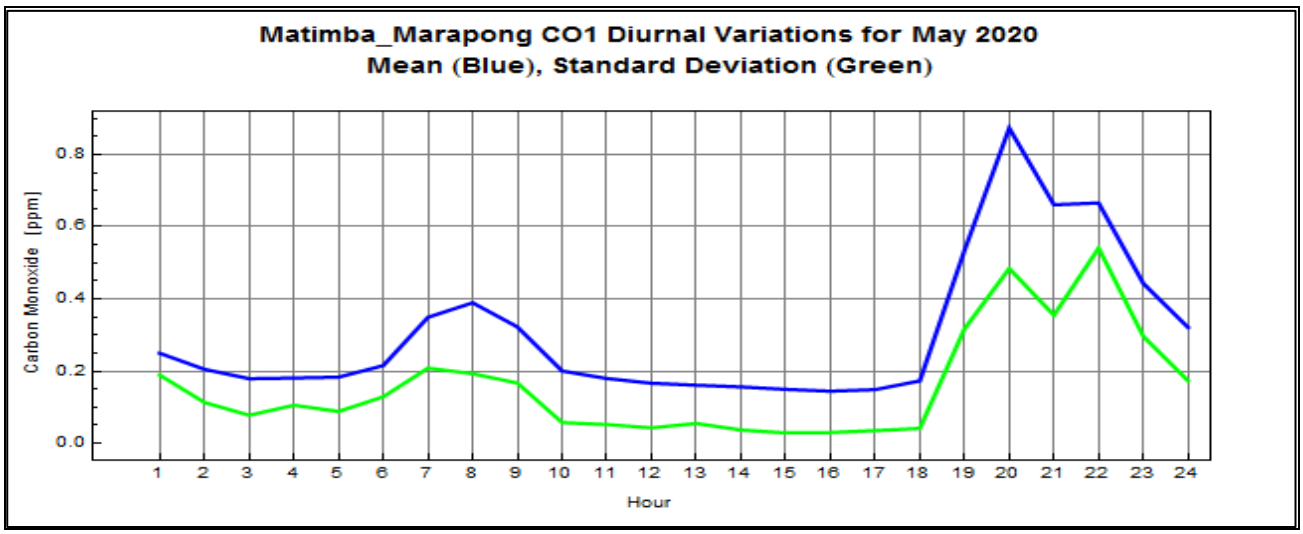


Figure 5: Diurnal variation by CO (Mean concentrations = Blue line, Standard Deviation = Green line)

The national ambient air quality hourly mean CO limit of 26 ppm was not exceeded during the period under review as shown in Figure 8 below.

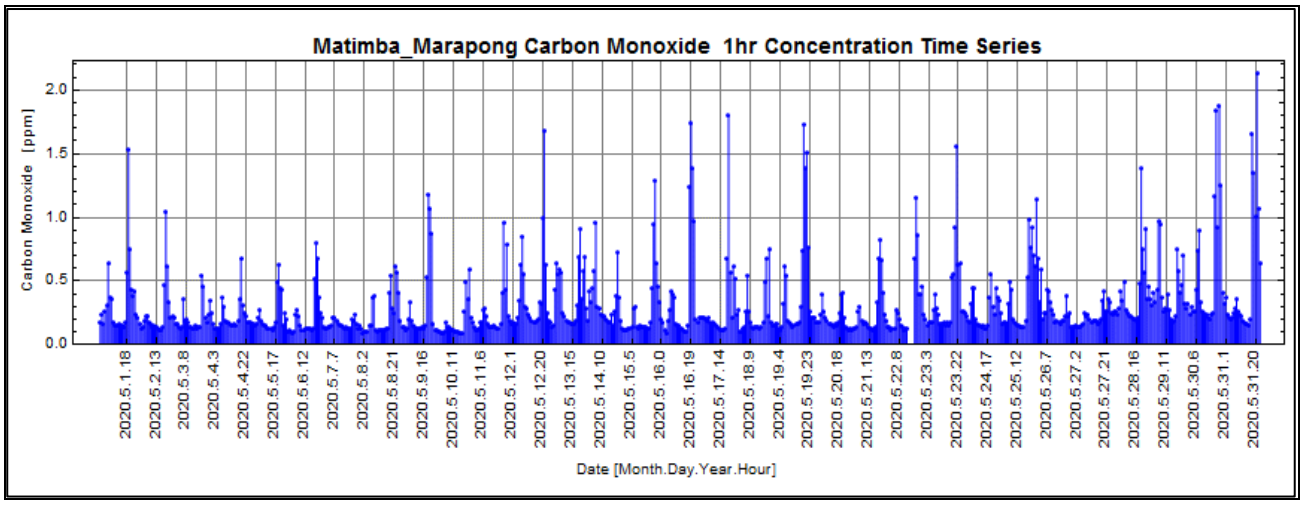


Figure 6: CO hourly Concentrations Time Series

6.3.2 CO hourly mean event roses and tables.

The daytime and night-time event roses are presented in Figure 7 to indicate the wind directions from which the highest concentrations are derived.

The most dominant hourly mean concentrations above 0.74 ppm at Marapong monitoring site during the daytime period were recorded from south-south-west, west, north, east-north-east, south-east and south-south-east sectors. The most dominant night-time concentrations above 1.56 ppm (98th percentile value) were recorded from north-north-east, east, south-east, west-north-west and north-east sectors. CO emissions measured at the monitoring station could be from different sources such as veld fires, back-up power generators, lawn mowers, leaf blowers, undiluted car exhausts without catalytic converters, combustion of fossil fuels. Other sources of CO could be from combustion of fuels such as natural gas, fuel oils from local industries and coal, wood, charcoal burning and also waste burning from Marapong Township.

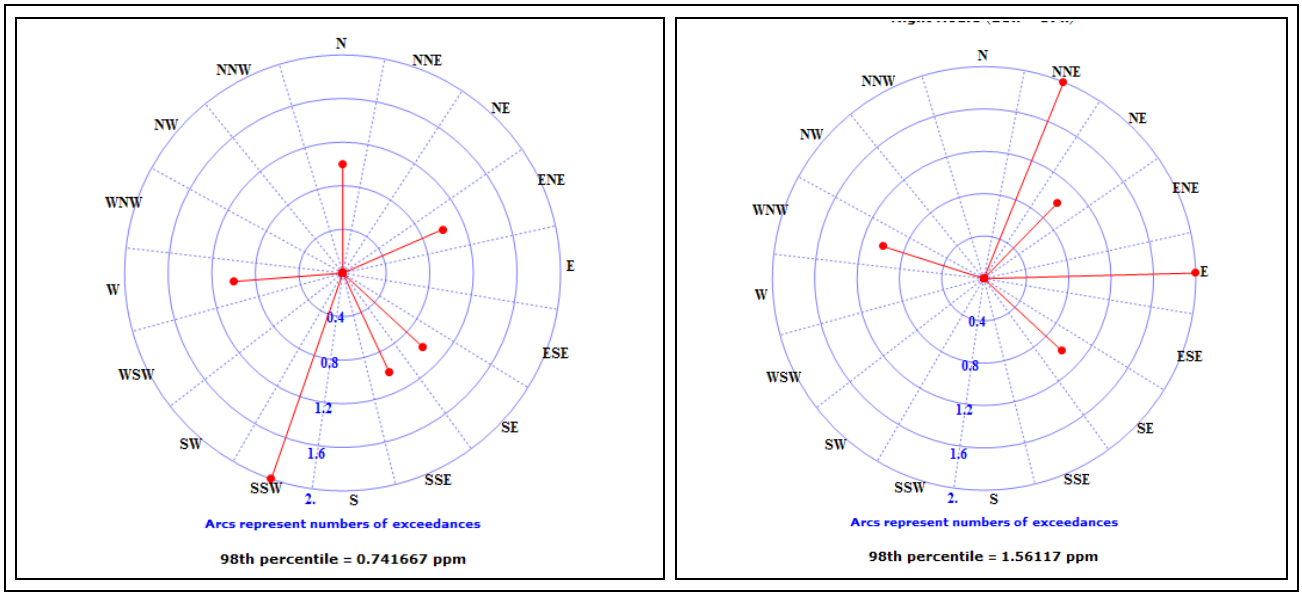


Figure 7: CO hourly mean 98th percentile event roses. Left - daytime (06:00-18:00) and right - night time (18:01-05:59)

Table 5: CO daytime hourly mean 98th percentile event table

Dir.	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Eve.	1	0	0	1	0	0	1	1	0	2	0	0	1	0	0	0
%	14.29	0	0	14.29	0	0	14.29	14.29	0	28.57	0	0	14.29	0	0	0

Table 6: CO night-time hourly mean 98th percentile event table

Dir.	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Eve.	0	2	1	0	2	0	1	0	0	0	0	0	0	1	0	0
%	0	28.57	14.29	0	28.57	0	14.29	0	0	0	0	0	0	14.29	0	0

6.4. SULPHUR DIOXIDE (SO_2)

6.4.1 Source identification by SO_2 diurnal variations

Figure 8 shows the SO_2 hourly mean diurnal variation. The graph shows that SO_2 levels are low in the morning and in the evening and higher during the day, with a peak recorded at 14:00 in the afternoon. This is a typical signature of a tall stack source and industrial activities during the day.

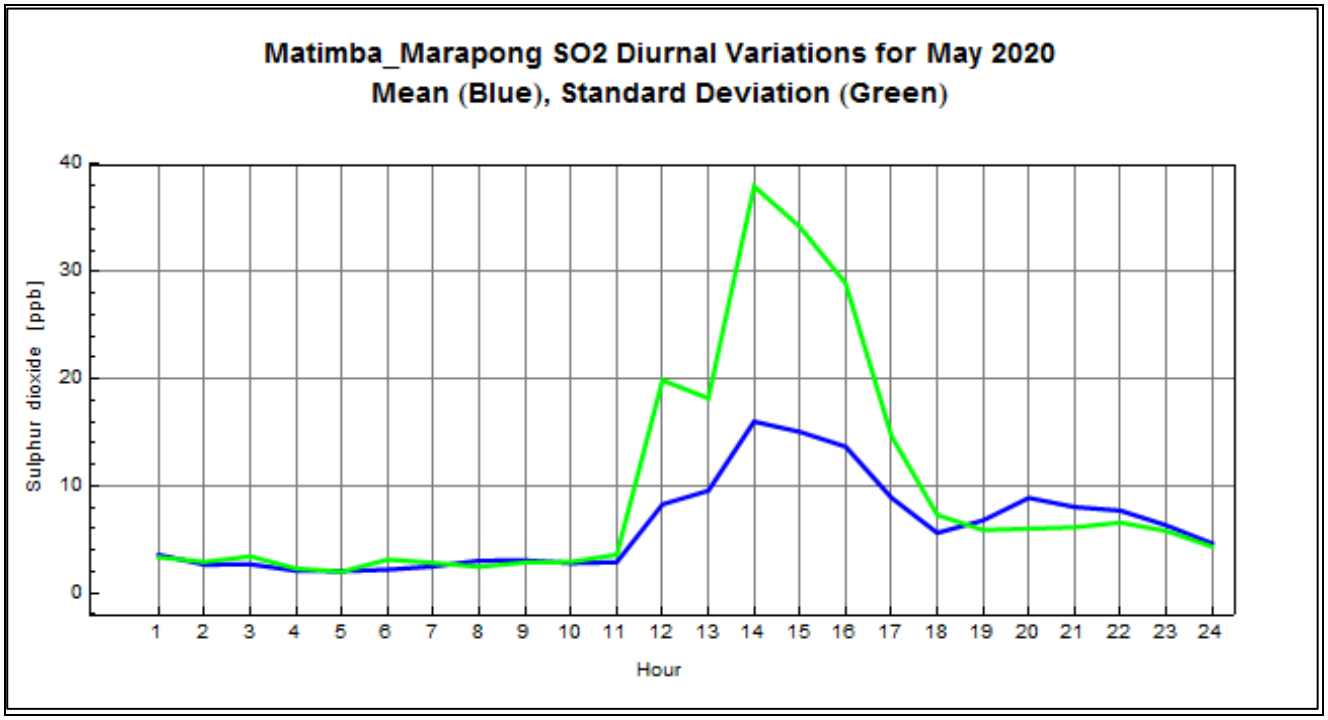


Figure 8: SO_2 diurnal variations (Mean concentrations = Blue line, Standard Deviation = Green line).

6.4.2 SO_2 daytime exceedance and night-time event roses and tables

The daytime exceedance and night-time event roses are presented in Figure 9 to indicate the wind directions from which the highest concentrations are derived.

There were three exceedances of the national SO_2 hourly limit of 134 ppb recorded in the south-south-west, west-south-west and west sectors of the monitoring site. Afrimat Lephalale is located in the south-south-west, Madupi Power Station in the west-south-west and Grootegeluk coal mine in the west sectors of the monitoring site. The most dominant night-time concentrations above 21.48 ppb (98th percentile value) were recorded from south-east, north-north-east, west-south-west and west-north-west sectors.

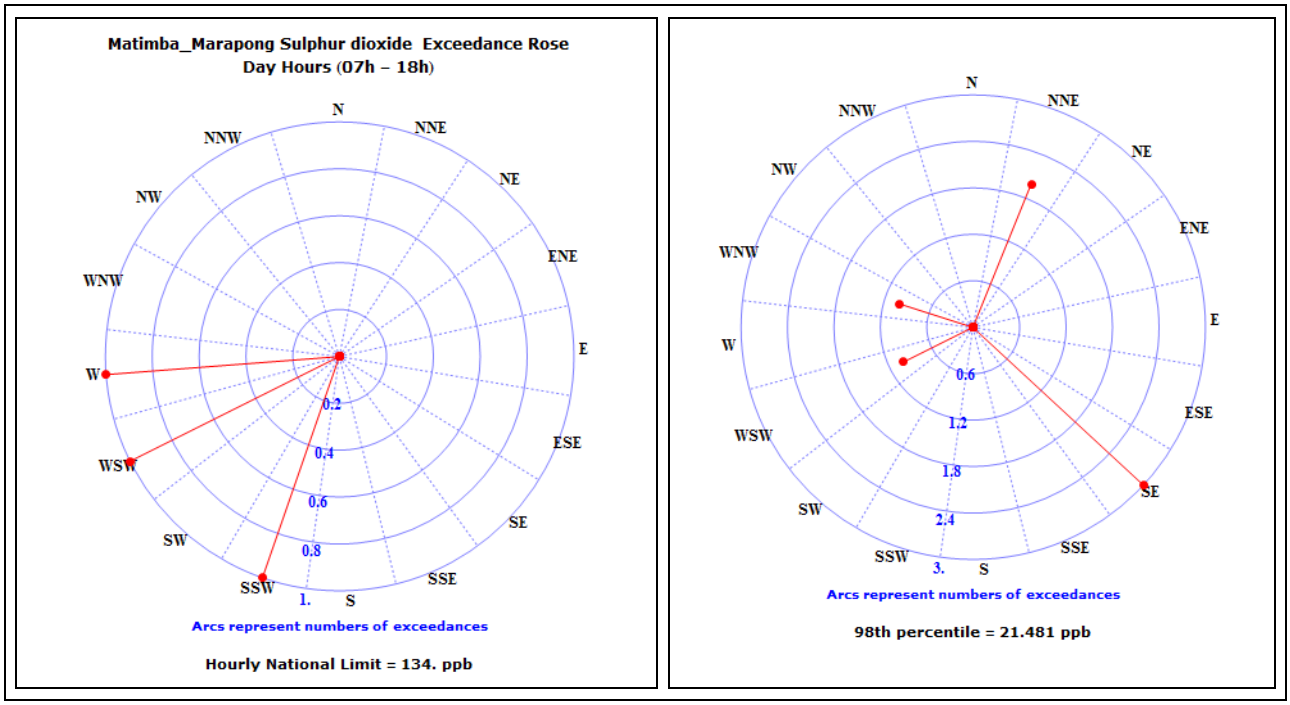


Figure 9: SO_2 daytime hourly mean exceedance and night-time hourly mean 98th percentile event roses. Left - daytime (06:00-18:00) and right - night time (18:01-05:59)

Table 7: SO_2 daytime hourly mean 98th percentile event table

Dir.	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Exc.	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0
%	0	0	0	0	0	0	0	0	0	33.33	0	33.33	33.33	0	0	0

Table 8: SO_2 night-time hourly mean 98th percentile event table

Dir.	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Eve.	0	2	0	0	0	0	3	0	0	0	0	1	0	1	0	0
%	0	28.57	0	0	0	0	42.86	0	0	0	0	14.29	0	14.29	0	0

6.5. NITROGEN DIOXIDE (NO_2)

6.5.1 Source identification by NO_2 diurnal variations

Figure 10 below shows the NO_2 hourly mean diurnal variation. The graph shows concentration peaks at 08:00 in the morning and at 20:00 in the evening which are indicative of contribution of low level source emissions on ambient NO_2 concentrations, such as early morning and evening emissions from vehicles transporting workers from/to Marapong Township to/from Medupi, Matimba power stations, Grootegeluk coal mine and other industries in the area. The NO_2 concentrations are low during midday and throughout the afternoon as a result of absence or minimal number of vehicles and domestic burning activities in the township at those times.

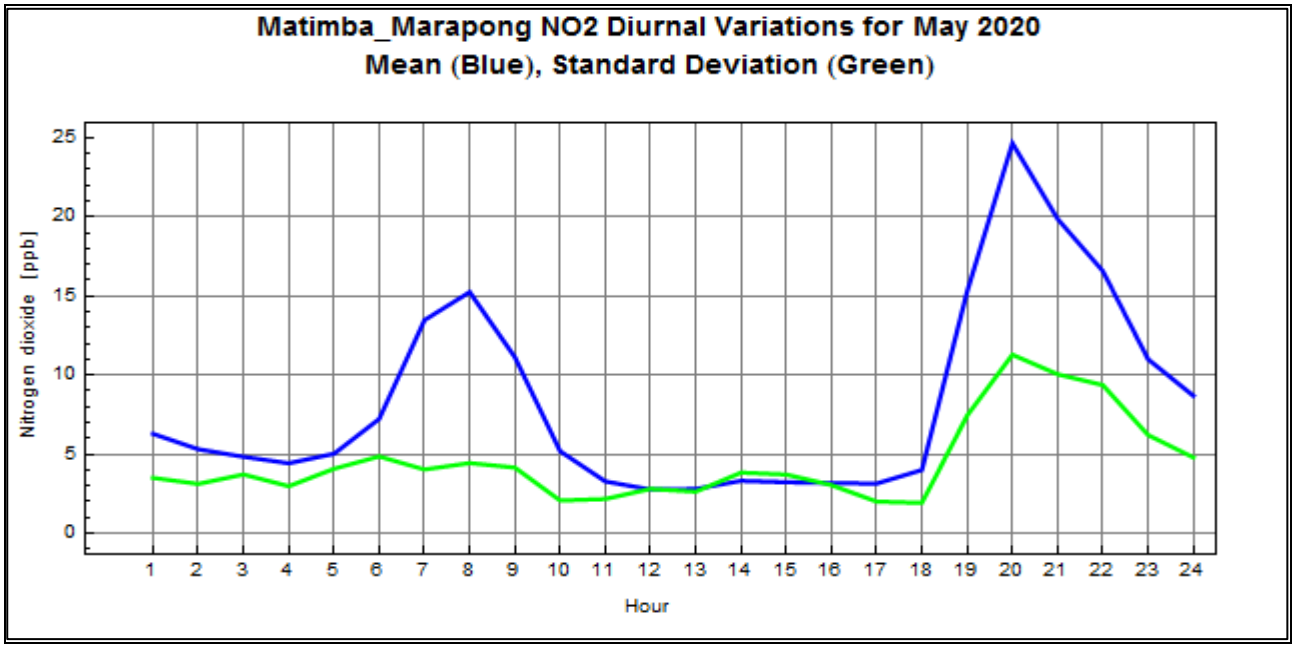


Figure 10: NO_2 diurnal variations (Mean concentrations = Blue line, Standard Deviation = Green line).

6.5.2. NO_2 hourly mean event roses and tables.

The daytime and night-time event roses are presented in Figure 11 to indicate the wind directions from which the highest concentrations are derived. The most dominant daytime concentrations above 22.70 ppb (98th percentile value) were from south-south-west, west, north, north-north-east, east-north-east, south-east and south-south-east sectors. The most dominant night-time concentrations above 36.15 ppb (98th percentile value) were recorded from north-north-east, east, east-south-east, south-west, west-south-west and north-east sectors. Traffic from Onverwacht and Marapong Township and trucks travelling to the municipal dump might have an influence in the NO_2 readings. There is a taxi rank and it is at a very close proximity to the monitoring site and Lowveld Bus Service just less than a kilometre to the east of the monitoring site. This could have an influence on the NO_2 readings.

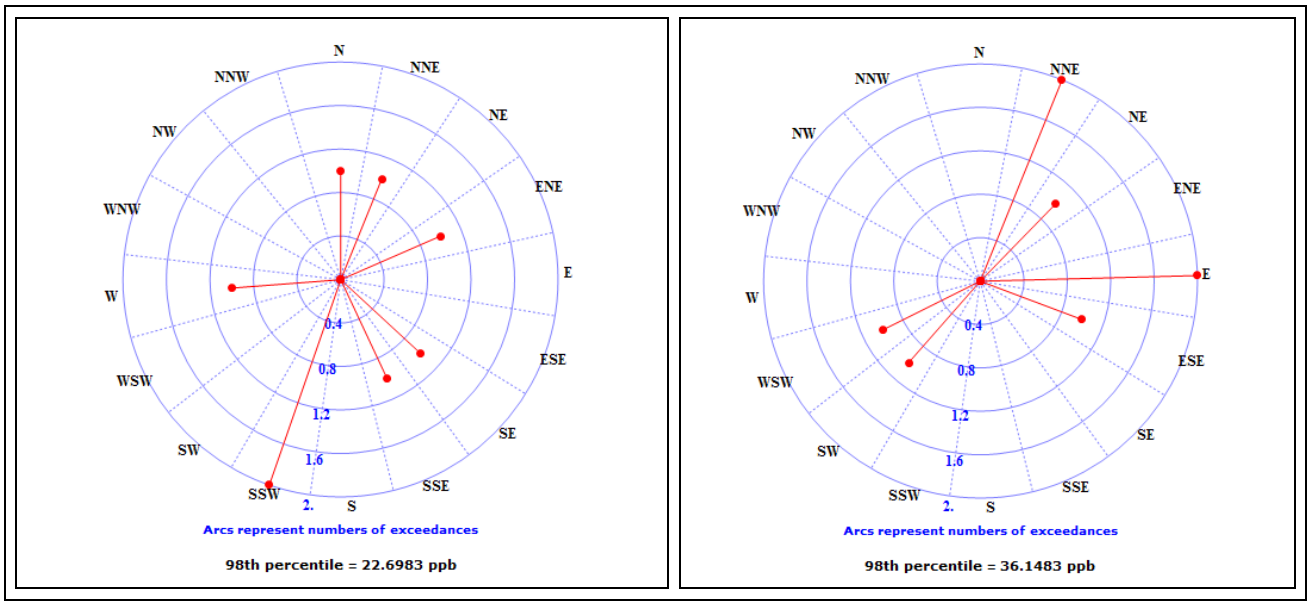


Figure 11: NO_2 hourly mean 98th percentile event roses. Left - daytime (06:00-18:00) and right - night time (18:01-05:59)

Table 9: NO_2 day-time hourly mean 98th percentile event table

Dir.	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Eve.	1	1	0	1	0	0	1	1	0	2	0	0	1	0	0	0
%	12.5	12.5	0	12.5	0	0	12.5	12.5	0	25	0	0	12.5	0	0	0

Table 10: NO_2 night-time hourly mean 98th percentile event table

Dir.	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
Eve.	0	2	1	0	2	1	0	0	0	0	1	1	0	0	0	0
%	0	25	12.5	0	25	12.5	0	0	0	0	12.5	12.5	0	0	0	0

6.6. OZONE (O_3)

There were no data recorded for ozone because the analyser was removed from site for repairs.

7. HISTORICAL CONCENTRATIONS

7.1. RECENT TRENDS

Time series graphs (Figures 12 – 17) for each pollutant with respect to the National Ambient Air Quality Standards are represented from the beginning of the previous year until the end of the current reporting period or since inception of the monitors. The resultant period may vary for each analyser, depending on when it was installed.

Ambient CO and NO_2 concentrations at the monitoring site are well within their national ambient limits with no exceedances from December 2018 until May 2020. The trends show higher concentrations during winter than summer. Ambient PM_{10} and $PM_{2.5}$ concentrations have exceeded their daily limits on several occasions during the period under review and show increase in winter and decrease in summer. The ambient SO_2 hourly limit has been exceeded several times during the period under review and there is no clear trends shown. There were no exceedances of the national SO_2 daily limit during the period under review. Ambient O_3 concentrations are higher in spring to summer months and lower in winter months. Gaps in the trend analysis are as a result of the instrument being out for service.

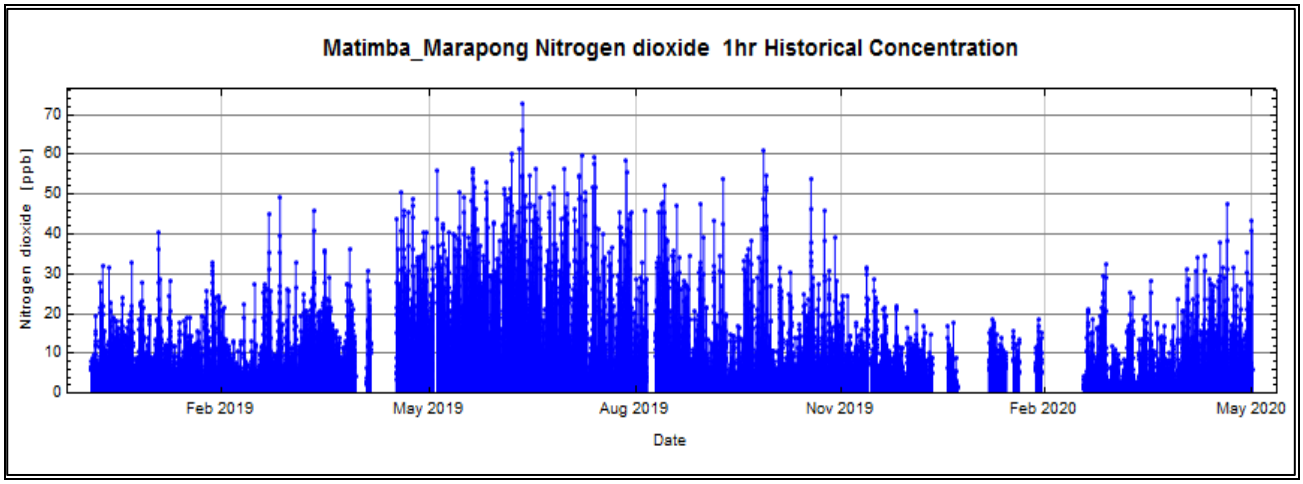


Figure 12: NO_2 Hourly Means

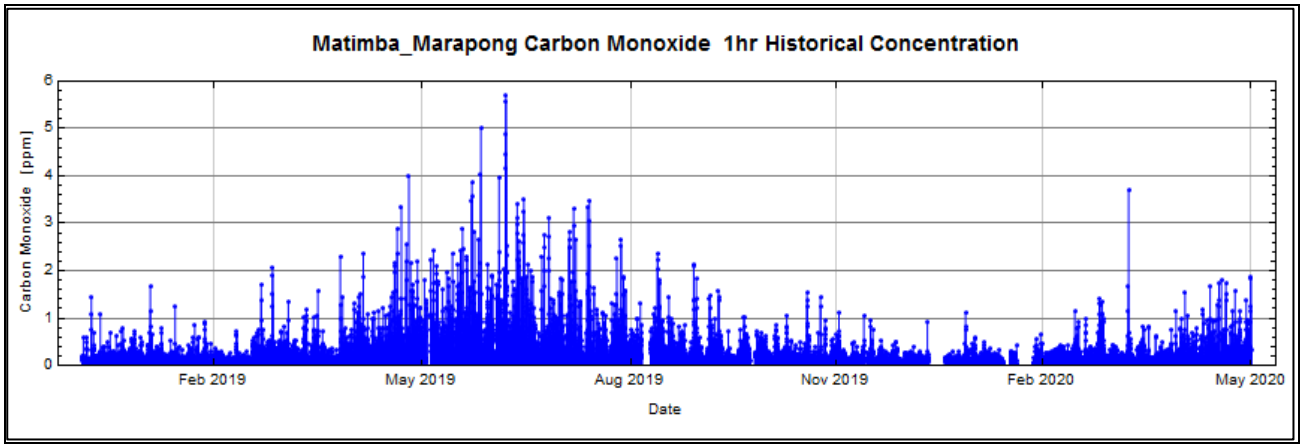


Figure 13: CO Hourly Means

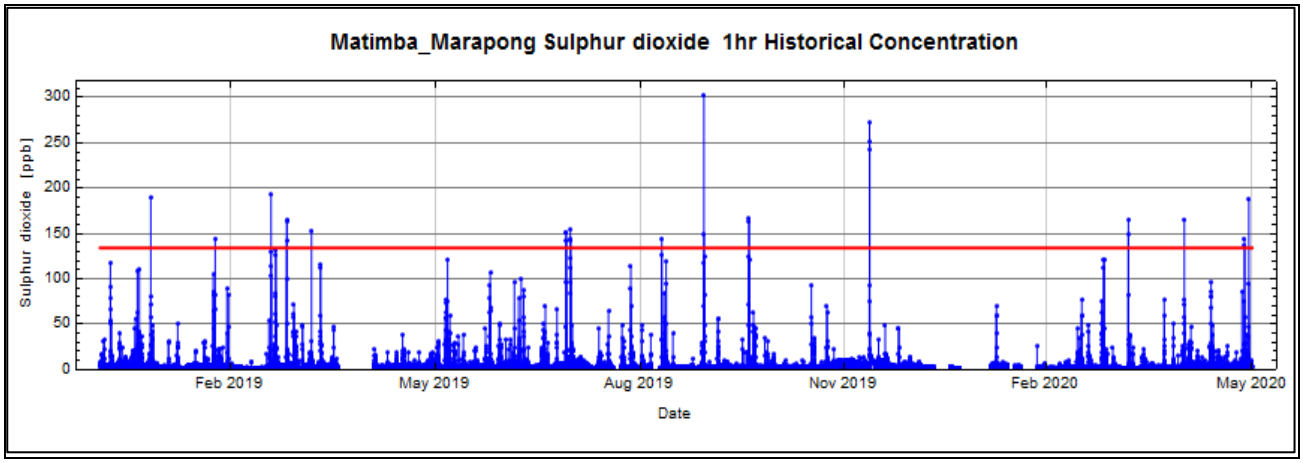


Figure 14: SO_2 Hourly Means

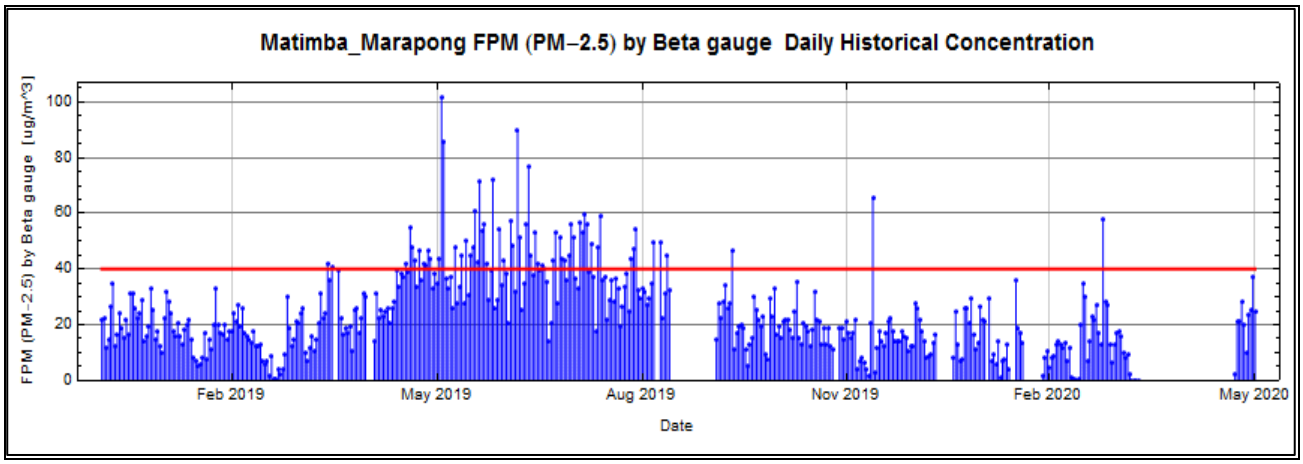


Figure 15: $PM_{2.5}$ Daily Means

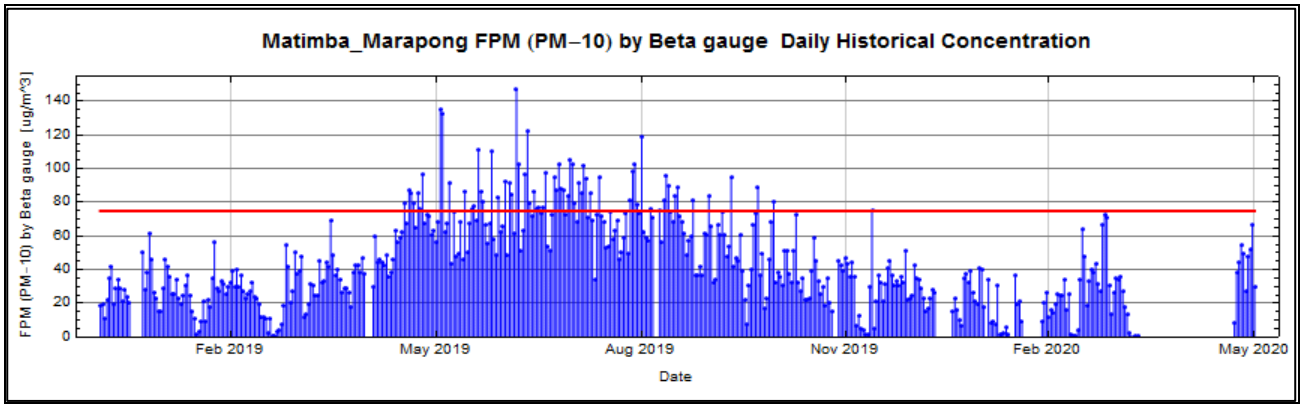


Figure 16: PM_{10} Daily Means

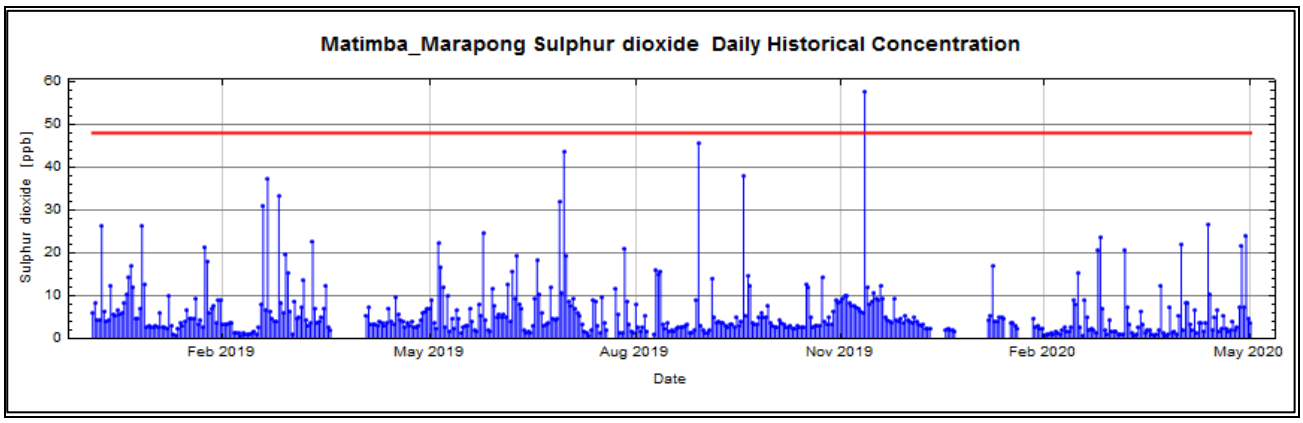


Figure 17: SO_2 Daily Means

7.2. MONTHLY MEANS FOR THE CURRENT CALENDAR YEAR 2020

Table 11: Monthly Means for current year 2020

Parameter measured	Jan	Feb	Mar	Apr	May
$PM_{2.5}$ ($\mu g/m^3$)	17.2	9.4	16.3	5.7	24.1
PM_{10} ($\mu g/m^3$)	25.9	12.8	31.1	12.1	48.2
NO_2 (ppb)	5.6	8.4	6	4.7	8.4
CO (ppb)	0.1	0.1	0.2	0.2	0.3
O_3 (ppb)	27.6	24.2	23.3	23.7	ND
SO_2 (ppb)	3	4.4	4.6	4	6.2

ND = No Data

The above table shows the monthly mean concentrations of pollutants until May 2020.

Table 12: Number of exceedances of the National Ambient Air Quality Limits

	SO_2 hourly	SO_2 daily	NO_2 hourly	PM_{10} daily	$PM_{2.5}$ daily	O_3 8-hourly	CO hourly	SO_2 10 minute
Jan 2020	0	0	0	0	0	0	0	0
Feb 2020	0	0	0	0	0	0	0	0
Mar 2020	0	0	0	0	1	0	0	1
Apr 2020	3	0	0	0	0	0	0	7
May 2020	3	0	0	0	0	0	0	4
Total No. of Exceedances	**6**	**0**	**0**	**0**	**1**	**0**	**0**	**12**
Allowed no of exceedances	88	4	88	4	4	11	88	526

The numbers of exceedances of all the parameters monitored until May 2020 are still below their respective allowed number of exceedances per year.

8. CONCLUSIONS

There were four exceedances of the SO_2 national 10-minute limit and three exceedances of the SO_2 national hourly limit recorded during the monitoring period. No other exceedances of the other parameters were recorded during the period under review.

Ambient CO, $PM_{2.5}$, PM_{10} and NO_2 concentrations at Marapong monitoring site show influence of emissions from low level sources in the area while ambient SO_2 concentrations show influence of tall stack emitters.

Report Compiled by:
Abram Segopa

Reviewed and Authorised by: Date of Issue: 08 Jul 2020

Bontle Moiloa
Air Quality, Climate Change & Ecosystem Management CoE
Research, Testing and Development (RT&D)

9. ABBREVIATIONS

DEA	Department of Environmental Affairs
FPM	Fine particulate matter
HG	Mercury
HUM	Humidity
NO_1	Nitric oxide
NO_2	Nitrogen dioxide
NO_X	Oxides of nitrogen
OZN / O_3	Ozone
CO	Carbon monoxide
SGT	Sigma theta
TMP	Ambient temperature
WDR	Wind direction from true North
WSP	Wind speed
WVL	Wind velocity
N	North
NNE	North-north-east
NE	North-east
ENE	East-north-east
E	East
ESE	East-south-east
SE	South-east
SSE	South-south-east
S	South
SSW	South-south-west
SW	South-west
WSW	West-south-west
W	West
WNW	West-north-west
NW	North-west
NNW	North-north-west
deg	Degree
deg C	Degree Celsius
$\mu g/m^3$	Microgram per cubic meter
m/s	Meters per second
$PM_{2.5}$	Particulate matter < 2.5 microns in diameter
PM_{10}	Particulate matter < 10 microns in diameter
ppb	Parts per billion
ppm	Parts per million
MWP	Megawatt Park
RT&D	Research Testing and Development

10. DISTRIBUTION LIST

Eskom Environmental Management Attention: Emile Marell	Medupi Power Station
Eskom Environmental Management Attention: Matlaleng Mamabolo	Matimba Power Station
Eskom Environmental Management Attention: Rosetta Rammutla	Medupi Power Station
Eskom Environmental Management Attention: Elmien Mocke	Matimba Power Station
CORPORATE SPECIALIST: ENVIRONMENTAL Attention: Dave Lucas Corporate Specialist	MWP
MANAGER: ENVIRONMENTAL MANAGEMENT Attention: Bryan McCourt Manager Air Quality CoE	MWP
Project File: Abram Segopa Senior Technician	RT&D