

	Matimba Power Station Emissions report	Matimba Power Station
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2022 emissions report**

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Functional Responsibility

Authorized by





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1. Report Summary

Matimba Power Station was issued with an Atmospheric Emission License (H16/1/13-WDM05) in September 2022. The License requires the license holder to submit monthly reports to the Department. This report contains the required information as specified in the license for November 2022.



During the period under review, eight exceedances of the daily particulate matter emission limit ($50\text{mg}/\text{Nm}^3$) occurred. All exceedances remained within the 48-hour grace period. No exceedances of the monthly SO_x limit ($3500\text{mg}/\text{Nm}^3$) or the daily NO_x emission limit ($750\text{mg}/\text{Nm}^3$) occurred.

Emission trends and tonnages reported in this report were calculated based on correlation curves of November 2020. As per the letters sent to your office on 09 October 2022 and 28 October 2022, the new curves are in the process of being reviewed and implemented.

The sulphur dioxide analyser for unit 2 is defective and averaged daily emissions from the Quality Assurance Level 2 report was used for reporting purposes. The analyser was repaired on the 29 November 2022.

More information regarding above mentioned issues is provided in the relevant sections within the report.

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2. Emission information

2.1 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	1 153 382
	Fuel Oil	Tons/month	1 200	1148,80
Production Rates	Product/ By-Product Name	Unit	Maximum Production Capacity Permitted (Quantity)	Production Rate
	Energy	MW	4000	2711,74

The consumption rates for the month of November 2022 were within the permitted maximum limits.

2.2 Abatement technology

Table 2: Abatement Equipment Control Technology Utilised

Associated Unit	Technology Type	Minimum utilisation (%)	Efficiency (%)
Unit 1	Electrostatic Precipitator	100%	99,88%
Unit 2	Electrostatic Precipitator	100%	99,90%
Unit 3	Electrostatic Precipitator	100%	99,93%
Unit 4	Electrostatic Precipitator	100%	99,89%
Unit 5	Electrostatic Precipitator	100%	99,86%
Unit 6	Electrostatic Precipitator	100%	99,90%
Associated Unit	Technology Type	Minimum utilisation (%)	Actual Utilisation (%)
Unit 1	SO ₃ Plant	100%	99,01%
Unit 2	SO ₃ Plant	100%	99,01%
Unit 3	SO ₃ Plant	100%	91,69%
Unit 4	SO ₃ Plant	100%	98,89%
Unit 5	SO ₃ Plant	100%	97,36%
Unit 6	SO ₃ Plant	100%	98,89%

Flue gas conditioning plant availability was below the required 100% for units 3, 4, 5 and 6 due to maintenance activities and unplanned breakdowns. Defects were addressed and plants returned to services.

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2.3 Energy source characteristics

Table 3: Energy Source Material Characteristics.

	Characteristic	Stipulated Range (Unit)	Monthly Average Content
Coal burned	Sulphur Content	1.6%	1.30%
	Ash Content	40%	34,75%

Energy source characteristics remained within the ranges stipulated in the license.

2.4 Emissions reporting

2.4.1 Particulate Matter Emissions

Unit 1 Particulate Emissions

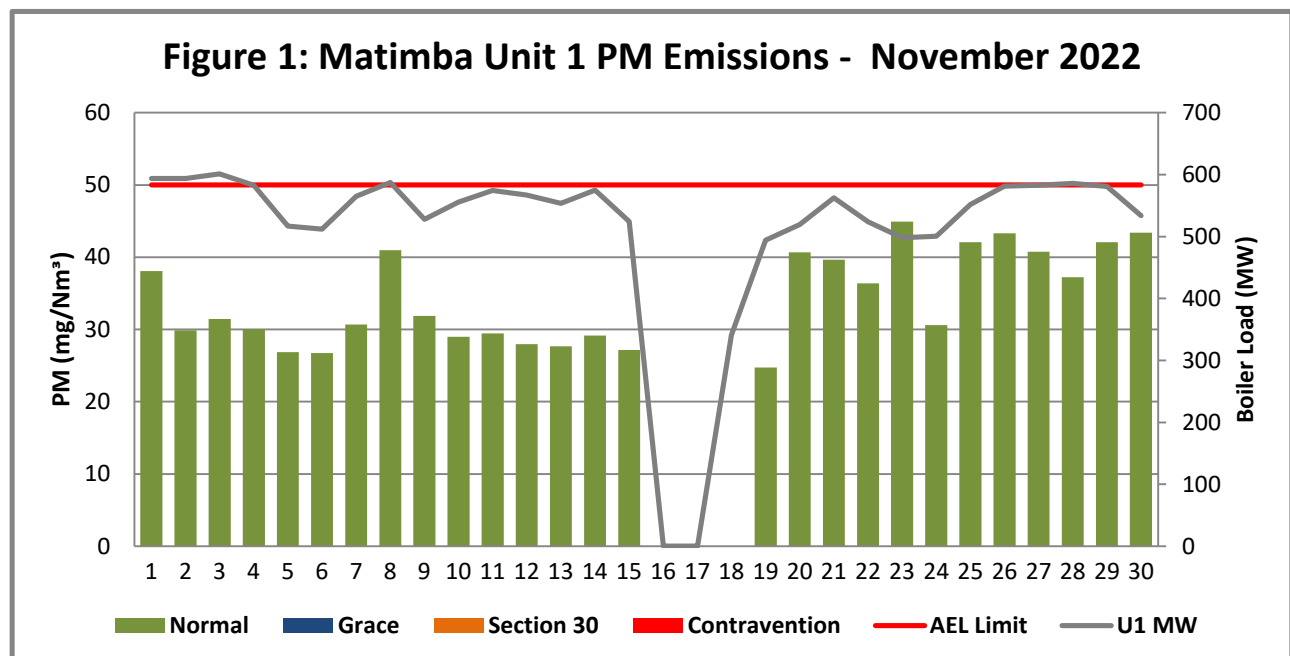


Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of November 2022

Interpretation:

All daily averages below Particulate matter emission daily limit of 50 mg/Nm³.

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Unit 2 Particulate Emissions

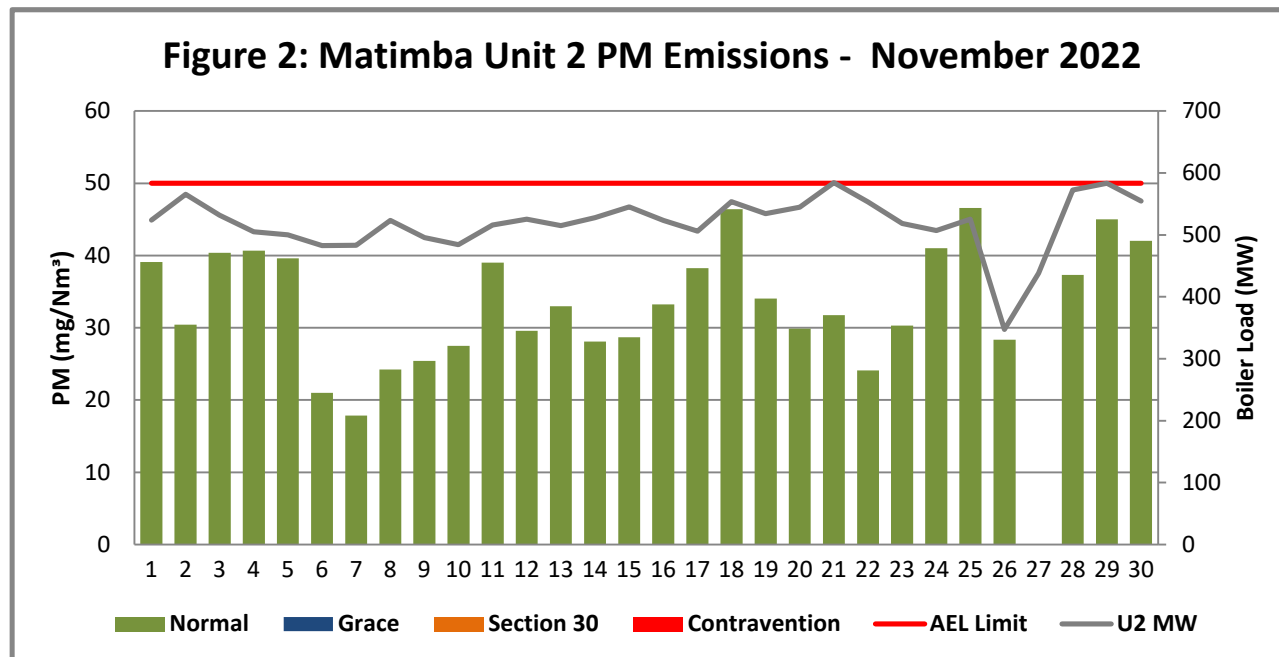


Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of November 2022

Interpretation:

All daily averages below Particulate matter emission daily limit of 50 mg/Nm³.

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Unit 3 Particulate Emissions

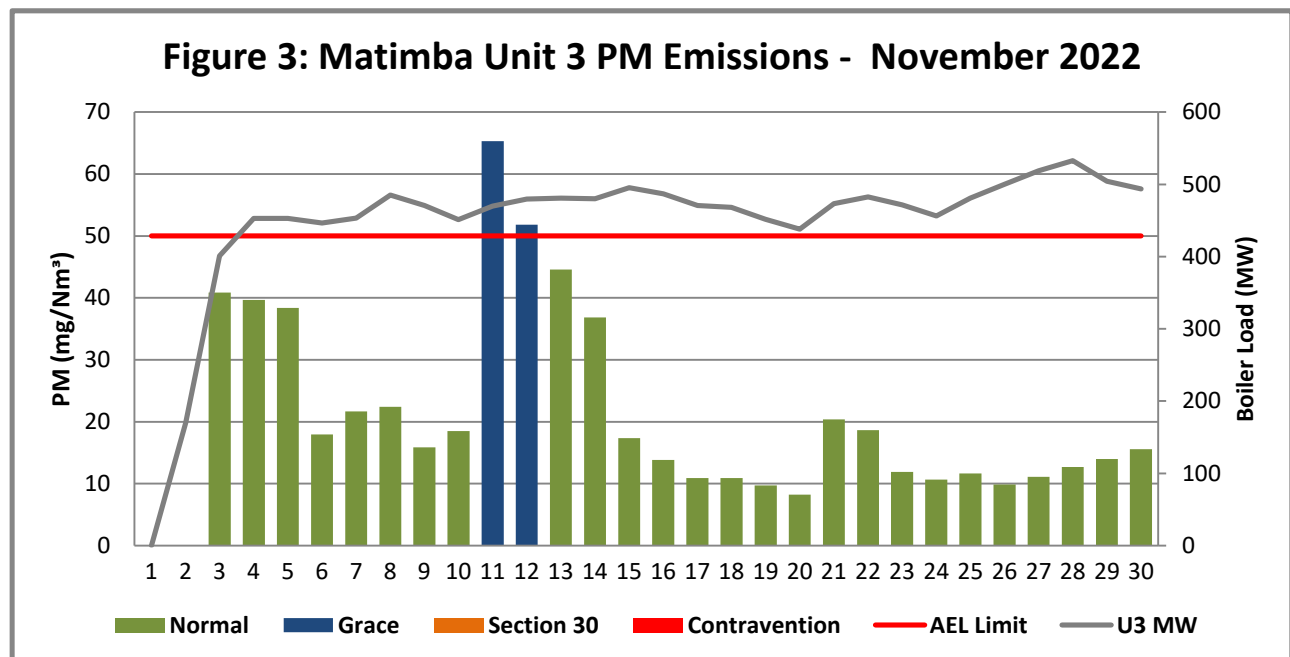


Figure 3: Particulate matter daily average emissions against emission limit for unit 2 for the month of November 2022

Interpretation:

The unit returned from long service maintenance on the 2nd of November 2022 and the emissions stabilised below the limit on the 3rd of the month; however, on the 11 and 12 of November 2022, the emissions were exceeded due to breakdown of flue gas condition plant (SO₃ plant) which affected the resistivity of the ash to be captured by the ESPs. The SO₃ plant was returned within 48 hours and the emissions normalised.

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Unit 4 Particulate Emissions

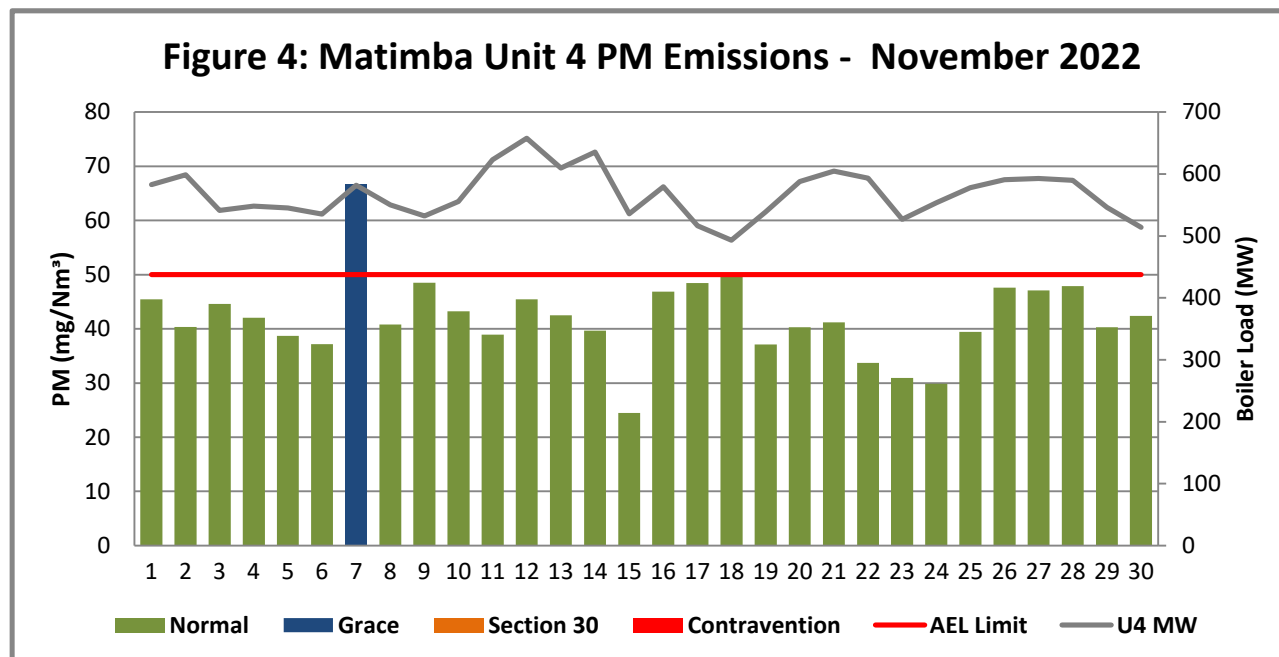


Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of November 2022

Interpretation:

The unit operated within the 50mg/Nm³ limit with an exception on the 07th of November 2022, the exceedance was caused by upset conditions (Sulphur flow issues) resulting in flue gas conditioning constraints. The plant was repaired, and the emissions normalised.

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Unit 5 Particulate Emissions

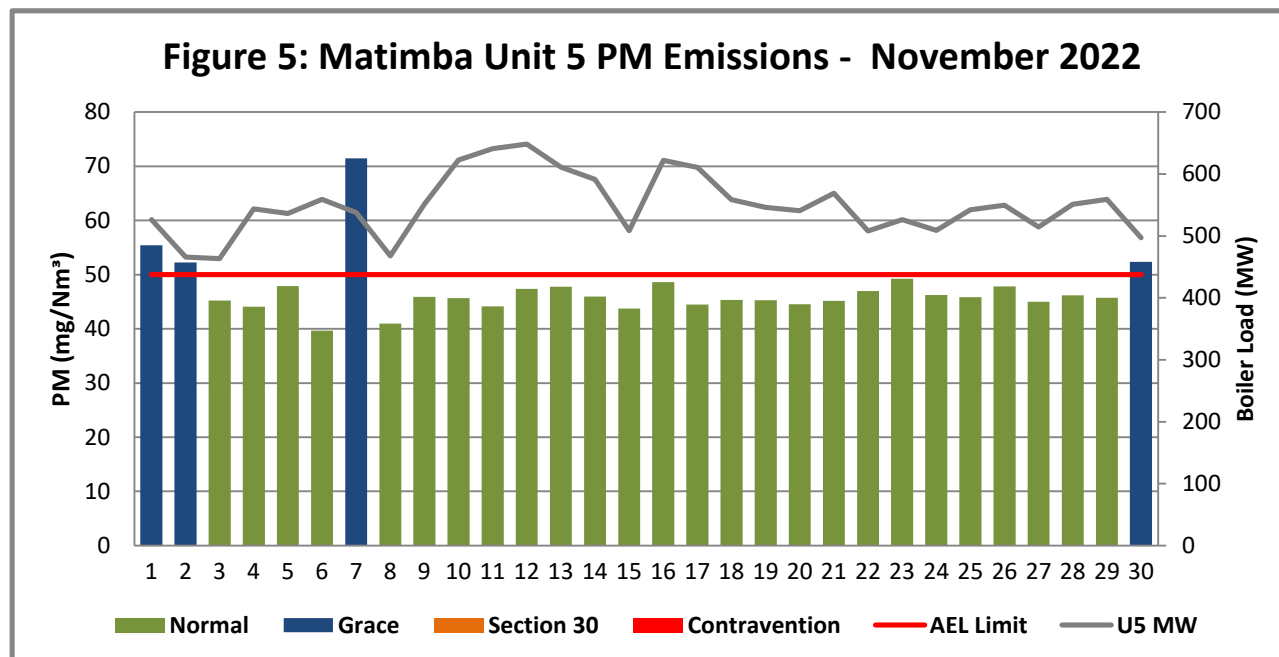


Figure 5 : Particulate matter daily average emissions against emission limit for unit 5 for the month of November 2022

Interpretation:

Unit 5 exceeded the daily particulate matter limit of 50mg/Nm³ on 1 ,2 ,7, and 30 November 2022. The exceedances were due to upset conditions affecting the efficiency of the electrostatic precipitators

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Unit 6 Particulate Emissions

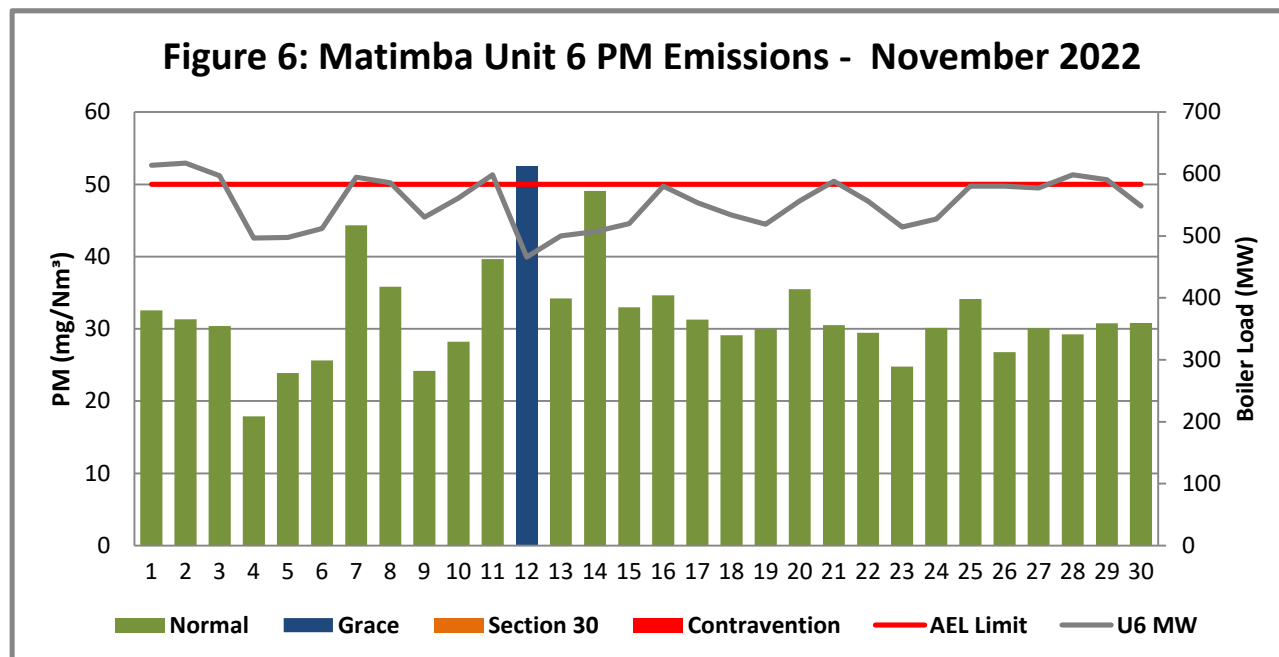


Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of November 2022

Interpretation:

The unit operated within the 50mg/Nm³ limit with an exception on the 12 November 2022, the exceedance was caused by upset conditions resulting in high hopper levels which affected the efficiency of the abatement technology (electrostatic precipitator fields).

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2.4.2 Gaseous Emissions

Unit 1 SO₂ Emissions

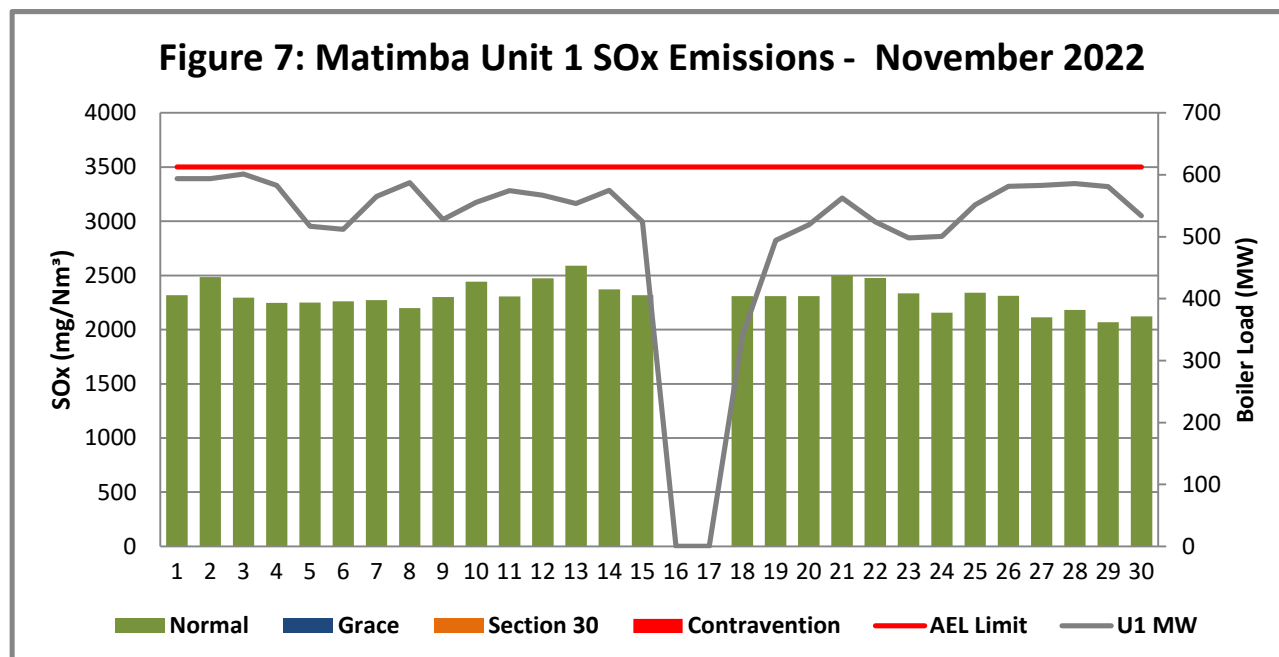


Figure 7: SO₂ daily average emissions against emission limit for unit 1 for the month of November 2022

Interpretation:

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

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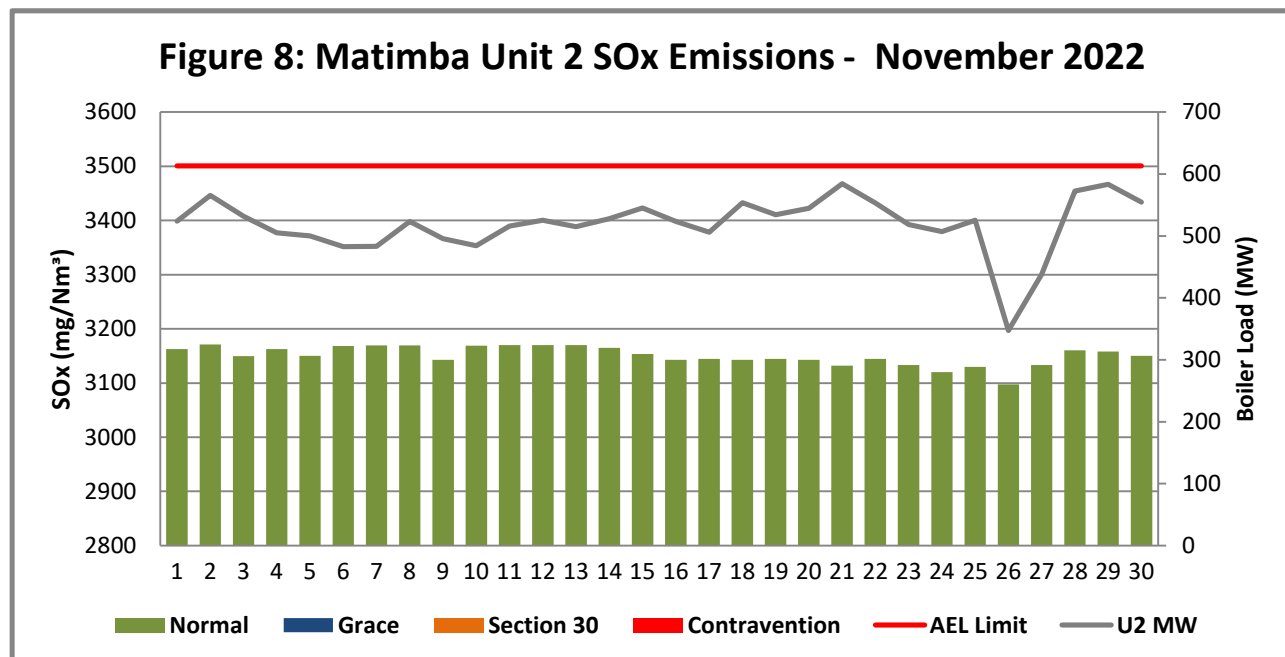
Unit 2 SO₂ Emissions

Figure 8: SO₂ daily average emissions against emission limit for unit 2 for the month of November 2022

Interpretation:

Averaged AMS values from the 2020 QAL 2 report was used to report unit 2 SO₂ emissions and O₂ readings due to unreliable monitor data since 1 October 2022. Investigation findings concluded that the analyser is experiencing significant drift. Corrective actions were put in place to repair the analyser including the movement of the Oxygen ports to make readings more reliable. The physical process for movement of the O₂ ports has been concluded pending the quality assurance tests for data reliability.

The analyser was repaired on the 29 November 2022.

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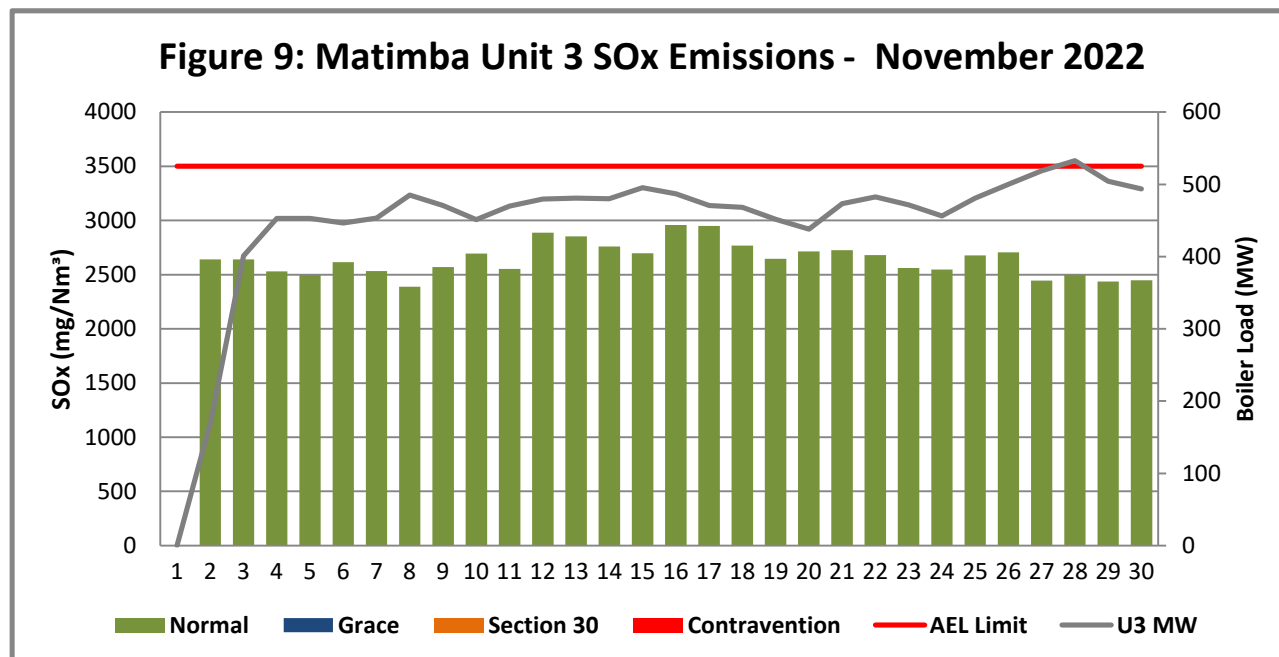
Unit 3 SO₂ Emissions

Figure 9: SO₂ daily average emissions against emission limit for unit 3 for the month of November 2022

Interpretation:

All daily averages below SO₂ emission monthly limit of 3500 mg/Nm³

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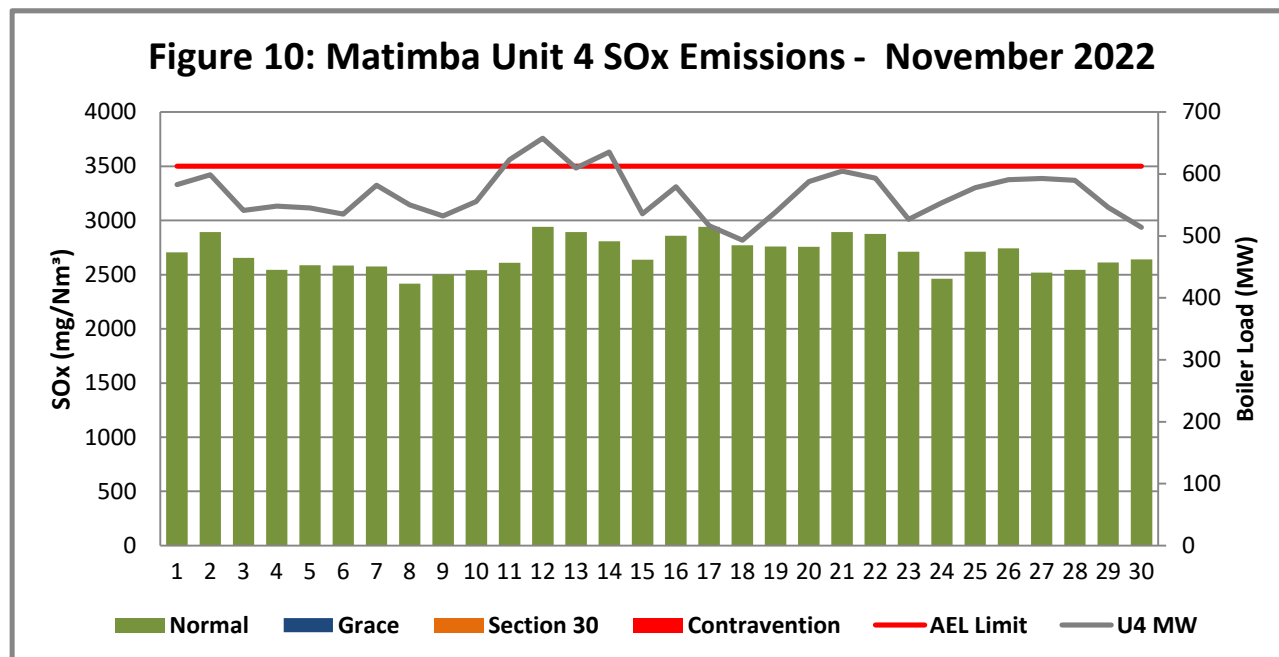
Unit 4 SO₂ Emissions

Figure 10: SO₂ daily average emissions against emission limit for unit 4 for the month of November 2022

Interpretation:

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

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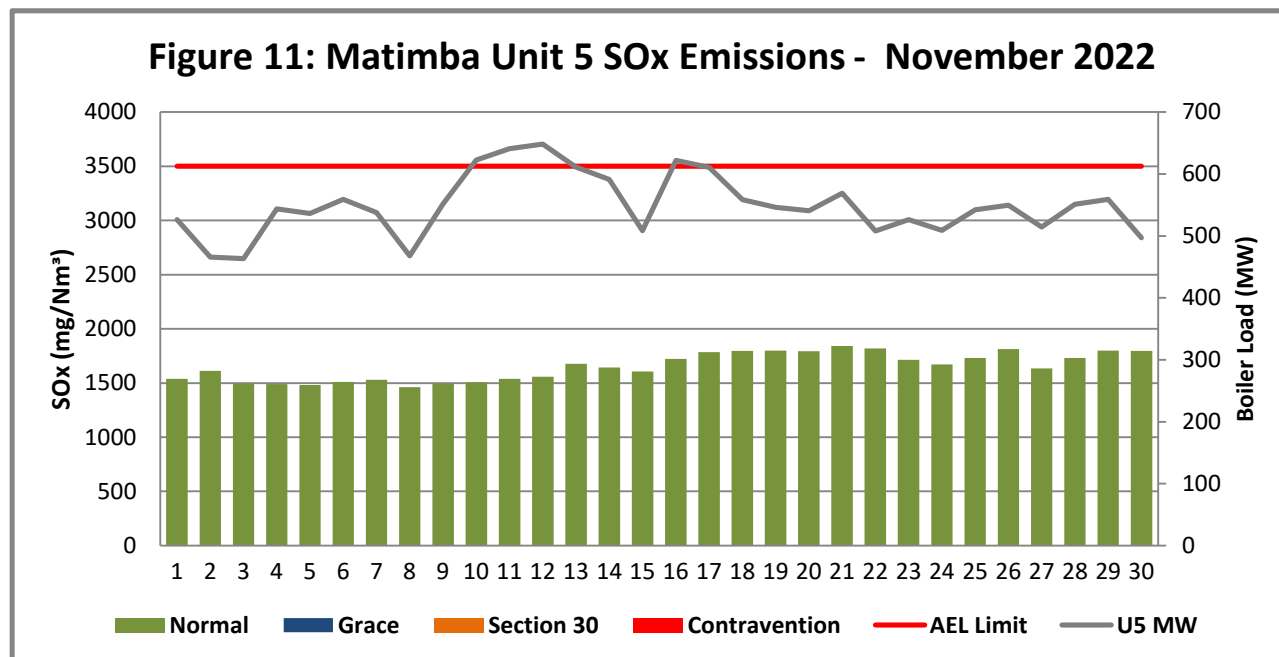
Unit 5 SO₂ Emissions

Figure 11: SO₂ daily average emissions against emission limit for unit 5 for the month of November 2022

Interpretation:

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

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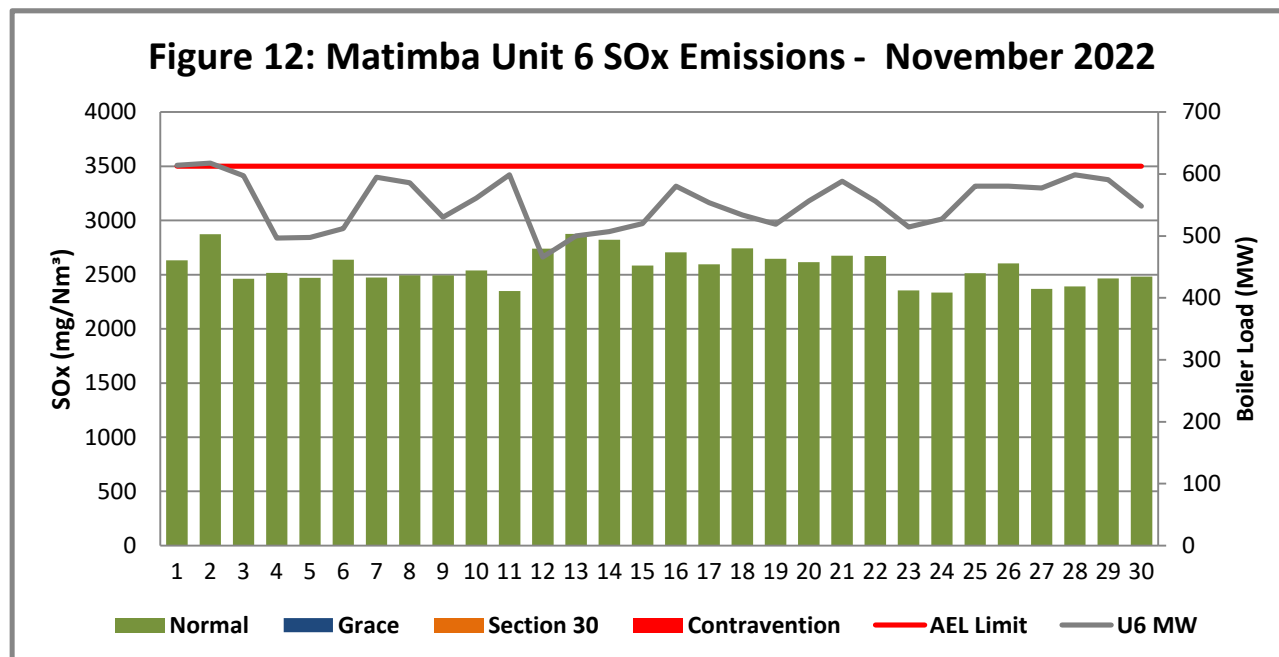
Unit 6 SO₂ Emissions

Figure 12: SO₂ daily average emissions against emission limit for unit 6 for the month of November 2022

Interpretation:

All daily averages remained below SO₂ emission monthly limit of 3500 mg/Nm³.

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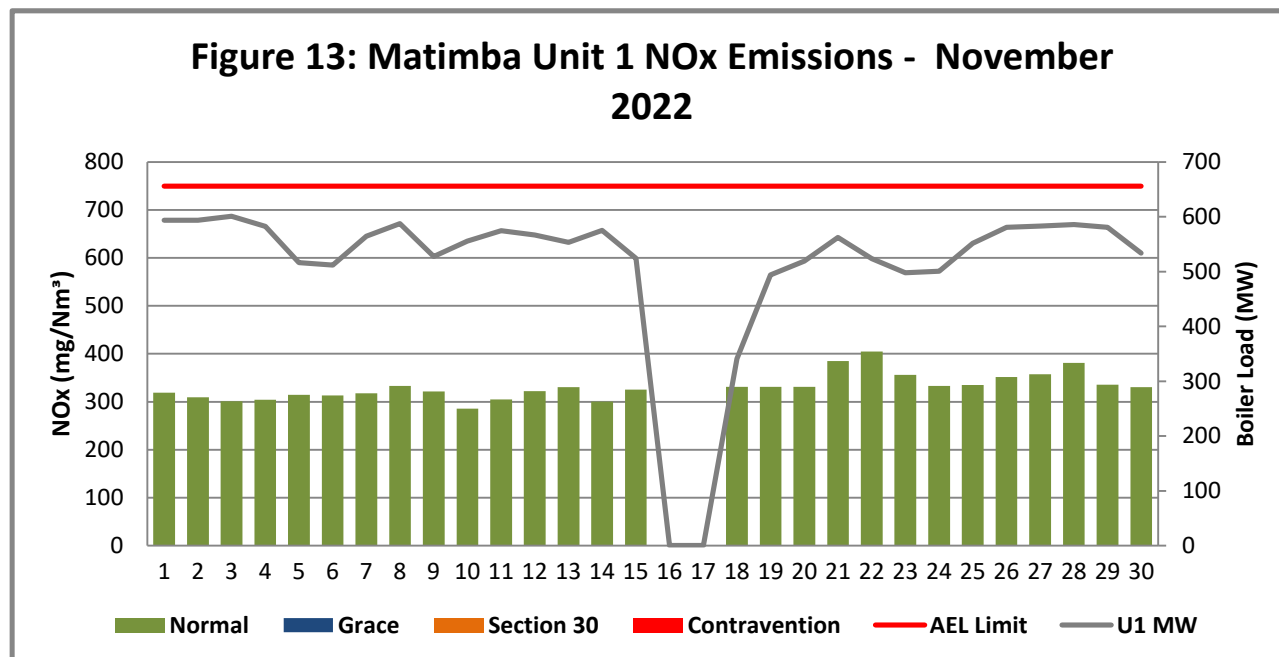
Unit 1 NO_x Emissions

Figure 13: NO_x daily average emissions against emission limit for unit 1 for the month of November 2022

Interpretation:

All daily averages below NO_x emission limit of 750 mg/Nm³.

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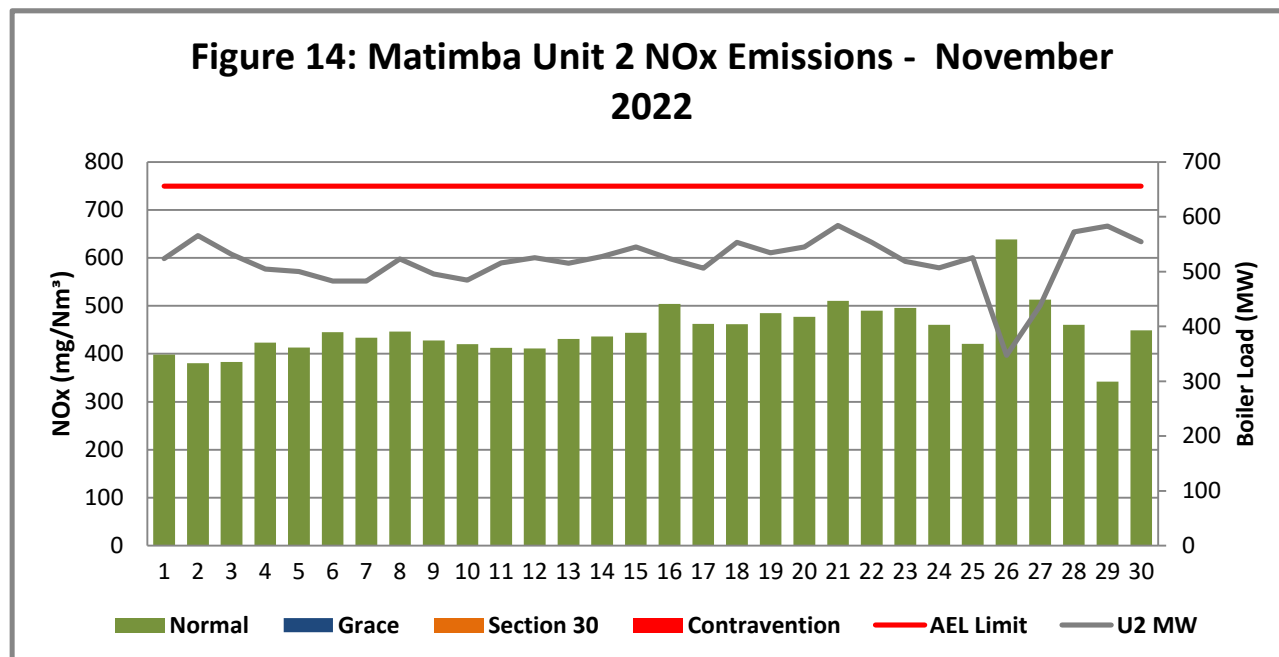
Unit 2 NO_x Emissions

Figure 14: NO_x daily average emissions against emission limit for unit 2 for the month of November 2022

Interpretation:

All daily averages below NO_x emission limit of 750 mg/Nm³.

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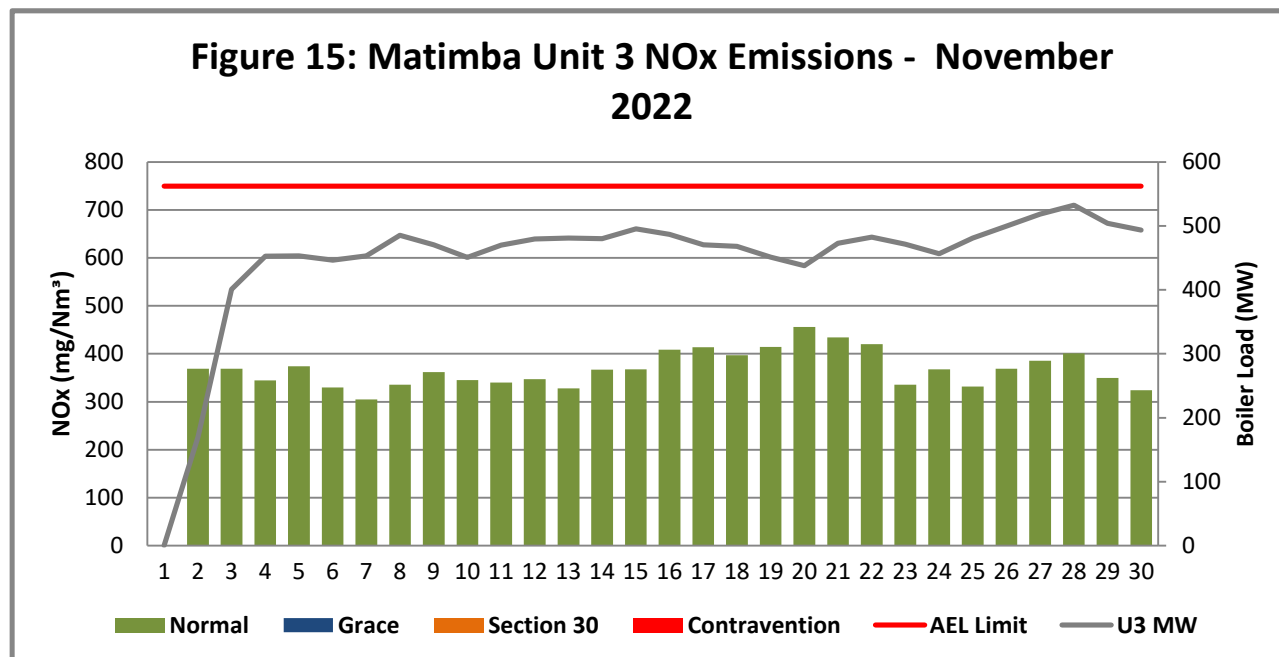
Unit 3 NO_x Emissions

Figure 15: NO_x daily average emissions against emission limit for unit 3 for the month of November 2022

Interpretation:

All daily averages below NO_x emission limit of 750 mg/Nm³.

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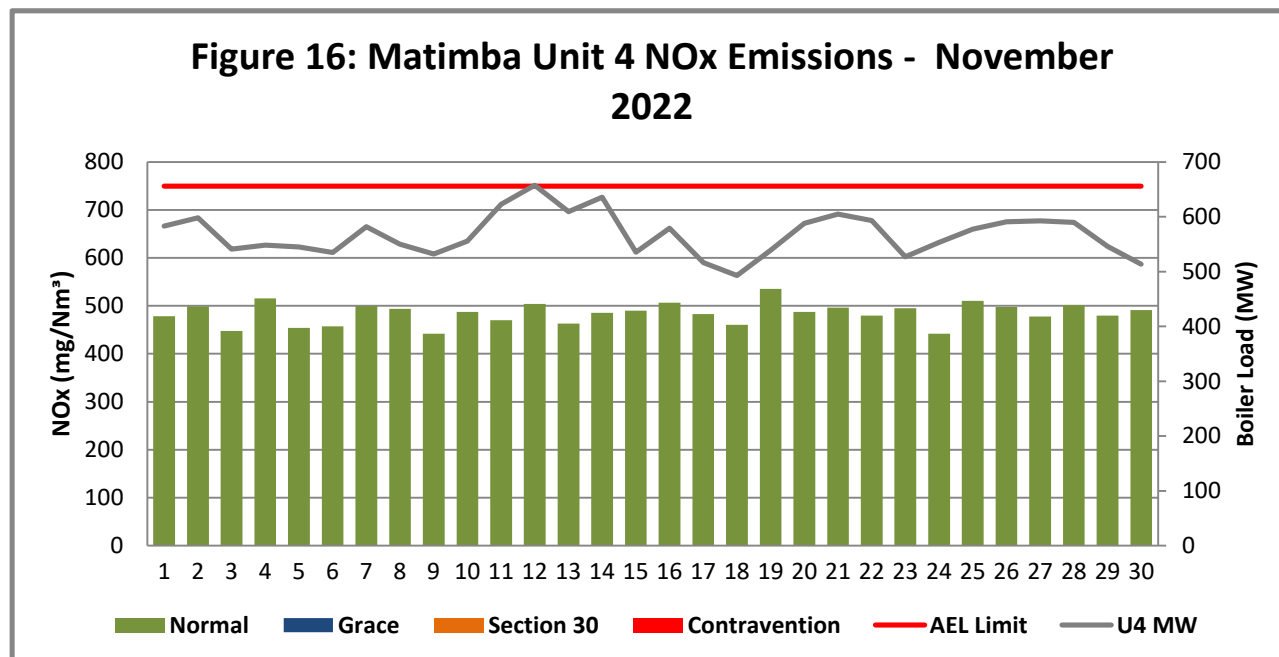
Unit 4 NO_x Emissions

Figure 36: NO_x daily average emissions against emission limit for unit 4 for the month of November 2022

Interpretation:

All daily averages below NO_x emission limit of 750 mg/Nm³.

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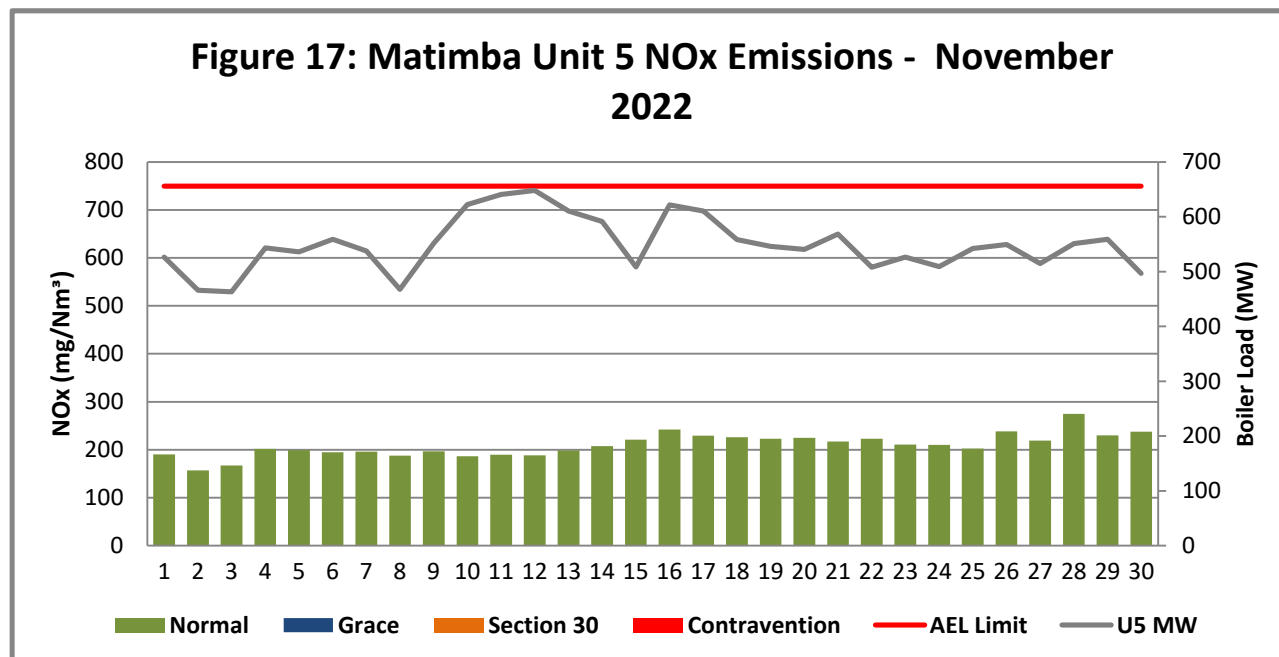
Unit 5 NO_x Emissions

Figure 47: NO_x daily average emissions against emission limit for unit 5 for the month of November 2022

Interpretation:

All daily averages below NO_x emission limit of 750 mg/Nm³.

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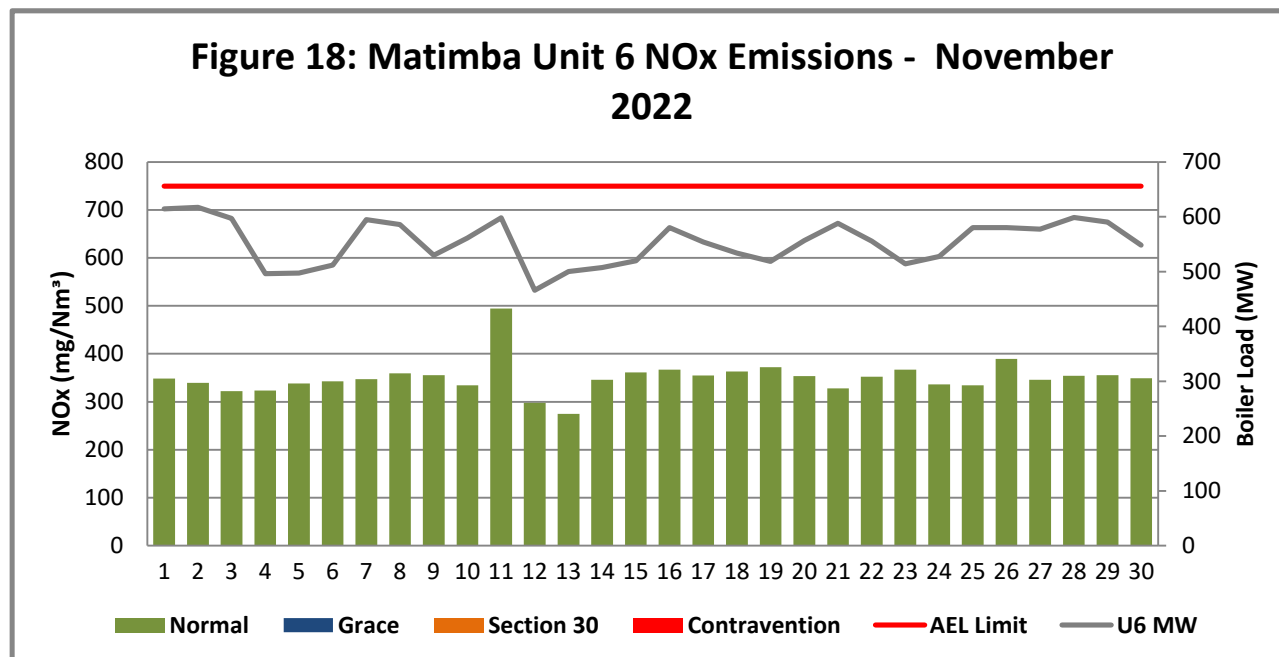
Unit 6 NO_x Emissions

Figure 58: NO_x daily average emissions against emission limit for unit 6 for the month of November 2022

Interpretation:

All daily averages below NO_x emission limit of 750 mg/Nm³.

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2.4.3 Total Volatile Organic Compounds

Table 4: Total volatile compound estimates

		
CALCULATION OF EMISSIONS OF TOTAL VOLATILE COMPOUNDS FROM FUEL OIL STORAGE TANKS*		
Date:	Tuesday, 20 December 2022	
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:	November	
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:	1148,799	
Molecular weight of the fuel oil:	166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH		
	Data	Unit
Daily average ambient temperature	26,22	°C
Daily maximum ambient temperature	32,63	°C
Daily minimum ambient temperature	20,19	°C
Daily ambient temperature range	12,44	°C
Daily total insolation factor	6,14	kWh/m²/day
Tank paint colour	Grey/medium	NA
Tank paint solar absorbance	0,68	NA
FINAL OUTPUT:		
	Result	Unit
Breathing losses:	0,59	kg/month
Working losses:	0,03	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	0,62	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.		

2.4.4 Greenhouse gas (CO₂) emissions

CO₂ emissions are reported in terms of the Greenhouse gas reporting regulations (GN 43712, GNR. 994/2020) and are not included in the monthly AEL compliance report.

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2.5 Daily power generated

Table 5: Daily power generated per unit in MWh for the month of November 2022

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2022/11/01	13008	11138	0	12757	11473	13373
2022/11/02	13016	12047	560,7	13031	10115	13434
2022/11/03	13178	11341	8505	11872	10063	13032
2022/11/04	12778	10766	9817	11912	11722	10815
2022/11/05	11310	10652	9799	11917	11615	10806
2022/11/06	11133	10271	9667	11625	12024	11082
2022/11/07	12344	10256	9814	12715	11675	12925
2022/11/08	12885	11153	10562	11963	10150	12750
2022/11/09	11551	10549	10203	11635	11870	11491
2022/11/10	12158	10270	9742	12116	13531	12212
2022/11/11	12604	10958	10170	13544	13831	12979
2022/11/12	12369	11204	10400	14383	14079	10162
2022/11/13	12136	10992	10411	13305	13223	10887
2022/11/14	12571	11219	10407	13871	12843	11048
2022/11/15	6244	11624	10741	11677	10928	11219
2022/11/16	0	11161	10571	12688	13473	12620
2022/11/17	0	10759	10198	11225	13210	12007
2022/11/18	1053	11811	10129	10704	12102	11594
2022/11/19	10763	11377	9817	11726	11803	11212
2022/11/20	11313	11612	7499	12772	11680	12056
2022/11/21	12348	12505	10260	13219	12313	12794
2022/11/22	11439	11817	8468	12971	10949	12071
2022/11/23	10917	11046	10262	11508	11359	11177
2022/11/24	10926	10719	9903	12016	10973	11391
2022/11/25	12036	11226	10415	12633	11661	12627
2022/11/26	12721	222	10880	12884	11912	12615
2022/11/27	12780	5785	11265	12897	11116	12570
2022/11/28	12848	12199	11593	12889	11847	13022
2022/11/29	12730	12448	10955	11930	12094	12858
2022/11/30	11691	11834	10704	11158	10725	11918

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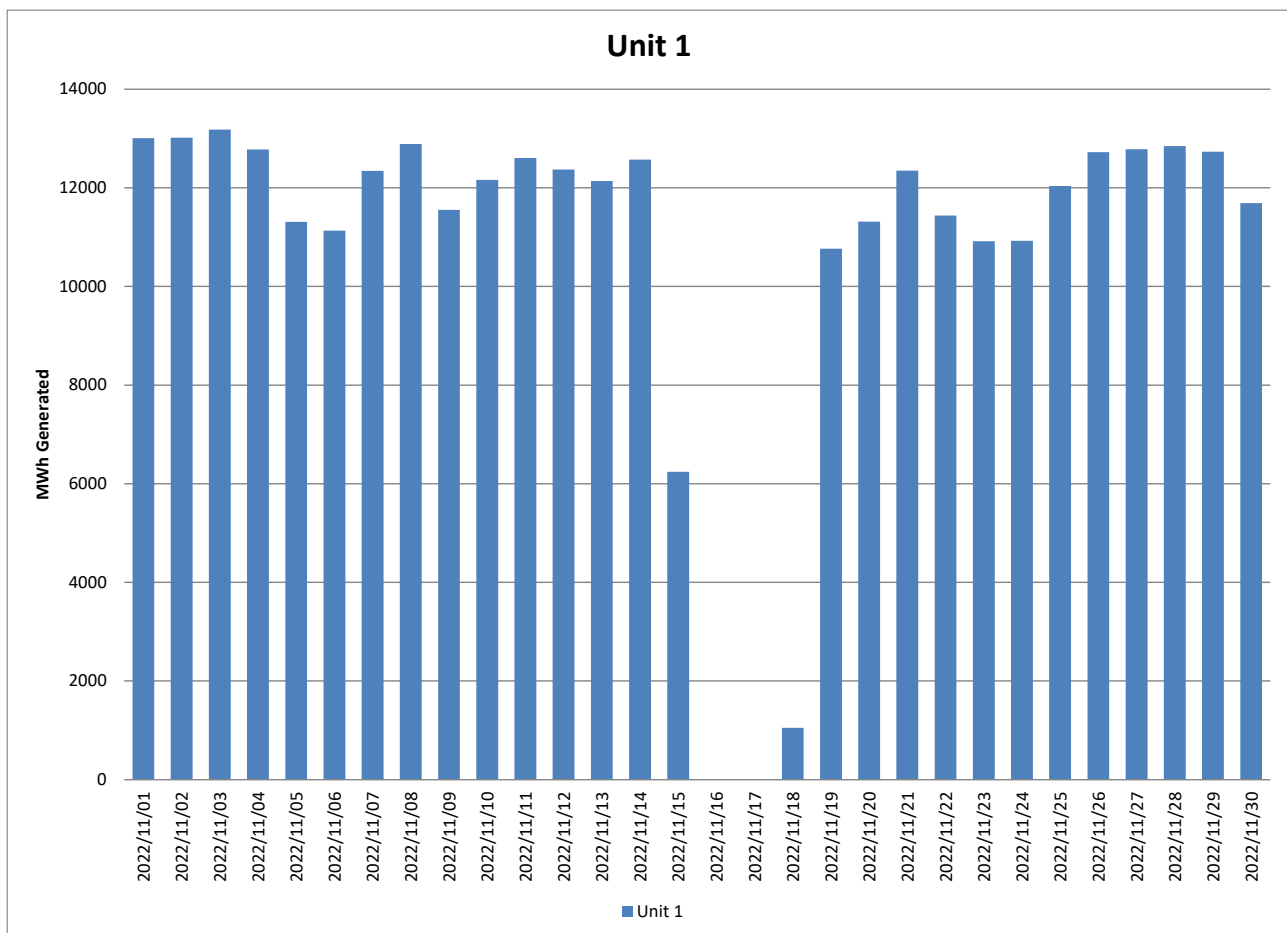


Figure 69: Unit 1 daily generated power in MWh for the month of November 2022

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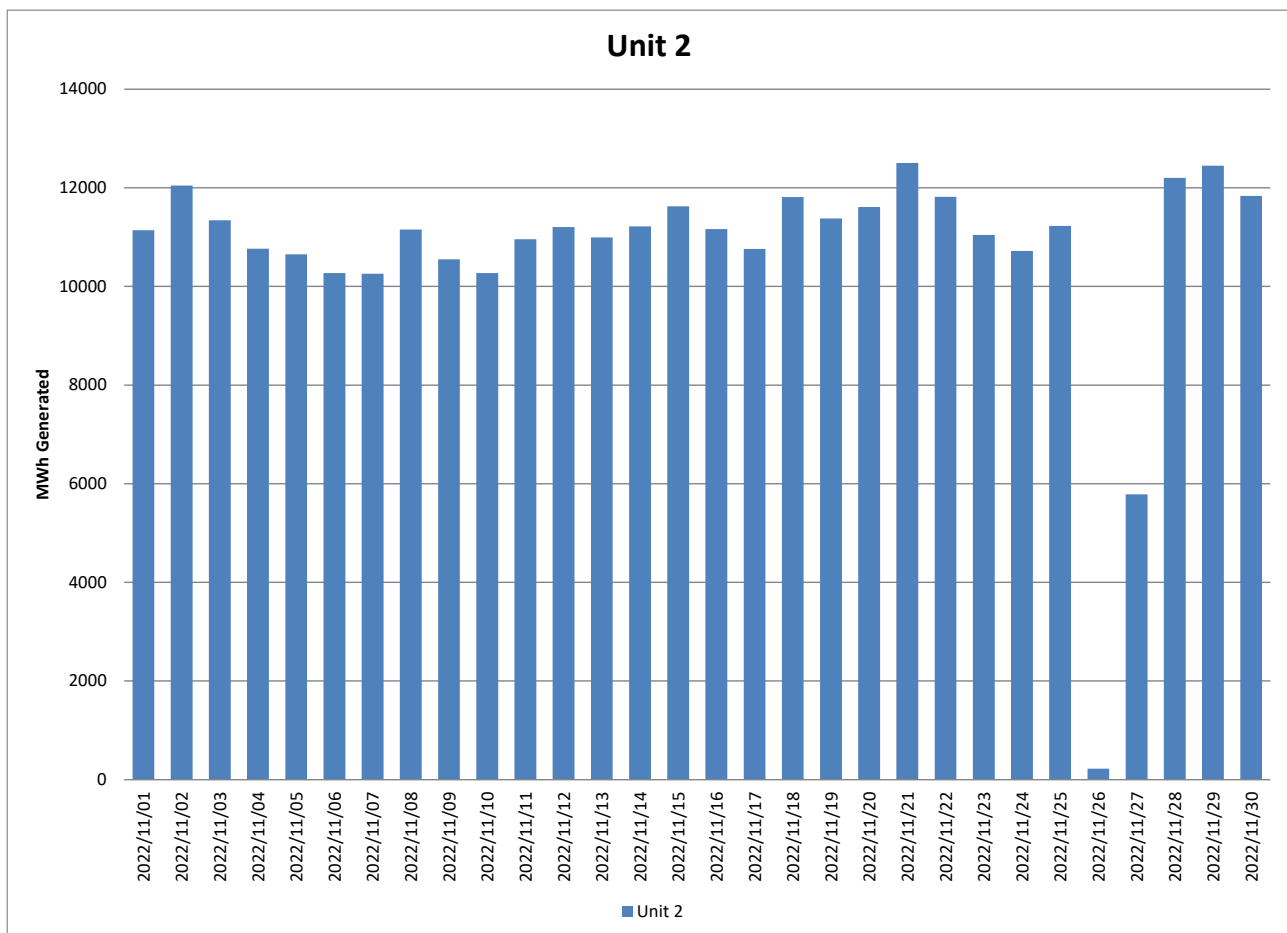


Figure 20: Unit 2 daily generated power in MWh for the month of November 2022

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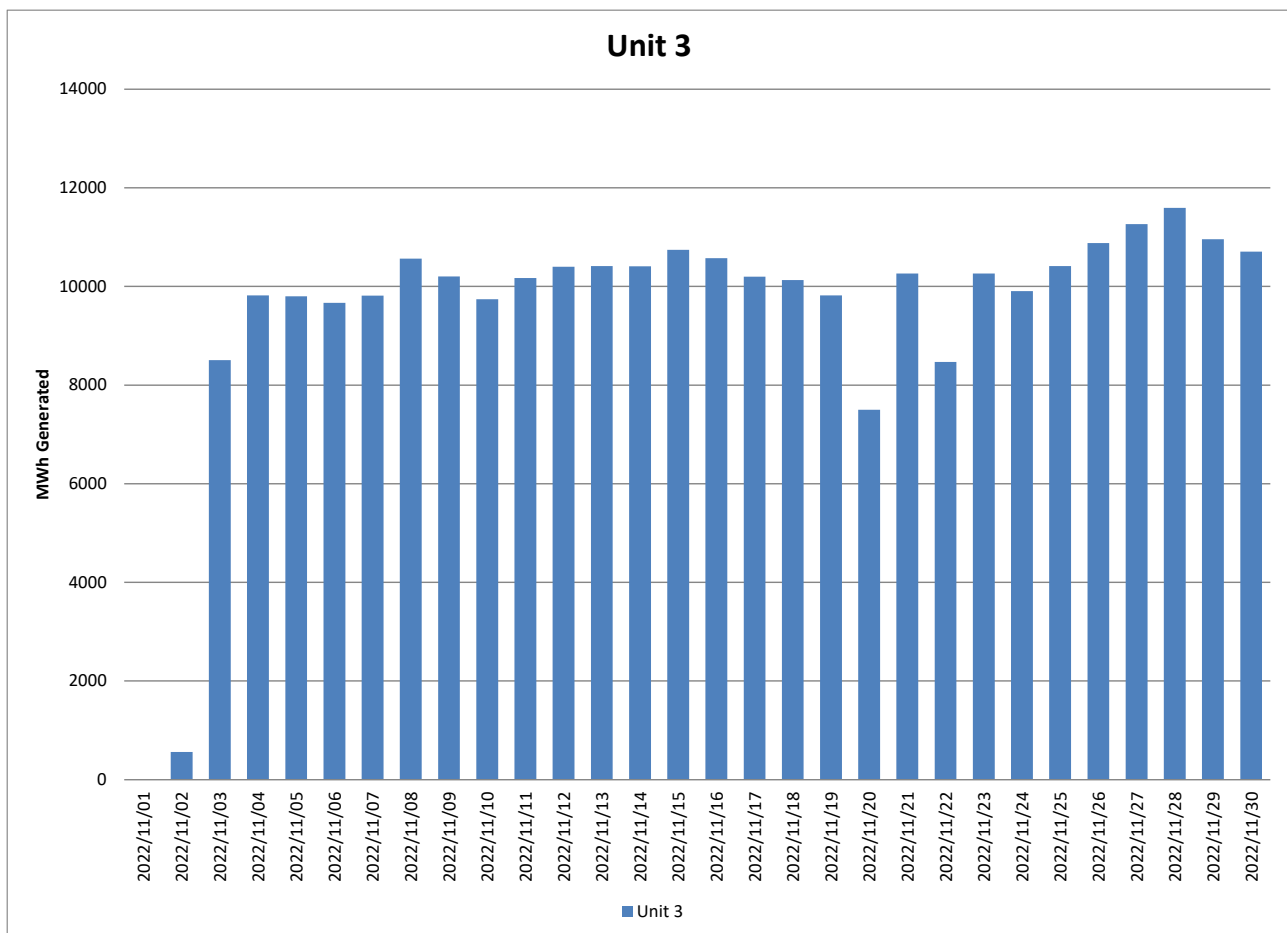


Figure 21: Unit 3 daily generated power in MWh for the month of November 2022

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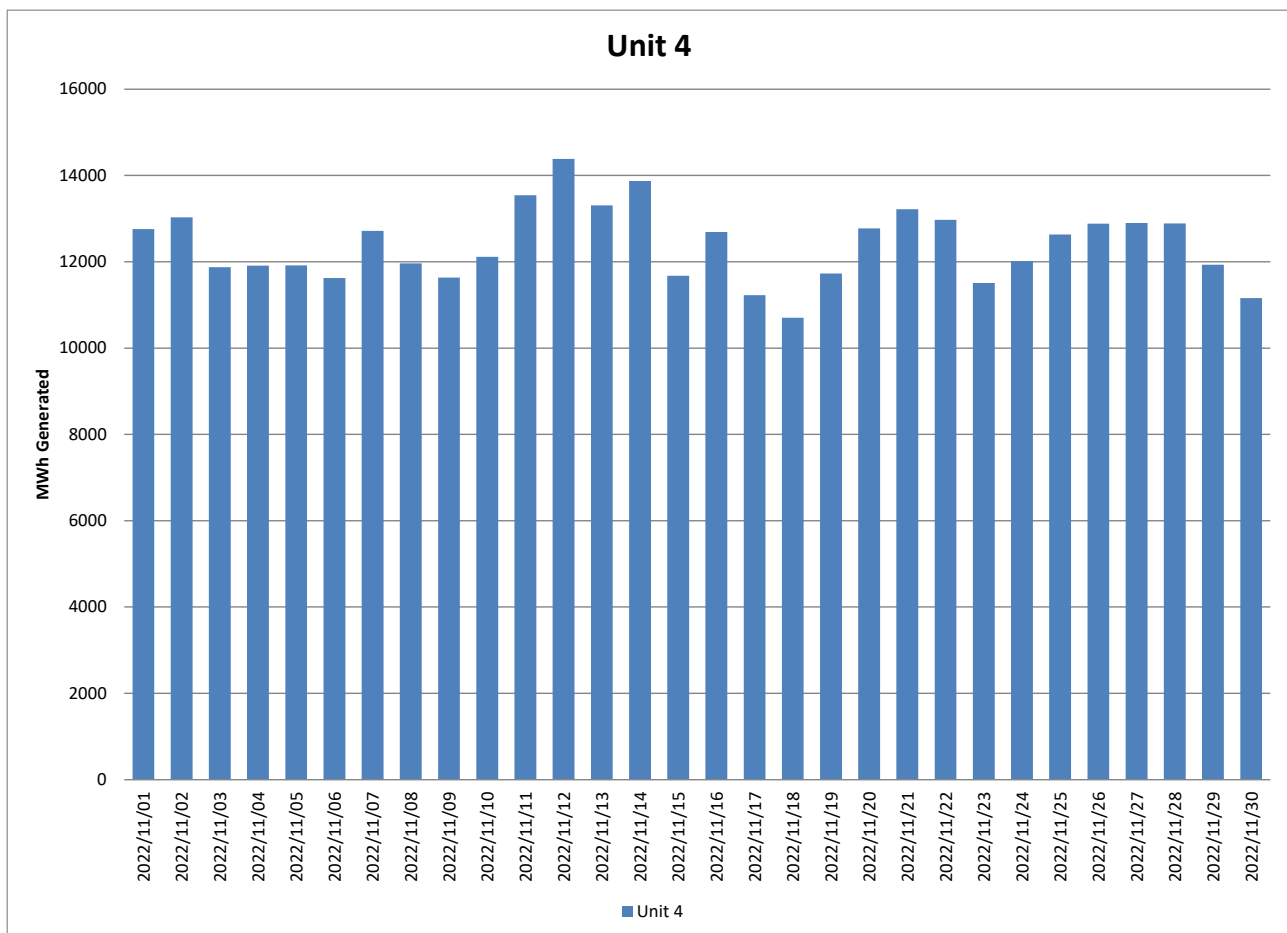


Figure 22 : Unit 4 daily generated power in MWh for the month of November 2022

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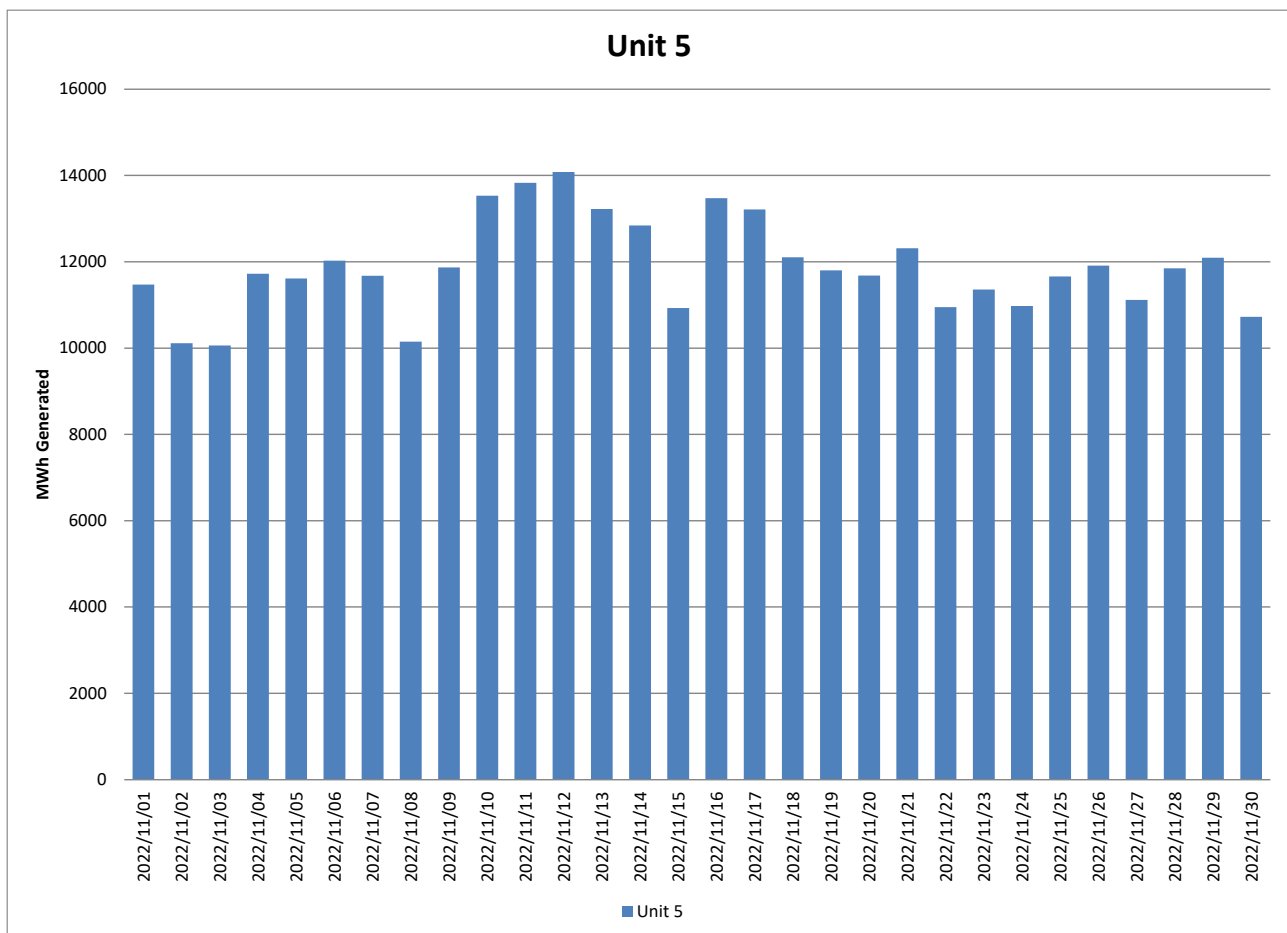


Figure 237: Unit 5 daily generated power in MWh for the month of November 2022

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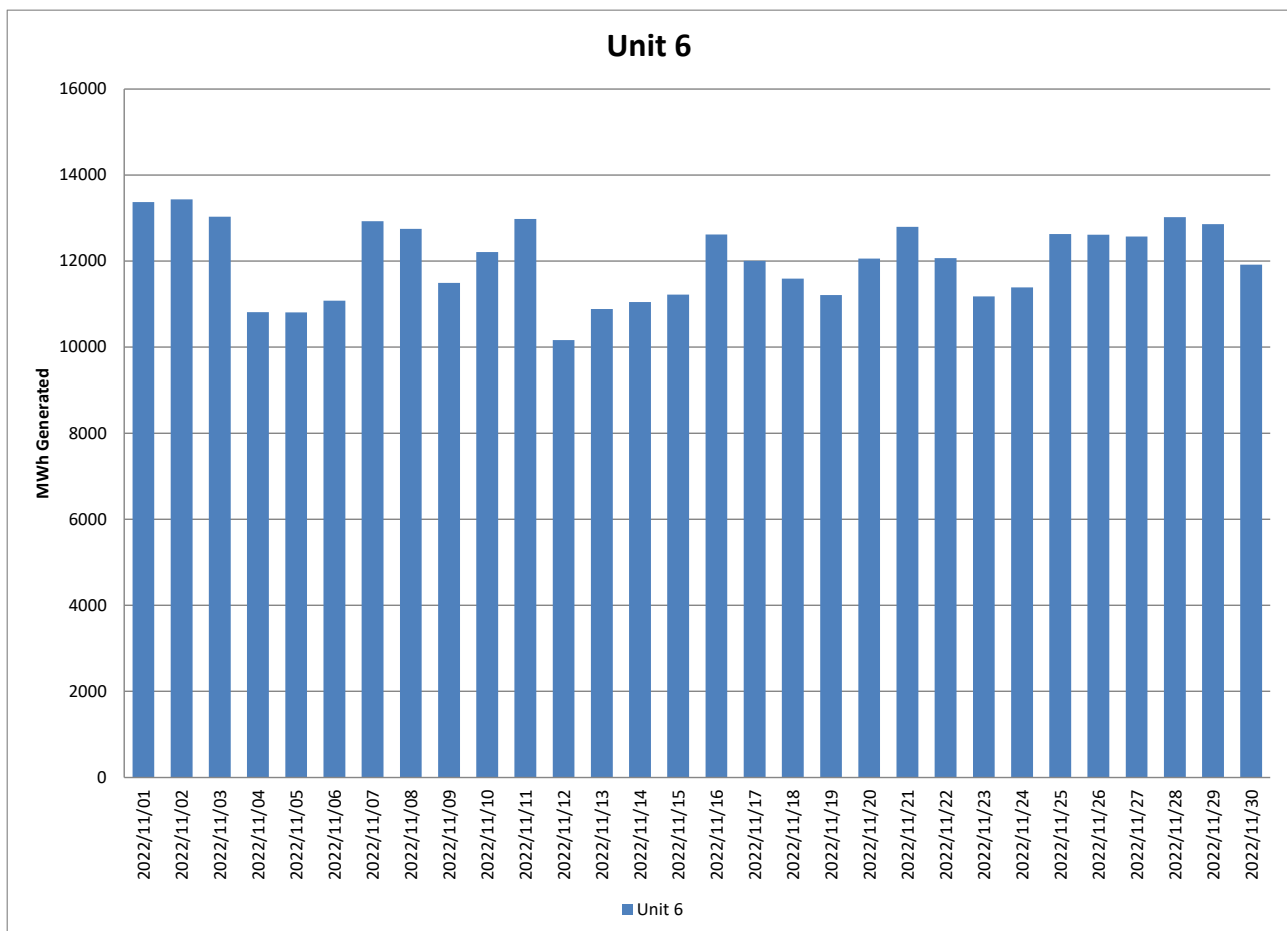


Figure 84: Unit 6 daily generated power in MWh for the month of November 2022

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2.6 Pollutant Tonnages

The emitted pollutant tonnages for November 2022 are provided in table 6. CO₂ values for units 2 were calculated per balance, from O₂ values, due to analyser providing unreliable data.

Table 6: Pollutant tonnages for the month of November 2022

Associated Unit/Stack	PM (tons)	SO ₂ (tons)	NO _x (tons)
Unit 1	66,2	4 374,9	632,2
Unit 2	58,5	8 434,1	930,5
Unit 3	34,5	5 236,4	729,6
Unit 4	70,5	5 348,4	962,5
Unit 5	87,5	4 010,6	508,6
Unit 6	63,6	6 012,4	821,2
SUM	380,8	33 416,8	4 584,7

2.7 Reference values

Table 7: Reference values for data provided, November 2022

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	5,61	7,68	5,99	6,77	6,30	7,29
Moisture	%	5,22	4,60	5,93	3,94	4,97	2,87
Velocity	m/s	23,4	34,4	24,5	24,3	27,5	28,2
Temperature	°C	138,7	125,1	128,7	134,9	123,7	123,0
Pressure	mBar	931,7	935,3	915,8	902,8	931,3	914,6

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2.8 Continuous Emission Monitors

2.8.1 Reliability

The emitted pollutant tonnages for November 2022 are provided in table 6. CO₂ values for units 2 were calculated per balance, from O₂ values, due to analyser providing unreliable data. Matimba is currently in the process of implementing recommended changes on gaseous emission analysers to improve the reliability of the data.

Table 8: Average percentage (%) availability of monitors for the month of November 2022.

Unit	SO ₂	NO _x	PM
1	87,9	87,9	100,0
2	100,0	92,8	100,0
3	91,7	91,7	100,0
4	99,9	99,9	100,0
5	100,0	97,8	100,0
6	97,9	98,8	100,0

2.8.2 Changes, downtime, and repairs

Unit 1

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 2

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 3

- Unit returned to service from outage.
- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 4

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 5

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 6

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- No adjustments done on the CEMS. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

2.8.3 Sampling dates and times

Table 9: Dates of last conducted CEMS verification tests for PM, SO₂ and NO_x

Name of service provider:		Stacklabs Environmental Services CC		
Address of service provider:		10 Chisel Street Boltonia Krugersdorp 1739		
Stack/ Unit	PM	SO ₂	NO _x	CO ₂
1	2020/09/30 06h04	2020/09/09 13h00	2020/09/09 13h00	2020/09/09 13h00
2	2021/01/26 04h52	2021/01/27 13h00	2021/01/27 13h00	2021/01/27 13h00
3	2021/08/10 12h05	2020/09/24 07h00	2020/09/24 07h00	2020/09/24 07h00
4	2021/07/13 14h31	2020/09/16 02h00	2020/09/16 02h00	2020/09/16 02h00
5	2020/10/06 05h39	2020/10/08 02h30	2020/10/08 02h30	2020/10/08 02h30
6	2020/09/09 06h41	2020/09/09 13h00	2020/09/09 13h00	2020/09/09 13h00

Correlation curves for Unit 1, Unit 5, and Unit 6 are currently outstanding. Quality assurance level 2 curves are outstanding for unit 1, unit 3, unit 4, unit 5 and unit 6. The new tests have been completed however, due to errors and disputes identified in the test reports during the review process updated curves have not yet been implemented. The disputes and corrections are being addressed by Matimba and the service provider and new curves will be implemented as soon as they are confirmed to be correct.

2.9 Units Start-up information

Table 10: Start-up information

Unit	1	
Fires in	2022/11/18	08H44
Synchronization with Grid	2022/11/18	19H20
Emissions below limit	2022/11/18	21H04
Fires in to synchronization	10,6	HOURS
Synchronization to < Emission limit	1,6	HOURS

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Unit	2	
Fires in	2022/11/27	02H45
Synchronization with Grid	2022/11/27	08H10
Emissions below limit	2022/11/27	14H00
Fires in to synchronization	5,4	HOURS
Synchronization to < Emission limit	5,8	HOURS

Unit	3	
Fires in	2022/11/02	00H27
Synchronization with Grid	2022/11/02	17H28
Emissions below limit	2022/11/02	22H01
Fires in to synchronization	17,01	HOURS
Synchronization to < Emission limit	4,55	HOURS

Unit	3	
Fires in	2022/11/20	13H24
Synchronization with Grid	2022/11/20	18H30
Emissions below limit	2022/11/20	22H00
Fires in to synchronization	5,1	HOURS
Synchronization to < Emission limit	3,5	HOURS

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Unit	3	
Fires in	2022/11/22	18H09
Synchronization with Grid	2022/11/22	22H23
Emissions below limit	2022/11/23	00H09
Fires in to synchronization	4,22	HOURS
Synchronization to < Emission limit	1,76	HOURS

2.10 Emergency generation

Table 11: Emergency generation

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Emergency Generation hours declared by national Control						
Emergency Hours declared including hours after stand down						
Days over the Limit during Emergency Generation						

During the period under review all Units were on emergency generation in force from 31 October 2022 until 30 November 2022.

2.11 Complaints register

Table 12: Complaints

Source Code/ Name	Root Cause Analysis	Calculation of Impacts/ emissions associated with the incident	Dispersion modelling of pollutants where applicable	Measures implemented to prevent reoccurrence	Date by which measure will be implemented
N/A					

2.12 Air quality improvements and social responsibility conducted

2.12.1 Air quality improvements

None

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2.12.2 Social responsibility conducted

None

2.13 Ambient air quality monitoring

Ambient air quality monitoring report was not available at the time of publishing this report. The report will be send through as soon as it is available.

2.14 Electrostatic precipitator and Sulphur plant status

Unit 1

- 3 fields out of service, will be inspected next opportunity.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 2

- 2 fields out of service, will be inspected next opportunity.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 3

- Unit returned to service from outage.
- No abnormalities on the precipitator plant.
- No abnormalities on the SO3 plant.

Unit 4

- 3 field out of service, will be inspected next opportunity.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 5

- 4 field out of service, will be inspected next opportunity.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 6

- 2 fields out of service, will be inspected next opportunity.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

SO3 common plant

- No abnormalities on the sulphur storage plant.

2.15 General

Name and reference number of the monitoring methods used:

1. Particulate and gas monitoring according to standards

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

3. Attachments

none

4. Report Conclusion

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



GENERAL MANAGER: MATIMBA POWER STATION

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