Eskom	Technical and Generic Report	Matimba Power Station

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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 April 2023.

During the period under review, Matimba experienced 90 exceedances of the daily particulate matter emission limit (50mg/Nm3) ,59 of these exceedances occurred outside of the 48-hour grace period and were recorded on the Eskom incident management process as non-compliance to the Atmospheric Emissions Licence. No gaseous emissions results reported for the month of April 2023 due to unreliability of the data obtained from the gaseous emissions monitors.

The Sulphur conditioning plant for unit 1,3,4 and unit 6 did not achieve the required 100% availability due to the defects and breakdown experienced on the plants throughout the month. The SO3 plants were repaired and operating as normal. Unit 5 was taken off load for outage from 20 March 2023.

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

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	853 241
	Fuel Oil	Tons/month	1 200	2125,566
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	MW	4000	1997,273

The consumption rates for the month of April 2023 exceeded the permitted maximum limits of 1200T due to defective pyrometers used to detect the flames in the boiler resulting in requirement to constantly supporting the combustion t with fuel oil. The unit ended the month with the fuel oil usage of 2125,566 T.

2.2 Abatement technology

Table 2: Abatement Equipment Control Technology Utilised

Associated Unit	Technology Type	Minimum utilisation (%)	Efficiency (%)
Unit 1	Electrostatic Precipitator	100%	99,732%
Unit 2	Electrostatic Precipitator	100%	99,701%
Unit 3	Electrostatic Precipitator	100%	99,817%
Unit 4	Electrostatic Precipitator	100%	99,856%
Unit 5	Electrostatic Precipitator	100%	Unit Off-line
Unit 6	Electrostatic Precipitator	100%	99,898%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	99,48%
Unit 2	SO_3 Plant	100%	100%
Unit 3	SO_3 Plant	100%	99,23%
Unit 4	SO_3 Plant	100%	93,76%
Unit 5	SO_3 Plant	100%	Unit Off
Unit 6	SO_3 Plant	100%	95,68%

Flue gas conditioning plant availability was below the required 100% for all six (06) units due to maintenance activities and unplanned breakdowns. Defects were addressed and plants returned to services.

2.3 Energy source characteristics

Table 3: Energy Source Material Characteristics.

	Characteristic	Stipulated Range (Unit)	Monthly Average Content
Coal burned	Sulphur Content	1.6%	1,33%
	Ash Content	40%	34,60%

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

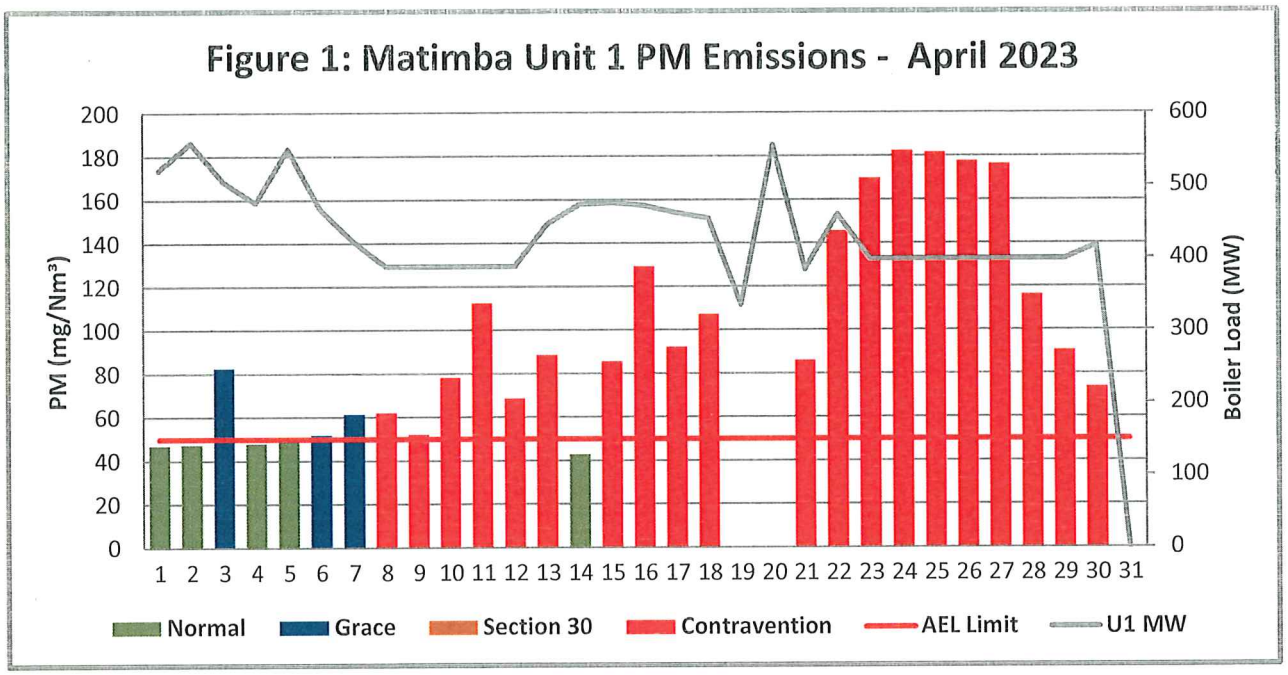

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of April 2023

Interpretation:

Unit 1 exceeded the daily particulate emission limit of 50mg/Nm3 on 3,6 to 13 and 15 to 30 April 2023. all exceedances occurred outside of the 48-hour grace period and were recorded on the Eskom incident management process as non-compliance to the Atmospheric Emissions Licence. The exceedances were due to defects on the dust handling plants leading to high hopper levels within the flue gas cleaning system and reducing the efficiency of the abatement technology (electrostatic precipitator fields). The investigation into the causes of the exceedances were done and corrective measure put in place to correct the root causes.

Unit 2 Particulate Emissions

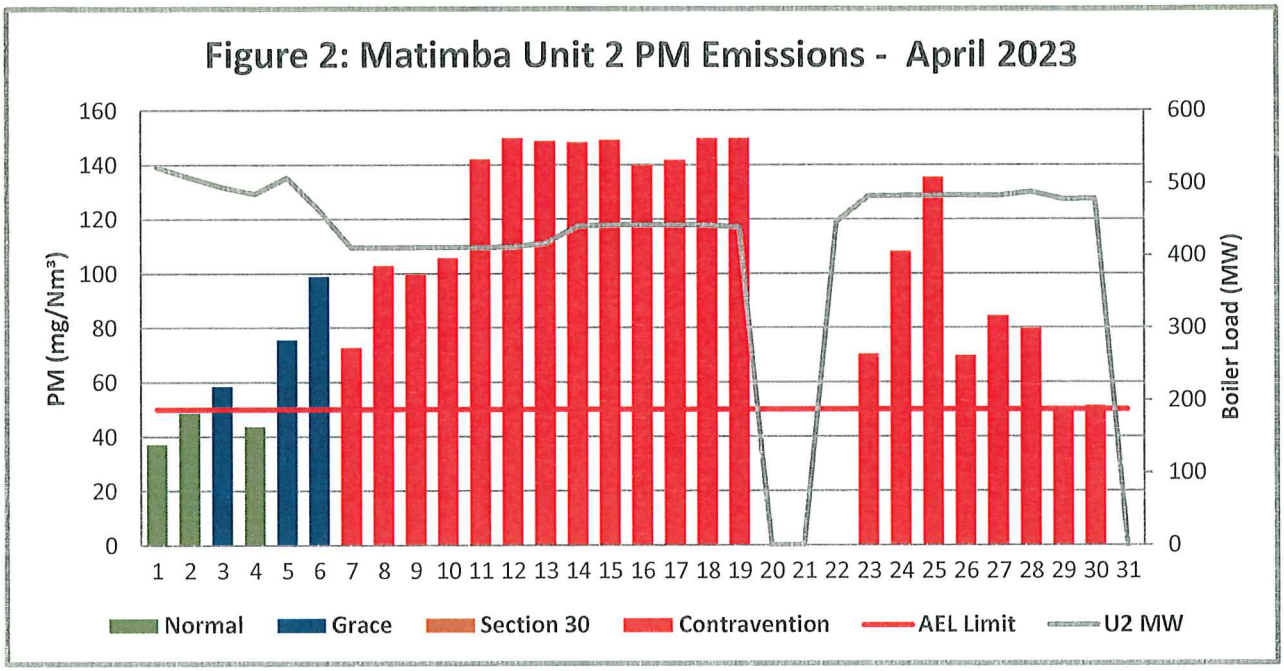

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of April 2023

Interpretation:

Unit 2 exceeded the daily particulate emission limit of 50mg/Nm3 on 3, 5 to 30 April 2023.all exceedances occurred outside of the 48-hour grace period and were recorded on the Eskom incident management process as non-compliance to the Atmospheric Emissions Licence. The exceedances were due to defects on the dust handling plants leading to high hopper levels within the flue gas cleaning system and reducing the efficiency of the abatement technology (electrostatic precipitator fields). The investigation into the causes of the exceedances were done and corrective measure put in place to correct the root causes.

Unit 3 Particulate Emissions

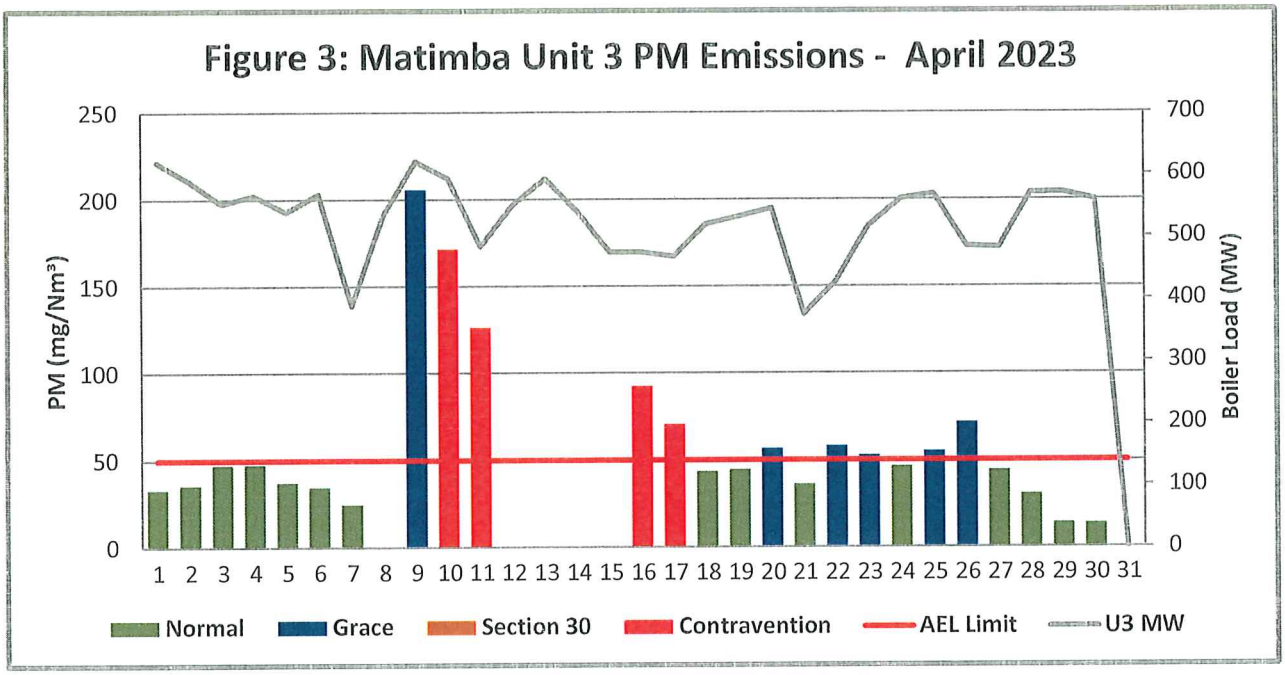

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of April 2023

Interpretation:

Unit 3 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 9 to 11, 16 to 17,20,22,23,25, and 26 April 2023. Exceedances from the 10 to the 17 April 2023 occurred outside of the 48-hour grace period and were recorded on the Eskom incident management process as non-compliance to the Atmospheric Emissions Licence. The exceedances were due to defects on the dust handling plants leading to high hopper levels within the flue gas cleaning system and reducing the efficiency of the abatement technology (electrostatic precipitator fields). The investigation into the causes of the exceedances were done and corrective measure put in place to correct the root causes.

Unit 4 Particulate Emissions

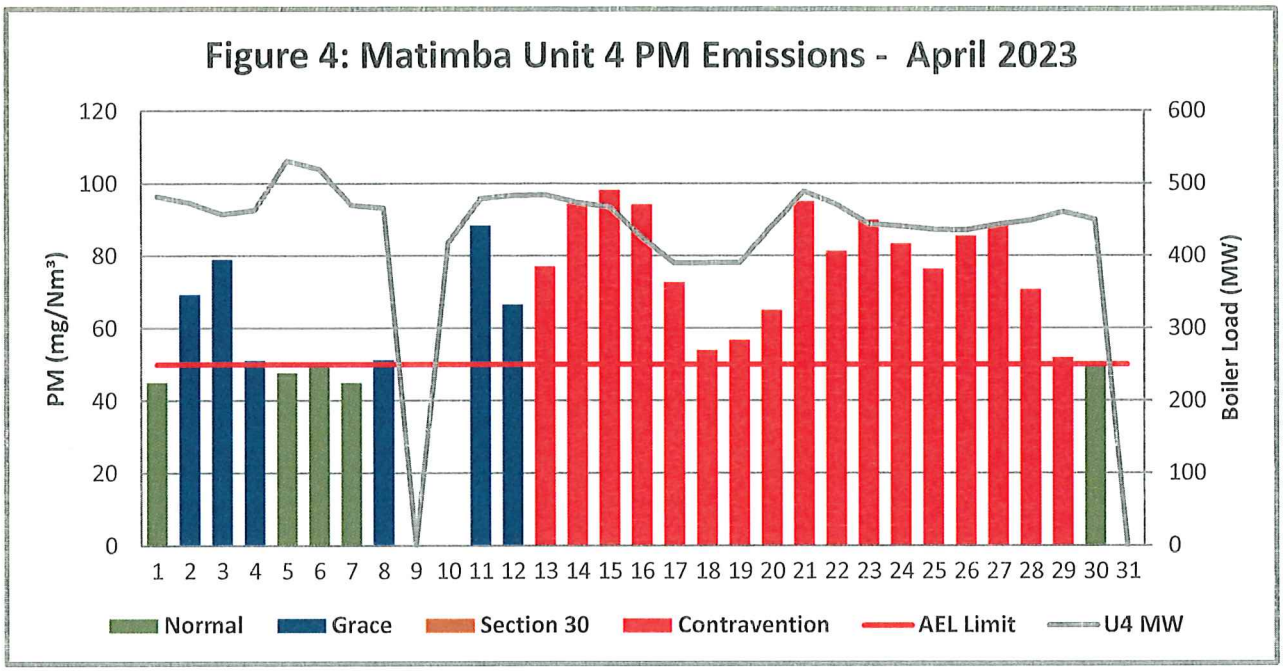

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of April 2023

Interpretation:

Unit 4 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 2 to 4,8,11 to 29 April 2023. Exceedances from 11 to 29 April 2023 occurred outside of the 48-hour grace period and were recorded on the Eskom incident management process as non-compliance to the Atmospheric Emissions Licence. The exceedances were due to defects on the dust handling plants leading to high hopper levels within the flue gas cleaning system and reducing the efficiency of the abatement technology (electrostatic precipitator fields). The investigation into the causes of the exceedances were done and corrective measure put in place to correct the root causes.

Unit 5 Particulate Emissions

Unit 5 on outage.

Unit 6 Particulate Emissions

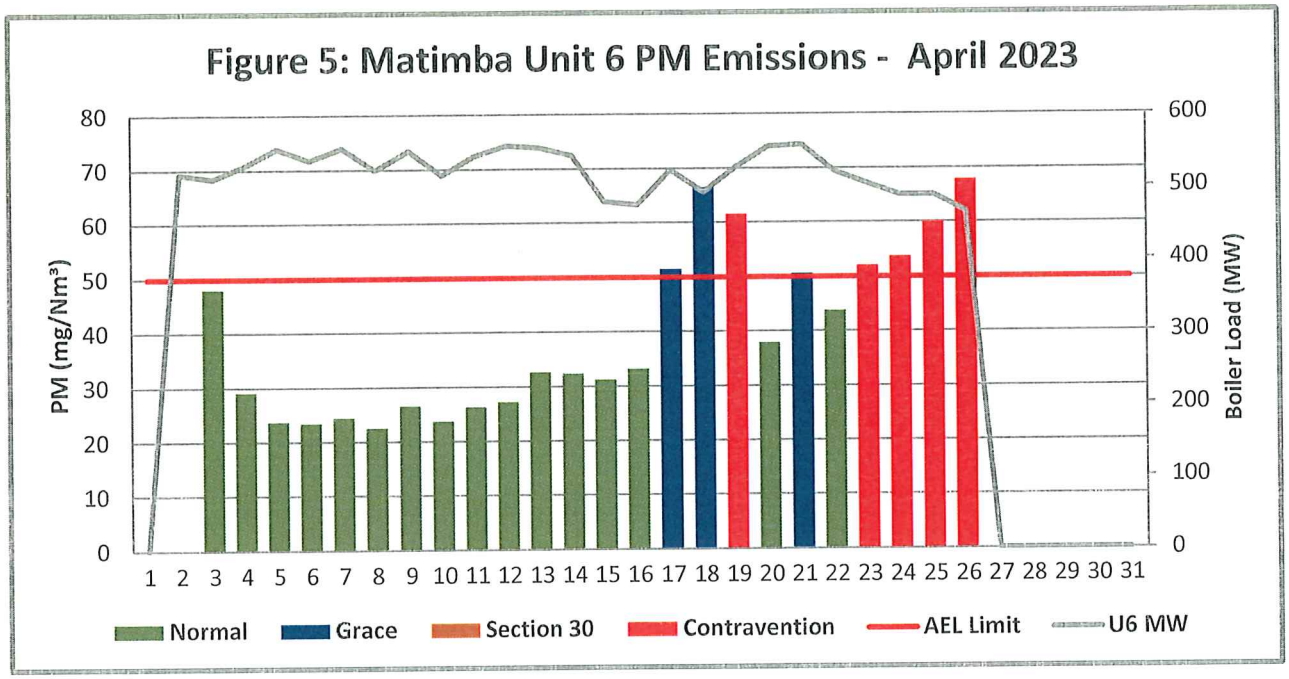

Figure 5: Particulate matter daily average emissions against emission limit for unit 6 for the month of April 2023

Interpretation:

Unit 6 Particulate matter exceeded the daily limit of 50 mg/Nm3 on 17 to 19,21,23 to 26 April 2023. Exceedances of 19,23 to 26 April 2023 occurred outside of the 48-hour grace period and were recorded on the Eskom incident management process as non-compliance to the Atmospheric Emissions Licence. The exceedances were due to defects on the dust handling plants leading to high hopper levels within the flue gas cleaning system and reducing the efficiency of the abatement technology (electrostatic precipitator fields). The investigation into the causes of the exceedances were done and corrective measure put in place to correct the root causes

2.4.2 Gaseous Emissions

Gaseous emissions analyzers for all 6 units are providing unreliable data due to the movement of the Oxygen analyzer ports that were previously installed incorrectly to a new correct position.
The station completed the project to relocate the Oxygen analyzer ports in November 2022 as part of the activities to implement the changes on gaseous emission analyzers to improve the reliability of the data.
The station is currently preparing to perform the quality assurance tests and calibrations on the monitors post the changes implemented.

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Unit 1 SO_2 Emissions

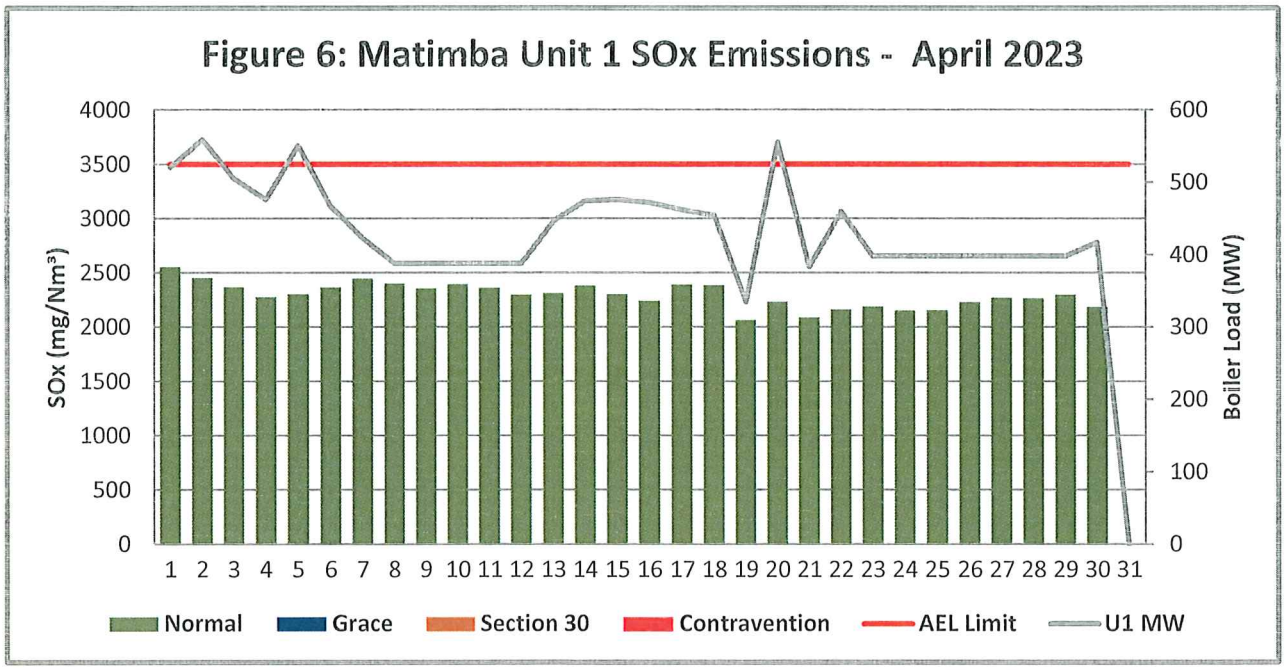

Figure 6: SO2 daily average emissions against emission limit for unit 1 for the month of April2023

Interpretation:

All daily averages below SO_2 emission monthly limit of 3500 mg/Nm³.

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Unit 2 SO_2 Emissions

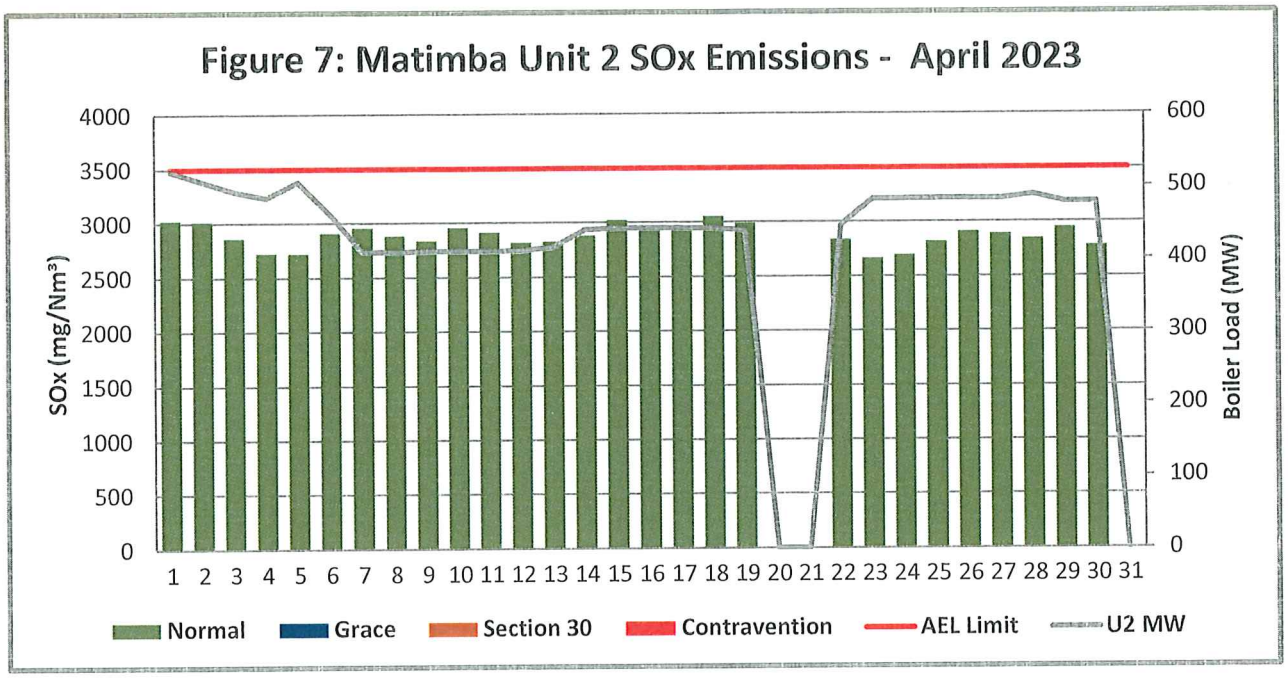

Figure 7: SO2 daily average emissions against emission limit for unit 2 for the month of April 2023

Interpretation:

All daily averages below SO_2 emission monthly limit of 3500 mg/Nm^3

Unit 3 SO_2 Emissions

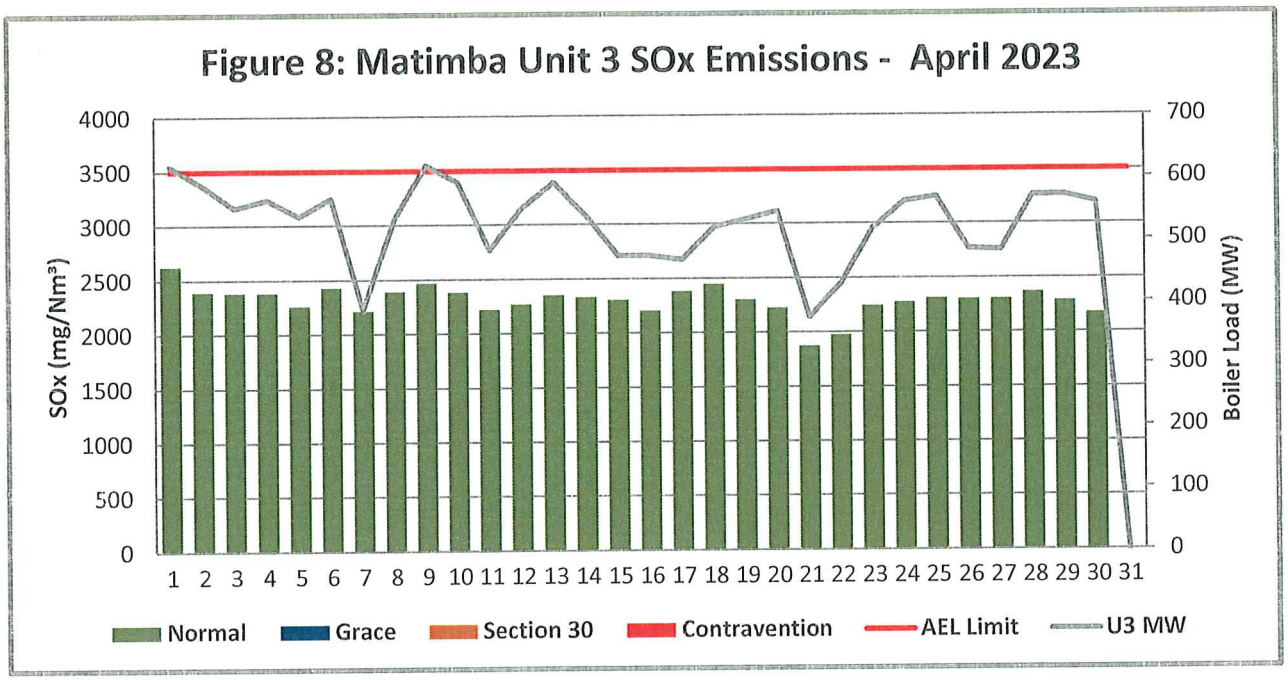

Figure 8: SO2 daily average emissions against emission limit for unit 3 for the month of April 2023

Interpretation:

All daily averages below SO_2 emission monthly limit of 3500 mg/Nm^3.

Unit 4 SO_2 Emissions

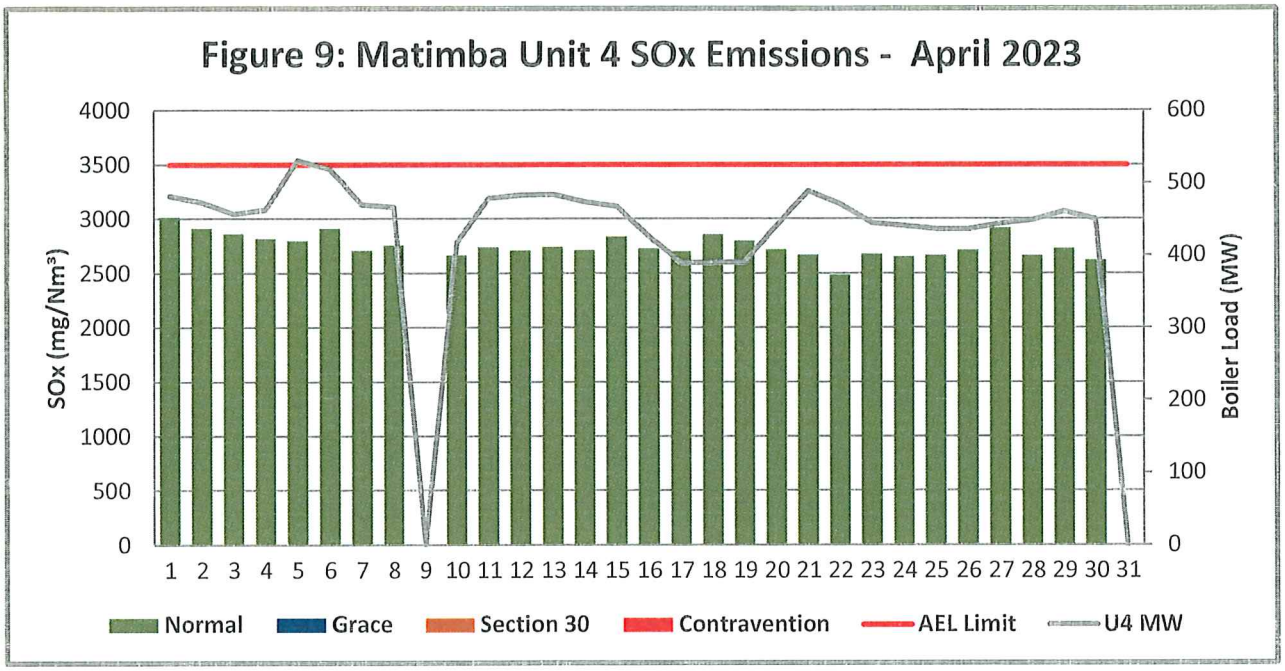

Figure 9: SO2 daily average emissions against emission limit for unit 4 for the month of April 2023

Interpretation:

All daily averages below SO_2 emission monthly limit of 3500 mg/Nm³.

Unit 5 SO_2 Emissions

Unit 5 off load for outage

Unit 6 SO_2 Emissions

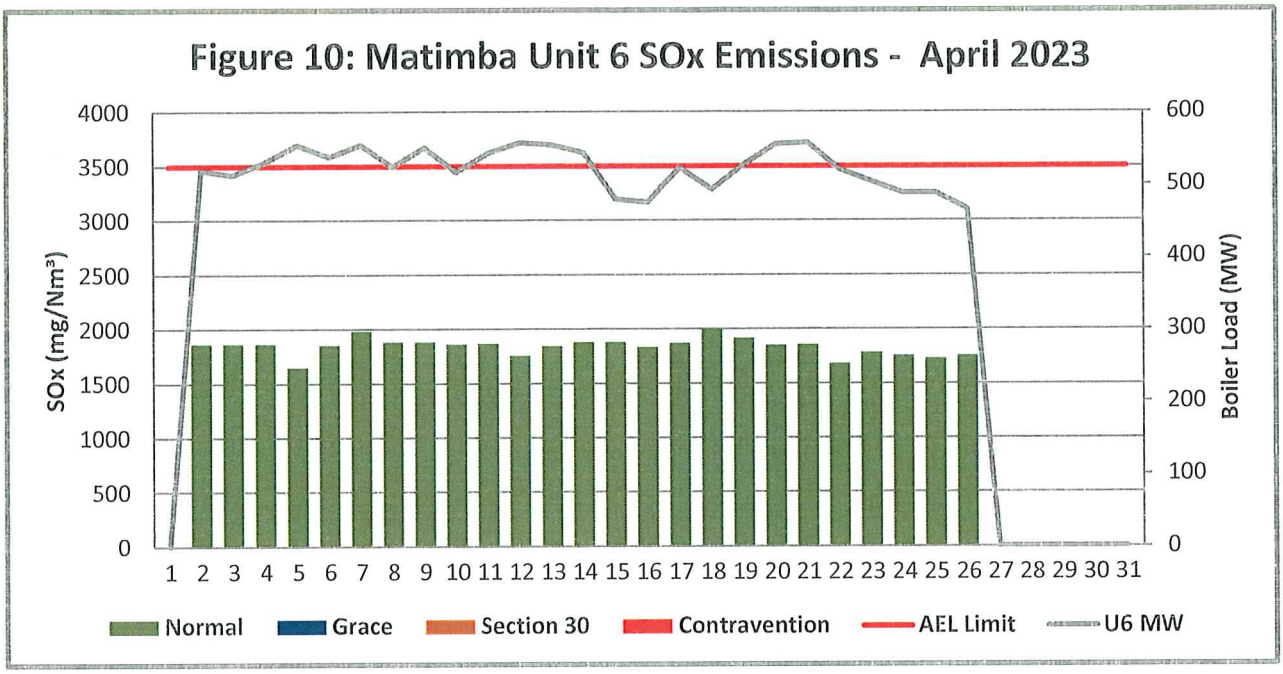

Figure 10: SO2 daily average emissions against emission limit for unit 6 for the month of April 2023

Interpretation:

All daily averages remained below SO_2 emission monthly limit of 3500 mg/Nm^3.

Unit 1 NO_x Emissions

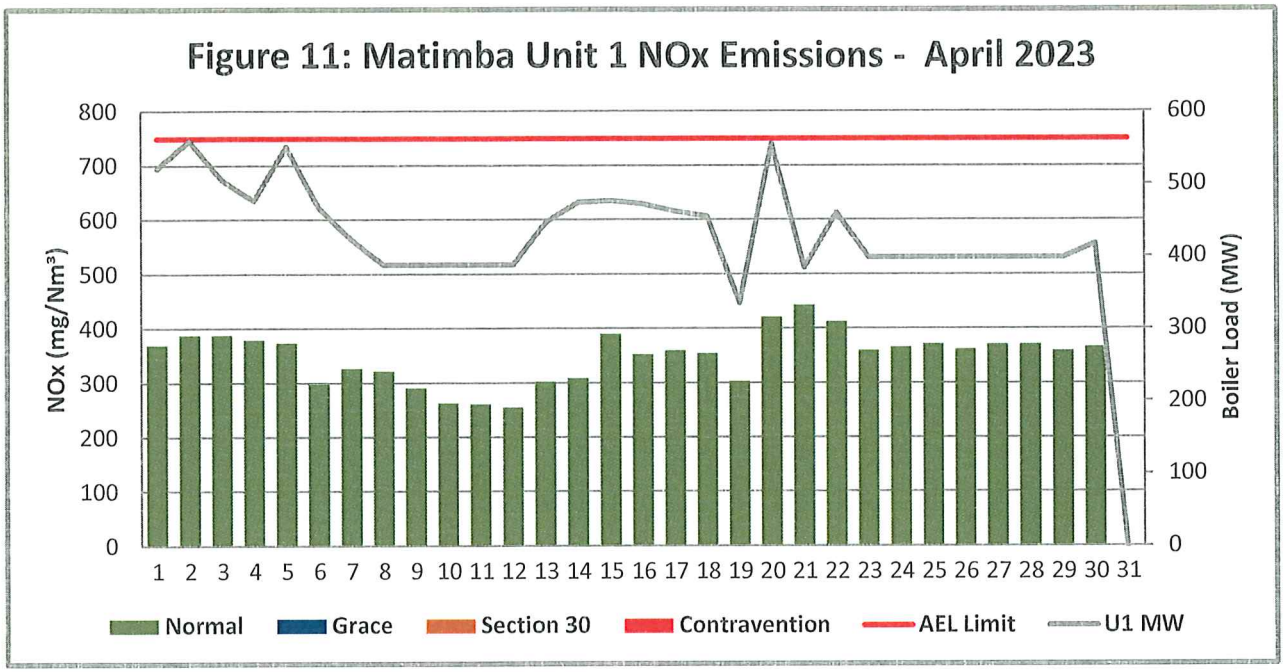

Figure 11: NOx daily average emissions against emission limit for unit 1 for the month of April 2023

Interpretation:

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

Unit 2 NO_x Emissions

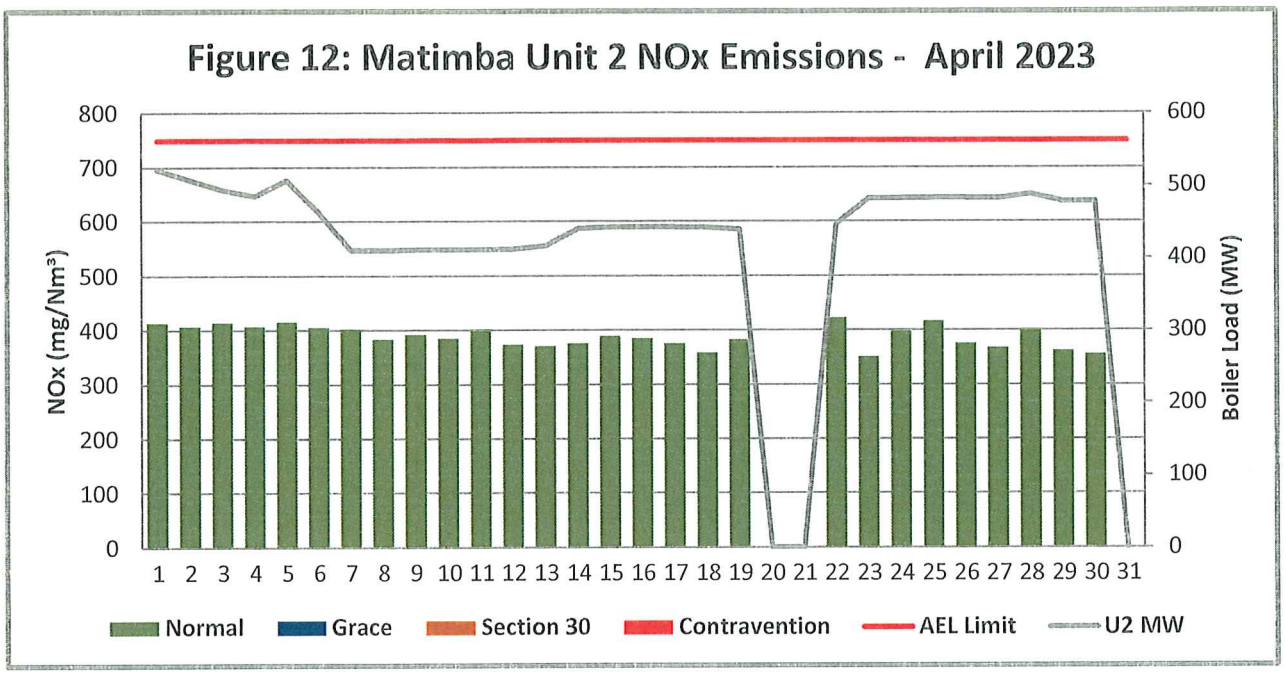

Figure 12: NOx daily average emissions against emission limit for unit 2 for the month of April 2023

Interpretation:

All daily averages below NOx emission limit of 750 mg/Nm^3.

Unit 3 NO_x Emissions

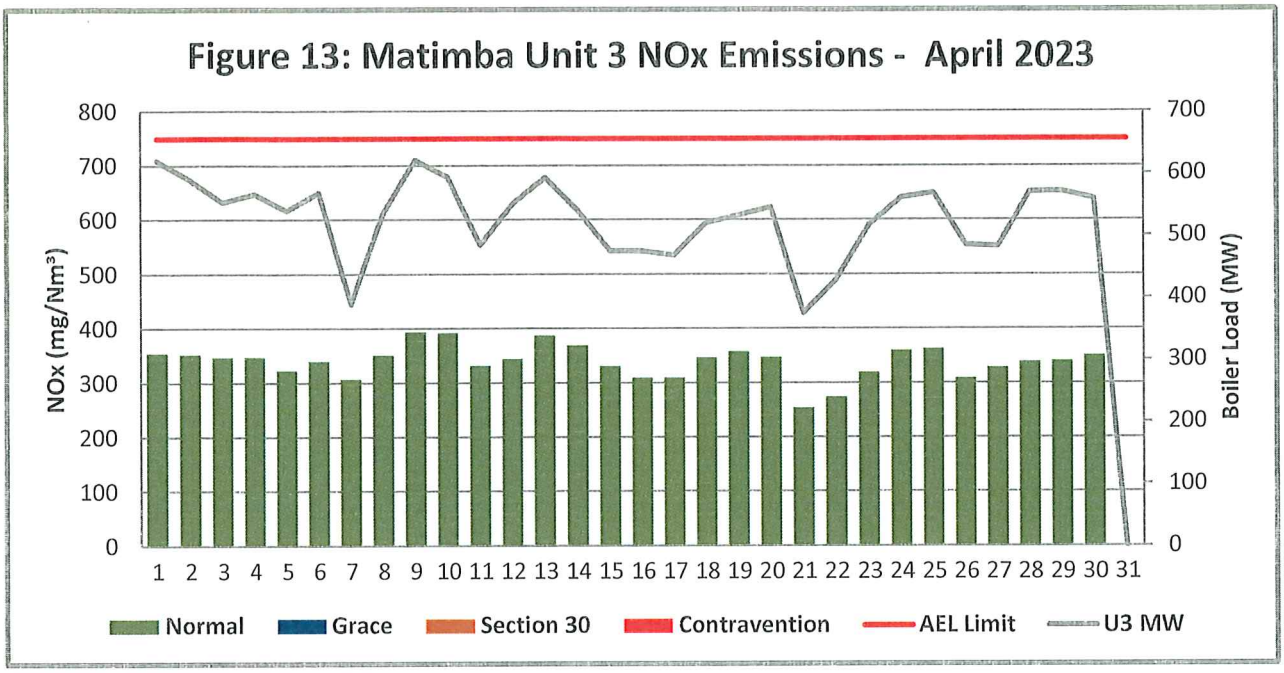

Figure 13: NOx daily average emissions against emission limit for unit 3 for the month of April 2023

Interpretation:

All daily averages below NOx emission limit of 750 mg/Nm^3.

Unit 4 NO_x Emissions

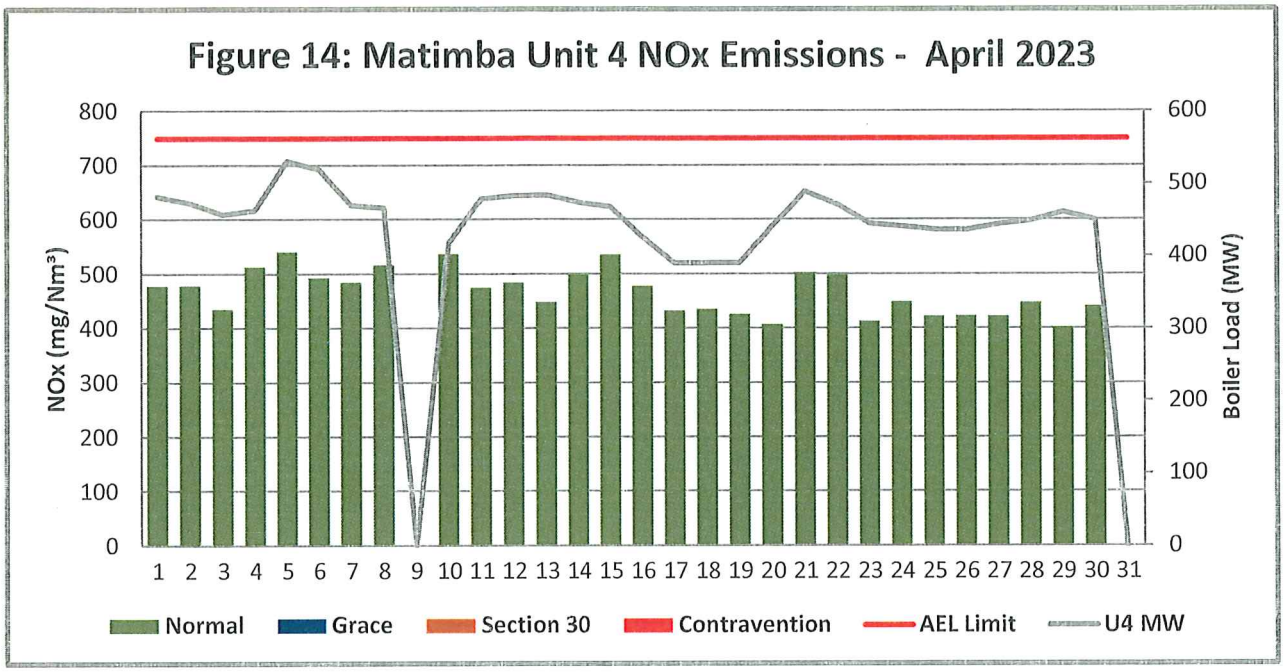

Figure 14: NOx daily average emissions against emission limit for unit 4 for the month of April 2023

Interpretation:

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

Unit 5 NO_x Emissions

Unit 5 off load for outage

Unit 6 NO_x Emissions

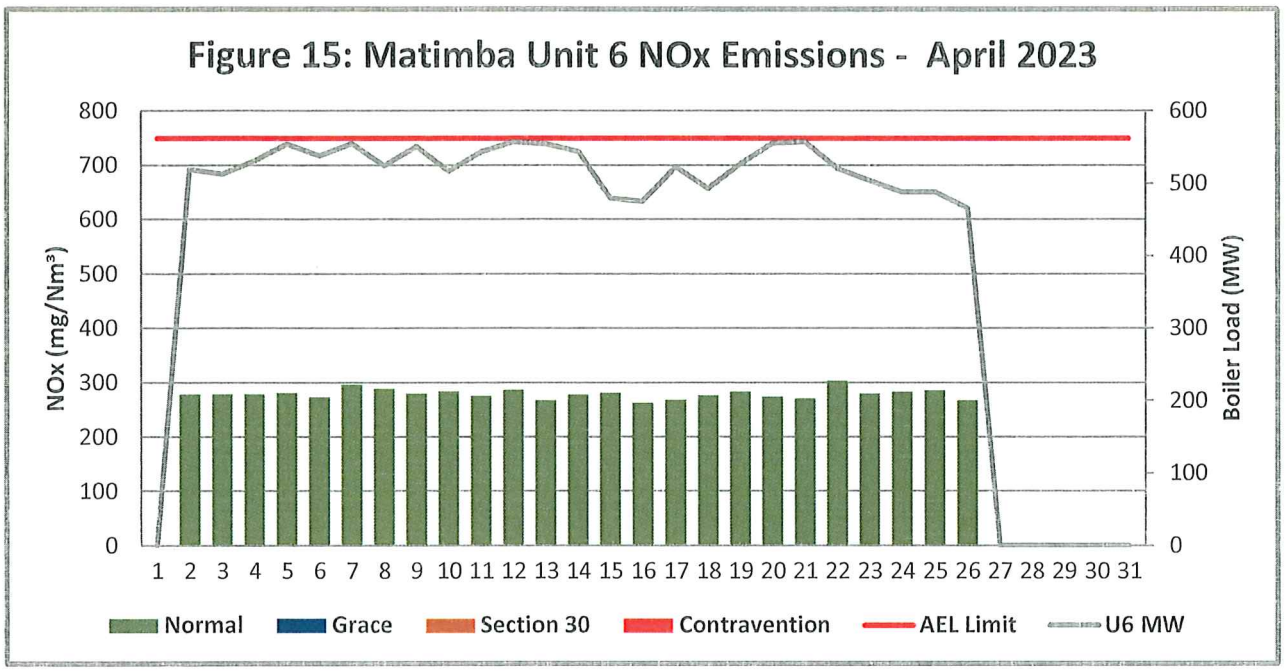

Figure 15: NOx daily average emissions against emission limit for unit 6 for the month of April 2023

Interpretation:

All daily averages below NOx emission limit of 750 mg/Nm^3.

2.4.3 Total Volatile Organic Compounds

Table 4: Total volatile compound estimates

Eskom

CALCULATION OF EMISSIONS OF TOTAL VOLATILE COMPOUNDS FROM FUEL OIL STORAGE TANKS*

Date:	Thursday, 01 June 2023
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:	April	
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:	*2125,566*	
Molecular weight of the fuel oil:	166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	**Data**	**Unit**
Daily average ambient temperature	20,60	°C
Daily maximum ambient temperature	27,37	°C
Daily minimum ambient temperature	13,11	°C
Daily ambient temperature range	10,46	°C
Daily total insolation factor	3,84	kWh/m²/day
Tank paint colour	*Grey/medium*	NA
Tank paint solar absorbtance	0,68	NA
FINAL OUTPUT:	**Result**	**Unit**
Breathing losses:	0,48 kg/month	
Working losses:	0,06 kg/month	
TOTAL LOSSES (Total TVOC Emissions for the month):	0,54 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 (CO_2) emissions

CO_2 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.

2.5 Daily power generated

Table 5: Daily power generated per unit in MWh for the month of April 2023

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2023/04/01	11420,5	10330,6	13568,7	10440,6		
2023/04/02	12229,6	10777,9	12911,9	10271,9		10781,1
2023/04/03	11024,8	10467,3	12030,5	9908,34		11057,1
2023/04/04	10372,7	10262,7	12360,9	5753,06		11436,5
2023/04/05	12044,3	10760,6	11789,6	11539,1		12022,1
2023/04/06	10195	9794,36	12419,5	11263,7		11603,9
2023/04/07	9245,08	8646,93	148,62	10185,6		11995,7
2023/04/08	8435,01	8630,32	11172,3	7124,63		11312
2023/04/09	8420,28	8655,54	13577,7			11908,2
2023/04/10	8427,94	8670,44	13082	8025,47		11173,8
2023/04/11	8415,32	8692,01	9774,11	10337		11732,2
2023/04/12	8438,16	8703,89	8463,95	10421,3		12071,6
2023/04/13	9730,65	8789,07	12920	10452,4		12015,3
2023/04/14	10325,6	9324,91	11771,9	10226,8		11756,7
2023/04/15	10409	9354,92	10295,9	10134,9		10338,6
2023/04/16	10316,7	9378,41	10313	9271,05		10261,2
2023/04/17	10111,8	9375,58	10187,6	8448,84		11334,8
2023/04/18	8658,72	9351,81	11301,6	8443,64		10648,9
2023/04/19	2523,04	9247,83	11560,7	8469,96		11390,3
2023/04/20	10663,8		11929,8	9542,9		12008,6
2023/04/21	8289,28		8055,29	10566,8		12055,9
2023/04/22	10026,1	7041,26	9264,49	10212,4		11264
2023/04/23	8642,79	10196,4	11233,1	9619,08		10859,5
2023/04/24	8650,71	10215,2	12211,9	9569,11		10499,9
2023/04/25	8639,58	10217,3	12396,6	9478,83		10532,3
2023/04/26	8625,87	10218,1	10519,9	9432,04		9749,9
2023/04/27	8643,53	10209,6	10481,2	9631,12		
2023/04/28	8644,02	10344,2	12405,8	9736,81		
2023/04/29	8641,37	10099,7	12491,5	9977,1		
2023/04/30	9057,83	10156,4	12162,2	9740,93		

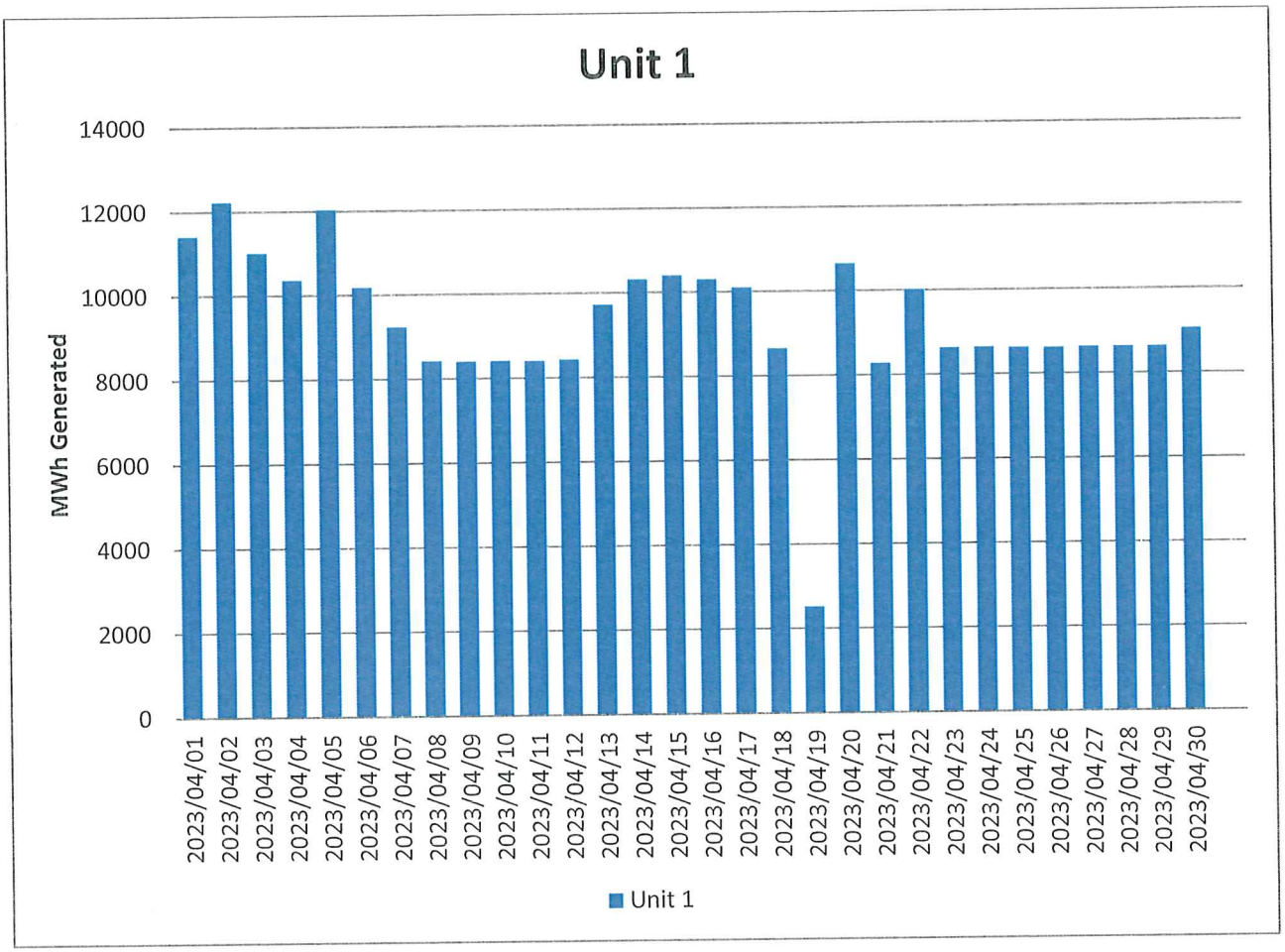

Figure 16: Unit 1 daily generated power in MWh for the month of April 2023

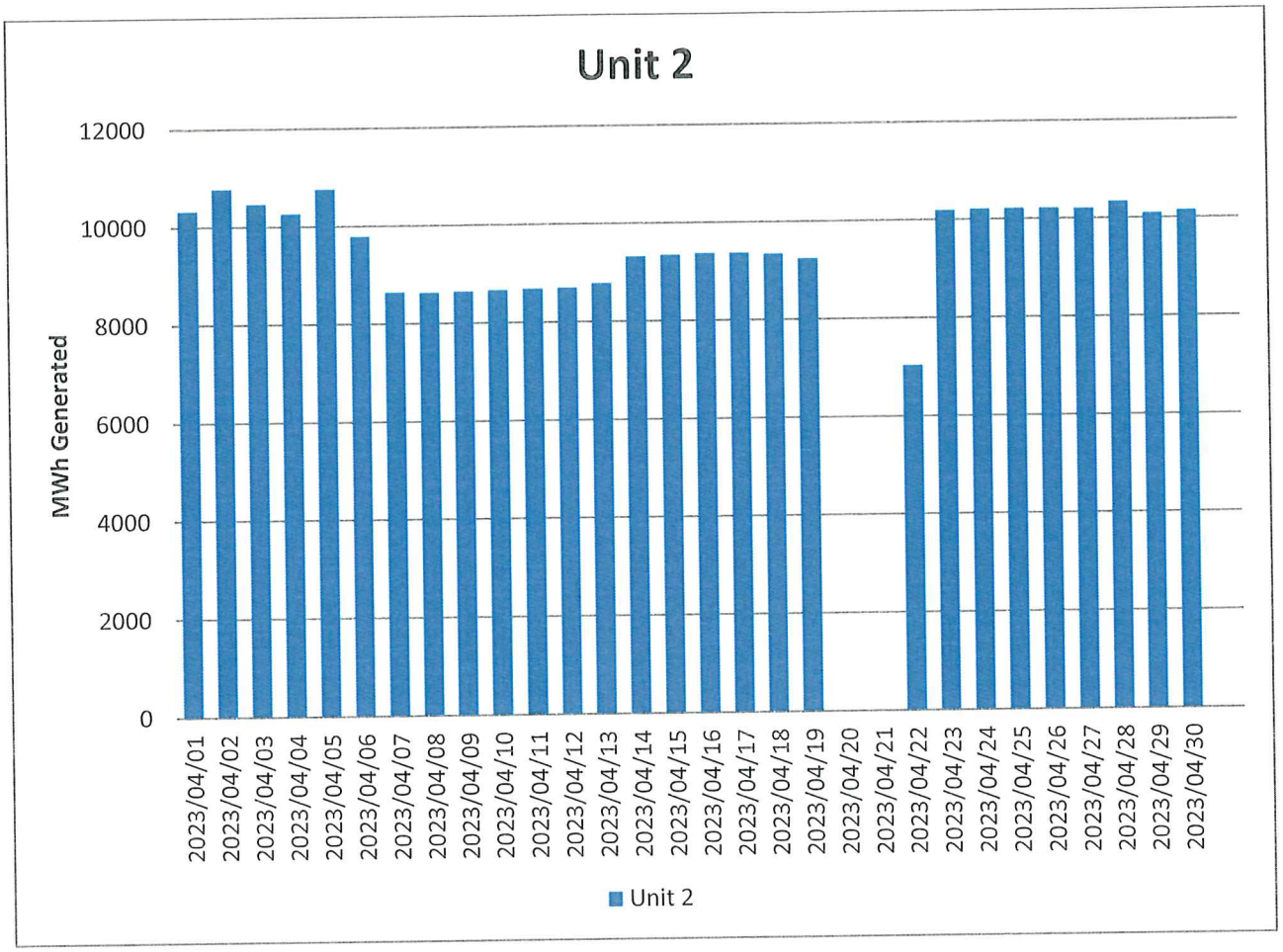

Figure 17: Unit 2 daily generated power in MWh for the month of April 2023

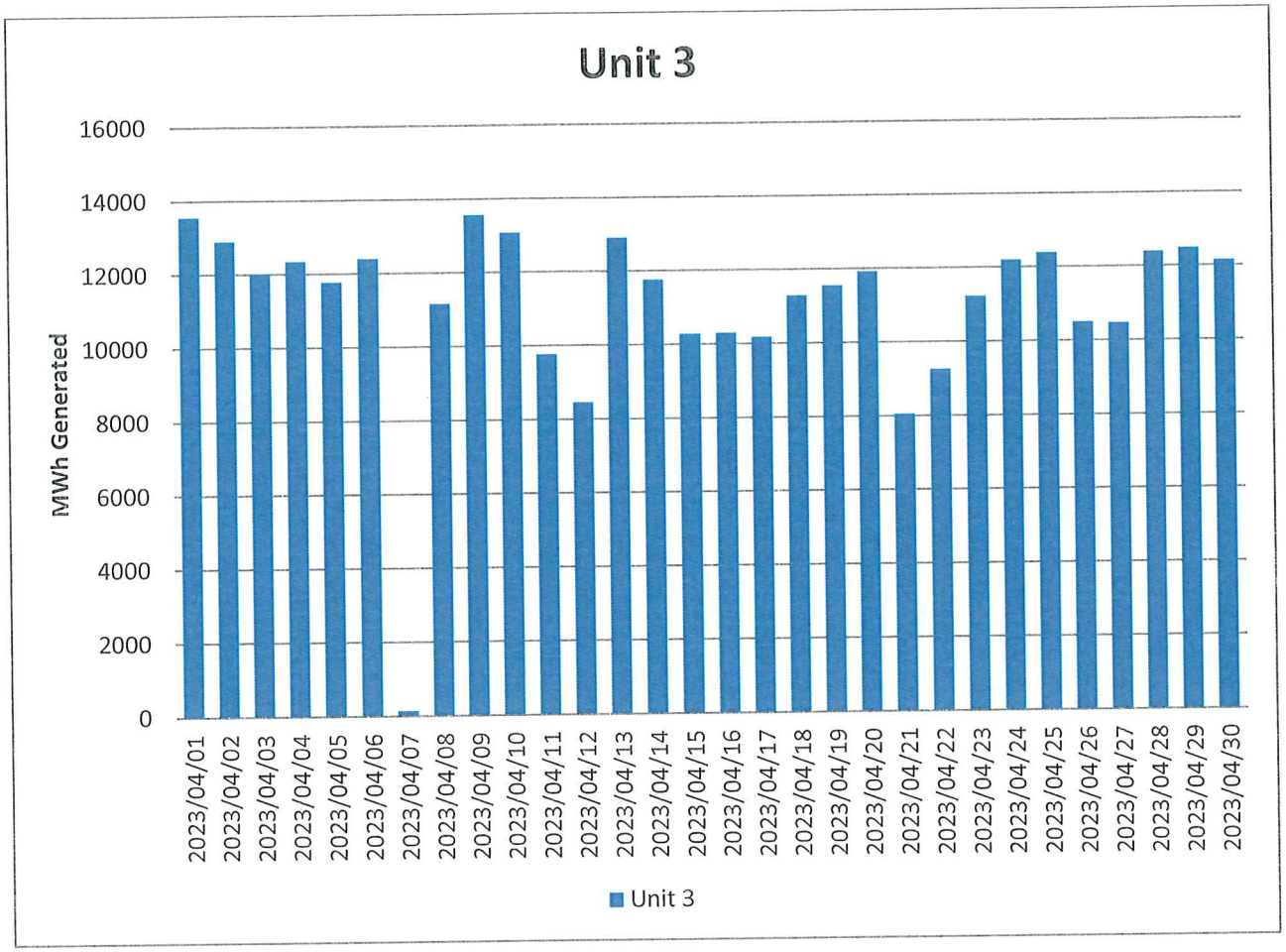

Figure 18: Unit 3 daily generated power in MWh for the month of April 2023

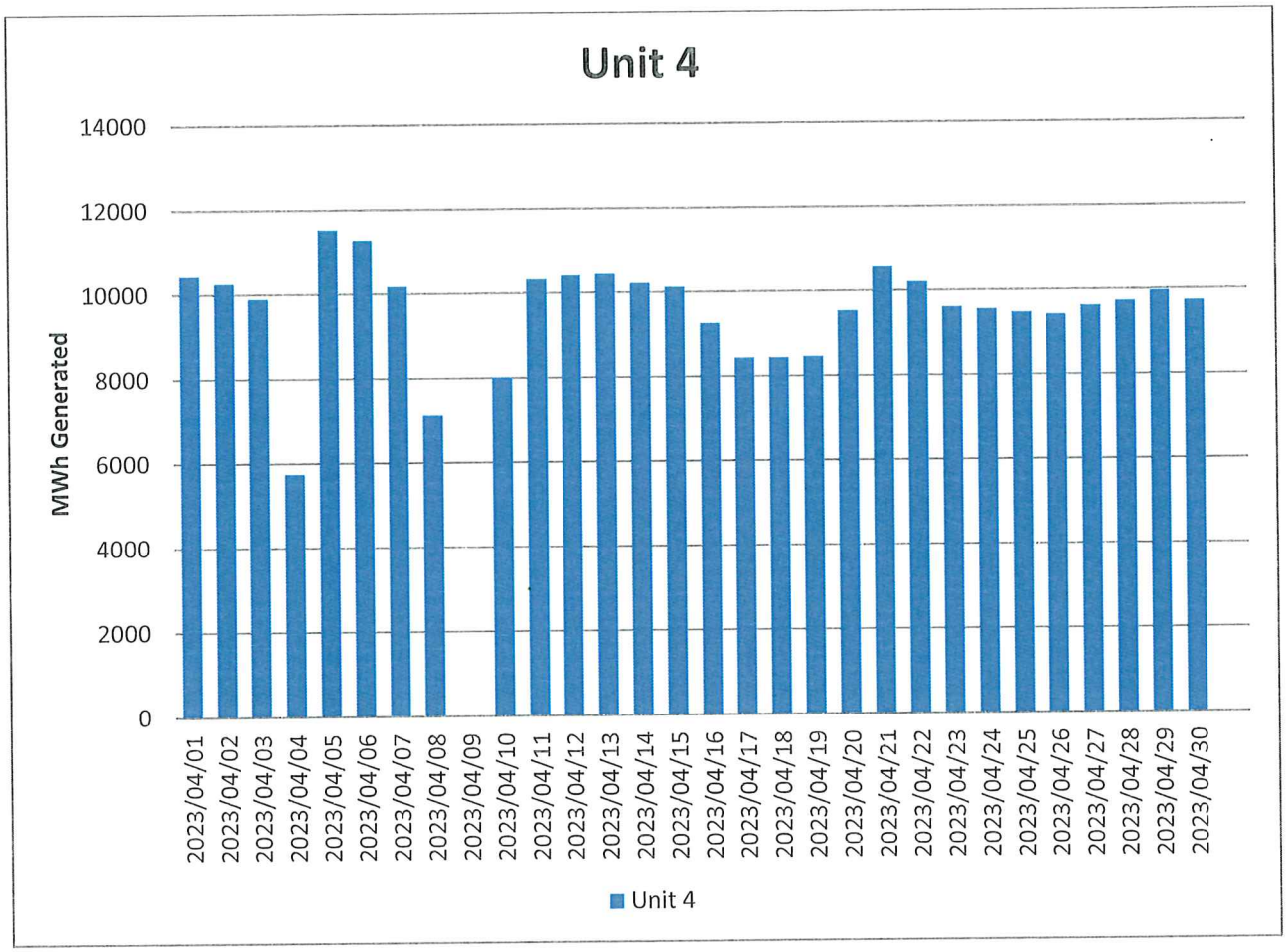

Figure 19: Unit 4 daily generated power in MWh for the month of April 2023

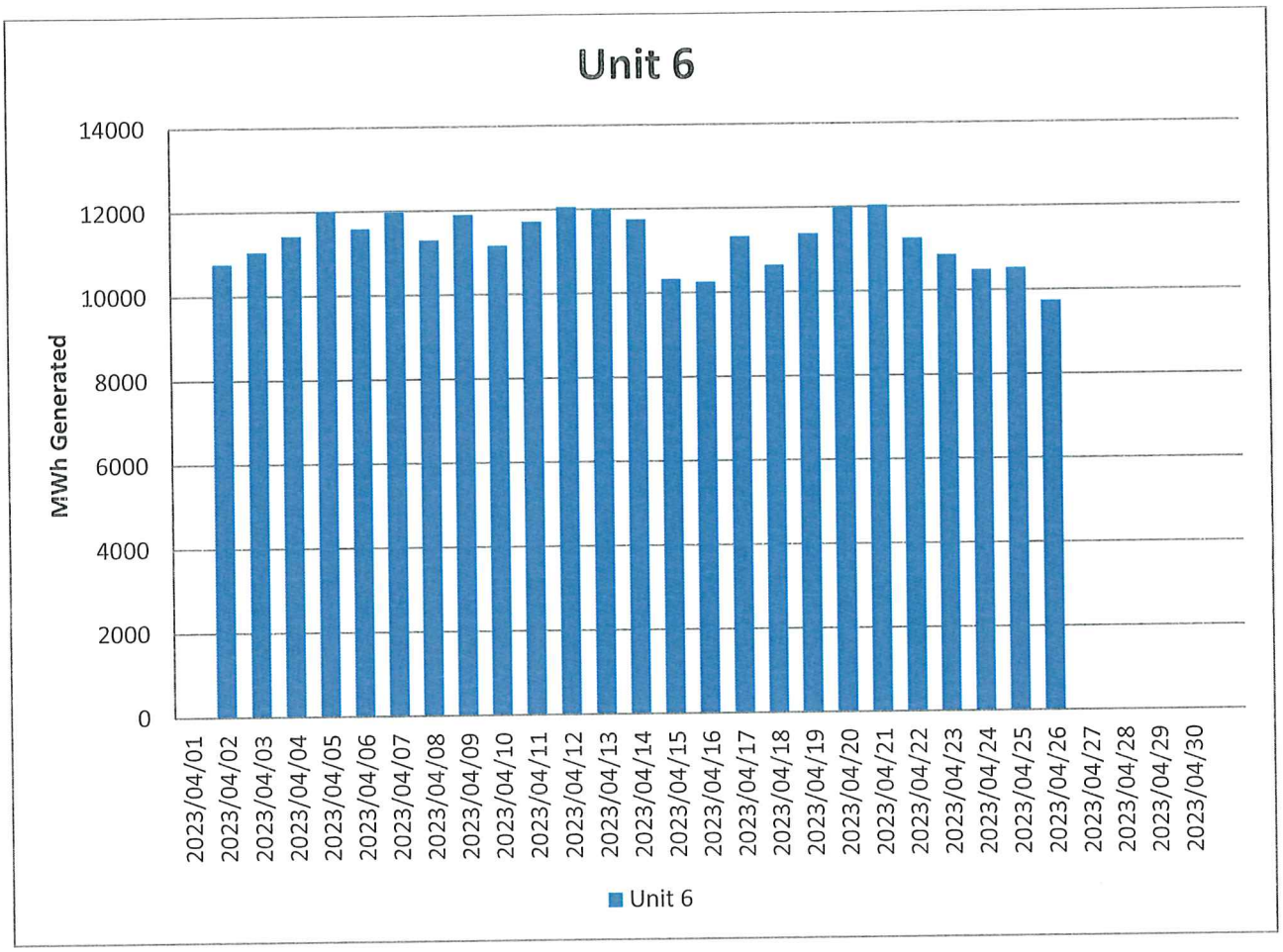

Figure 20: Unit 6 daily generated power in MWh for the month of April 2023

2.6 Pollutant Tonnages

The emitted pollutant tonnages for April 2023 are provided in table 6. Gaseous emissions analysers for all 6 units are providing unreliable data due to the movement of the Oxygen analyser port to a new position. Matimba is currently in the process of implementing recommended changes on gaseous emission analysers to improve the reliability of the data.

Table 6: Pollutant tonnages for the month of April 2023

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO_2 (tons)
Unit 1	140,3	4 157,8	637,1	328 708
Unit 2	157,9	5 645,8	761,6	357 450
Unit 3	105,4	5 637,9	834,3	408 345
Unit 4	72,7	4 574,4	775,1	263 561
Unit 5	0,0	0,0	0,0	0
Unit 6	53,7	3 446,4	523,3	324 390
SUM	530,0	23 462,4	3 531,5	1 682 455

2.7 Operating days in compliance to PM AEL Limit

Table 7: Operating days in compliance with PM AEL limit of April 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	5	17	0	6	23	96,8
Unit 2	3	11	0	13	24	100,6
Unit 3	15	6	0	4	10	58,8
Unit 4	5	6	0	17	23	70,7
Unit 5	0	0	0	0	0	
Unit 6	16	7	0	1	8	39,5
SUM	**28**	**40**	**0**	**40**	**80**	

2.8 Operating days in compliance to SOx AEL Limit

Table 8: Operating days in compliance with SOx AEL limit of April 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm³)
Unit 1	30	0	0	0	0	2 298,2
Unit 2	28	0	0	0	0	2 884,9
Unit 3	30	0	0	0	0	2 304,9
Unit 4	29	0	0	0	0	2 754,0
Unit 5	0	0	0	0	0	
Unit 6	25	0	0	0	0	1 841,0
SUM	**117**	**0**	**0**	**0**	**0**	

2.9 Operating days in compliance to NOx AEL Limit

Table 9: Operating days in compliance with NOx AEL limit of April 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	30	0	0	0	0	349,9
Unit 2	28	0	0	0	0	389,3
Unit 3	30	0	0	0	0	339,6
Unit 4	29	0	0	0	0	466,5
Unit 5	0	0	0	0	0	
Unit 6	25	0	0	0	0	279,6
SUM	**117**	**0**	**0**	**0**	**0**	

2.10 Reference values

Table 10: Reference values for data provided, April 2023

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	6,97	9,64	4,13	7,89		5,89
Moisture	%	4,32	3,82	5,63	2,94		1,86
Velocity	m/s	22,2	30,2	25,6	22,3		27,0
Temperature	°C	139,8	123,3	128,6	127,6		166,8
Pressure	mBar	932,3	936,0	919,3	925,8		914,7

2.11 Continuous Emission Monitors

2.11.1 Reliability

Continuous emission monitors were available for more than 80% of the reporting period. The emitted pollutant tonnages for April 2023 are provided in table 6. Gaseous emissions analysers for all 6 units are providing unreliable data due to the movement of the Oxygen analyser port to a new position. Matimba is currently in the process of implementing recommended changes on gaseous emission analysers to improve the reliability of the data.

Table 11: Average percentage (%) availability of monitors for the month of April 2023.

Associated Unit/Stack	PM	SO_2	NO
Unit 1	81,7	100,0	100,0
Unit 2	63,6	100,0	98,9
Unit 3	100,0	100,0	100,0
Unit 4	100,0	100,0	100,0
Unit 5			
Unit 6	100,0	86,0	86,0

2.11.2 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

- 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

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.

- No downtime or repairs done on the particulate monitors

2.11.3 Sampling dates and times

Table 12: Dates of last conducted CEMS verification tests for PM, SO_2 and NOx

Name of service provider:	Stacklabs Environmental Services CC			
Address of service provider:	10 Chisel Street Boltonia Krugersdorp 1739			
Stack/ Unit	**PM**	**SO_2**	**NOx**	**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

2.12 Units Start-up information

Table 13: Start-up information

Unit	1	
Fires in	2023/04/19	11h36
Synchronization with Grid	2023/04/19	14h40
Emissions below limit	2023/04/19	15h01
Fires in to synchronization	3,4	HOURS
Synchronization to < Emission limit	0,21	HOURS