Eskom	Matimba Power Station Emissions report	Matimba Power Station

Title: **Matimba Power Station March 2022 emissions report**

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Environmental Officer	**Environmental Manager**	**General Manager**
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Content

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1. Report Summary

Matimba Power Station was issued with an Atmospheric Emission License (H16/1/13-WDM05) in November 2021. 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 March 2022.

During the period under review, no exceedances of the daily particulate matter emission limit (50mg/Nm^3), monthly SO_x limit (3500mg/Nm^3) or the daily NO_x emission limit (750mg/Nm^3) occurred.

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	1 055 874
	Fuel Oil	Tons/month	1 200	744,655
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	1 887,649

The consumption rates for the month of March 2022 were within the permitted maximum limit.

2.2 Abatement technology

Table 2: Abatement Equipment Control Technology Utilised

Associated Unit	Technology Type	Minimum utilisation (%)	Efficiency (%)
Unit 1	Electrostatic Precipitator	100%	99,9%
Unit 2	Electrostatic Precipitator	100%	99,9%
Unit 3	Electrostatic Precipitator	100%	99,9%
Unit 4	Electrostatic Precipitator	100%	99,9%
Unit 5	Electrostatic Precipitator	100%	99,9%
Unit 6	Electrostatic Precipitator	100%	99,9%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	80,65%
Unit 2	SO_3 Plant	100%	96,77%
Unit 3	SO_3 Plant	100%	96,77%
Unit 4	SO_3 Plant	100%	96,77%
Unit 5	SO_3 Plant	100%	100%
Unit 6	SO_3 Plant	100%	100%

Flue gas conditioning plant availability was below the required 100% for unit 1, unit 2, unit 3 and unit 4 due to unexpected breakdowns and low loads. The defects were addressed, and the plants are operational.

2.3 Energy source characteristics

Table 3: Energy Source Material Characteristics.

	Characteristic	Stipulated Range (Unit)	Monthly Average Content
Coal burned	**Sulphur Content**	1.6%	1,369
	Ash Content	40%	34,953

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

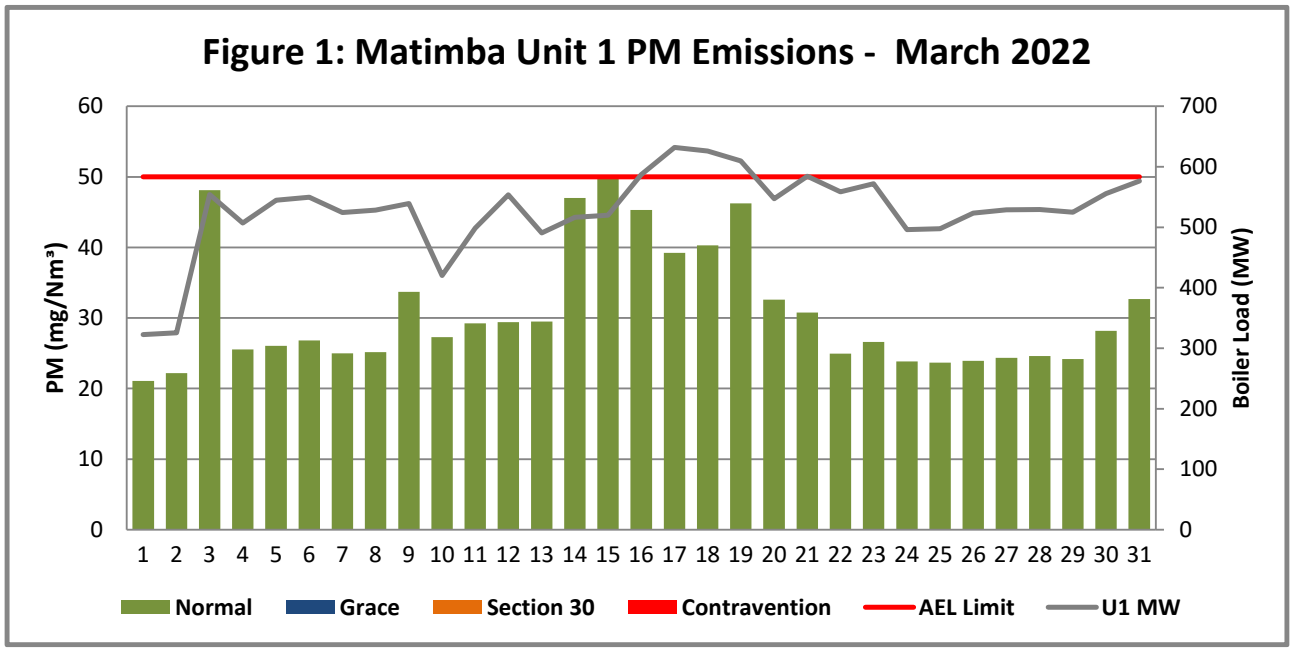

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of March 2022

Interpretation:

All daily averages below Particulate matter emission daily limit of 50 mg/Nm^3.

Unit 2 Particulate Emissions

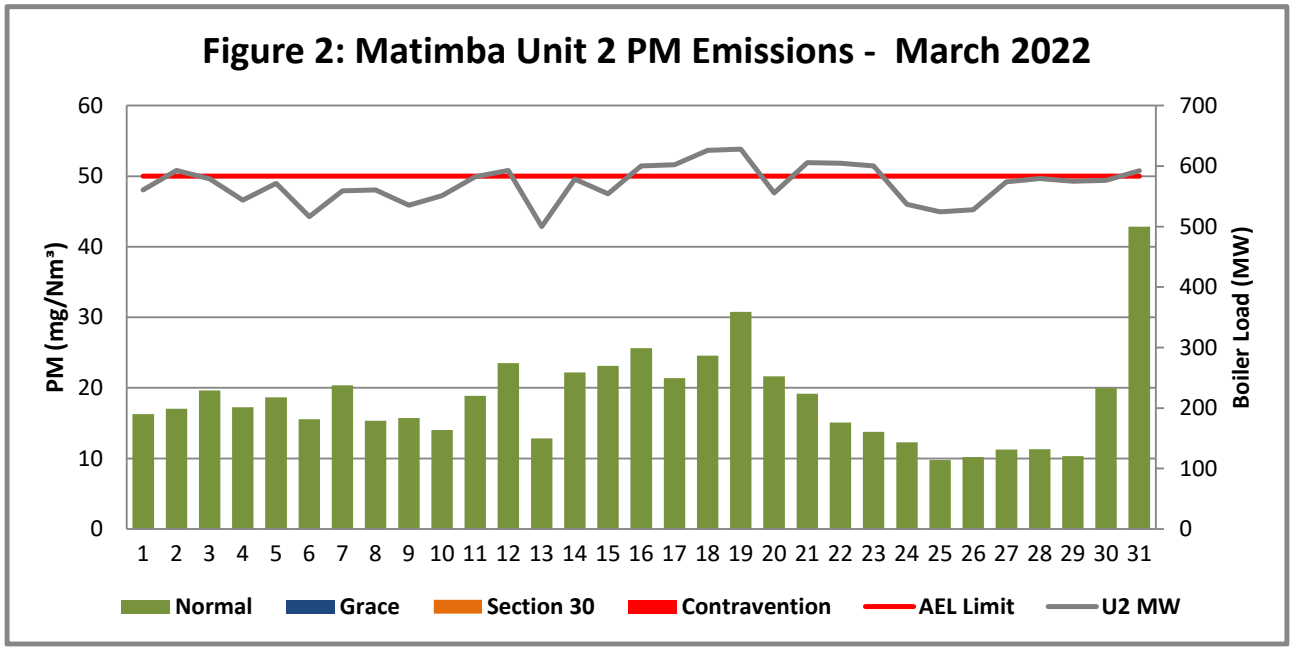

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of March 2022

Interpretation:

All daily averages below Particulate matter emission daily limit of 50 mg/Nm^3.

Unit 3 Particulate Emissions

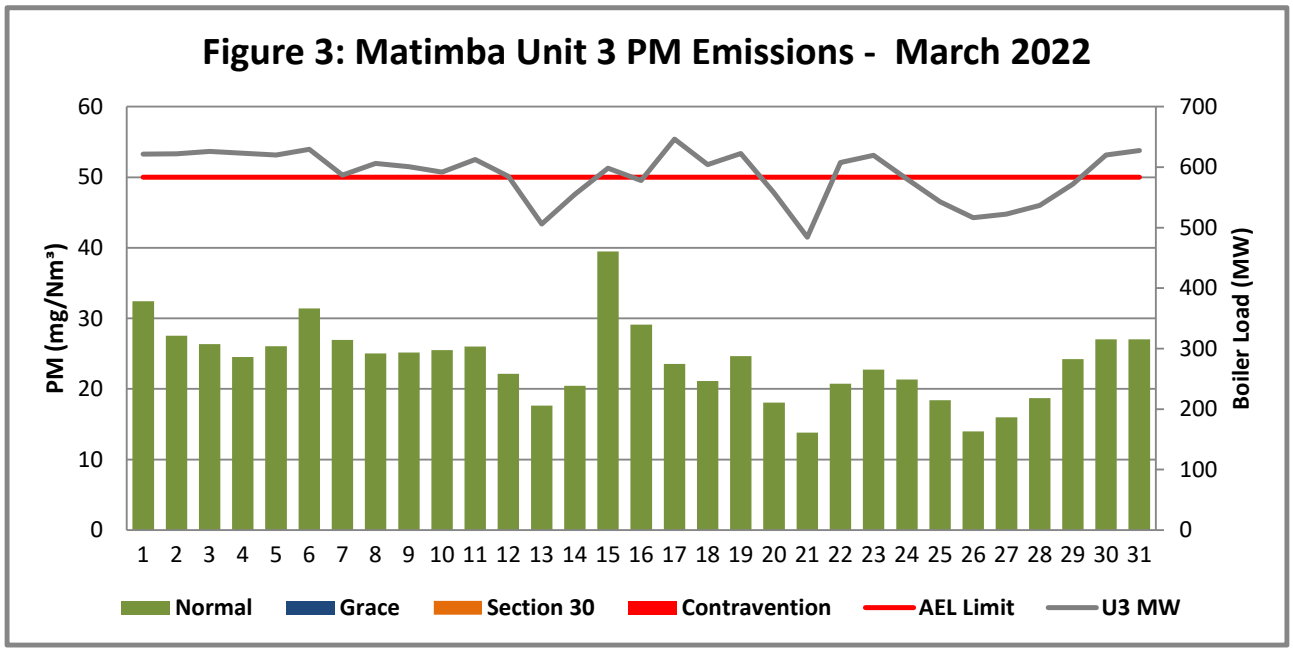

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of March 2022

Interpretation:

All daily averages below Particulate matter emission daily limit of 50 mg/Nm^3.

Unit 4 Particulate Emissions

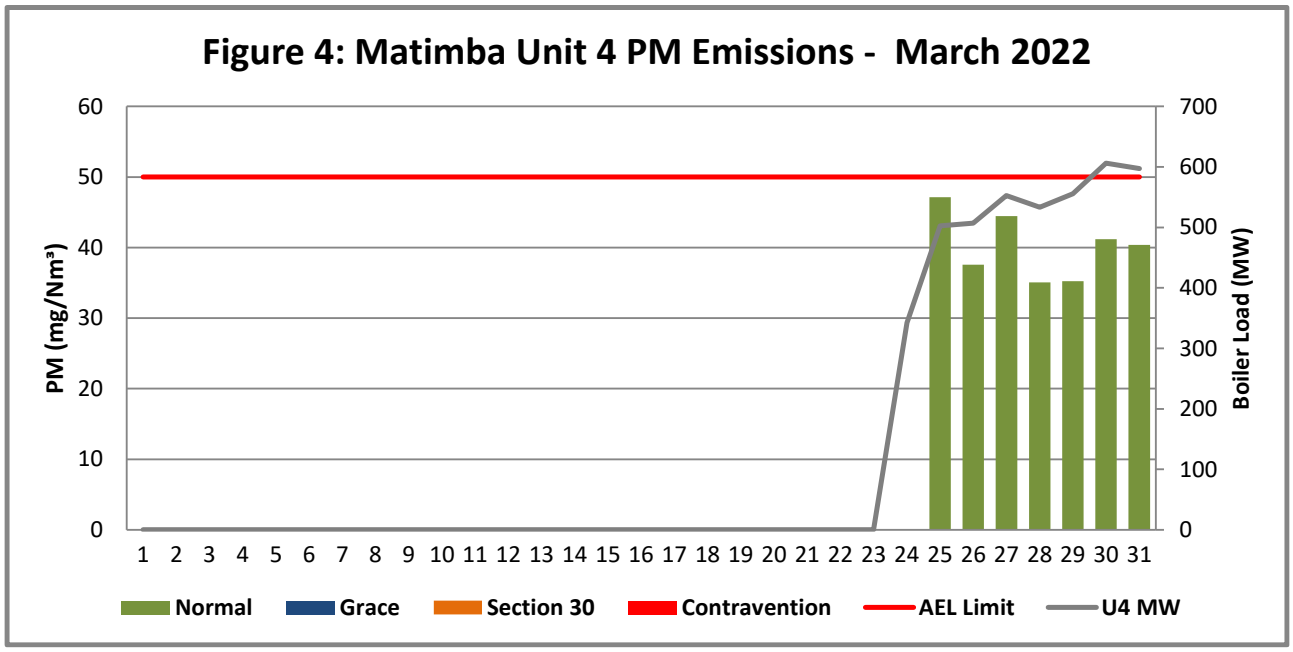

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of March 2022

Interpretation:

All daily averages below Particulate matter emission daily limit of 50 mg/Nm^3. Unit 4 was off for maintenance from 28 February 2022, the unit was back on load on 24 March 2022.

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Unit 5 Particulate Emissions

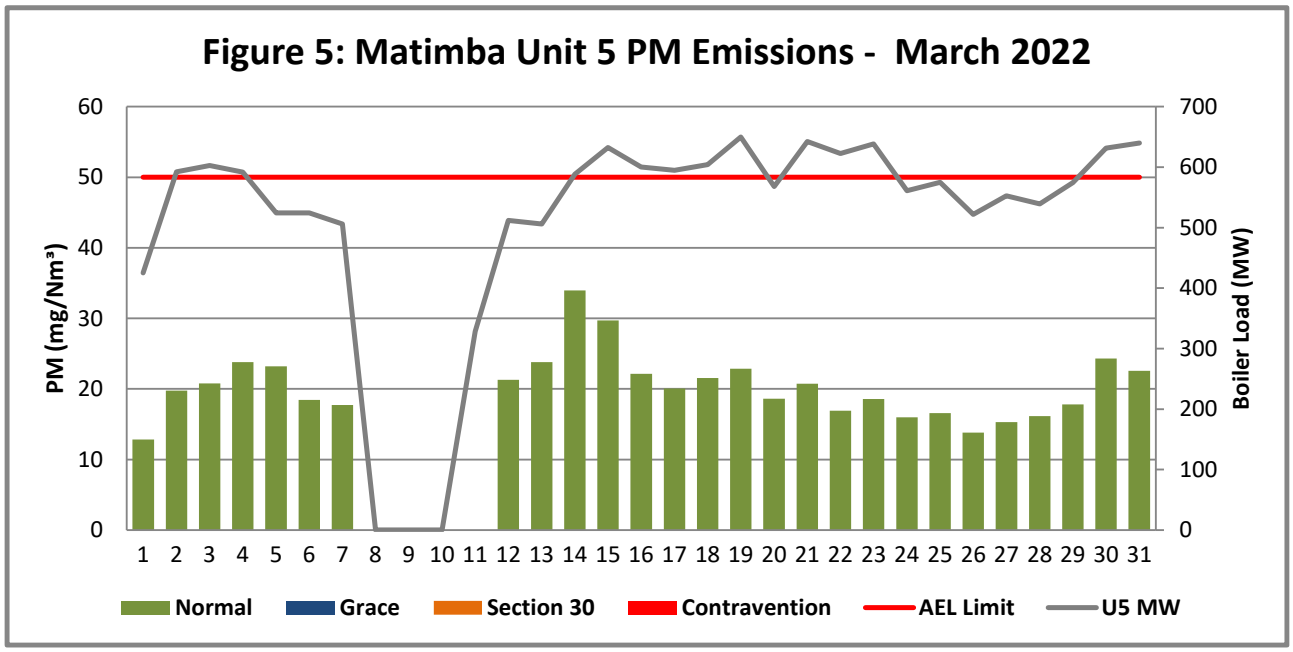

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of March 2022

Interpretation:

All daily averages below Particulate matter emission daily limit of 50 mg/Nm^3.

Unit 6 Particulate Emissions

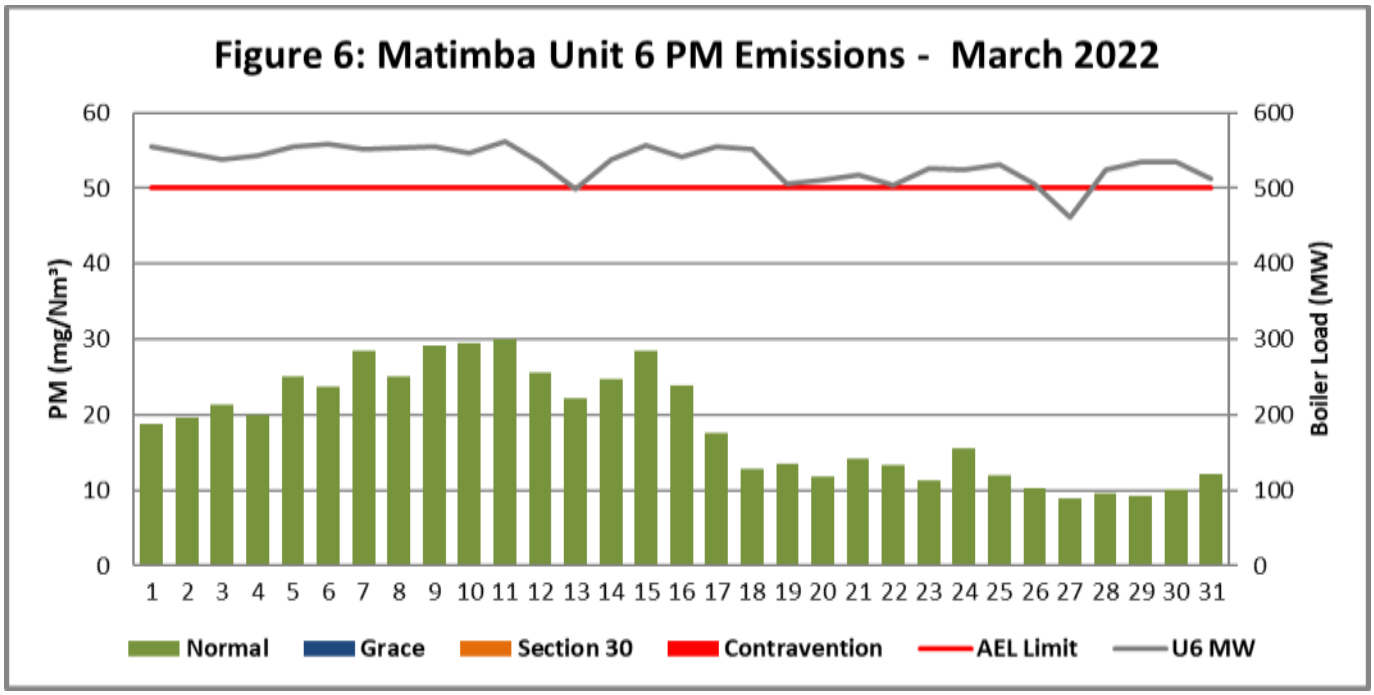

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of March 2022

Interpretation:

All daily averages below Particulate matter emission daily limit of 50 mg/Nm^3.

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

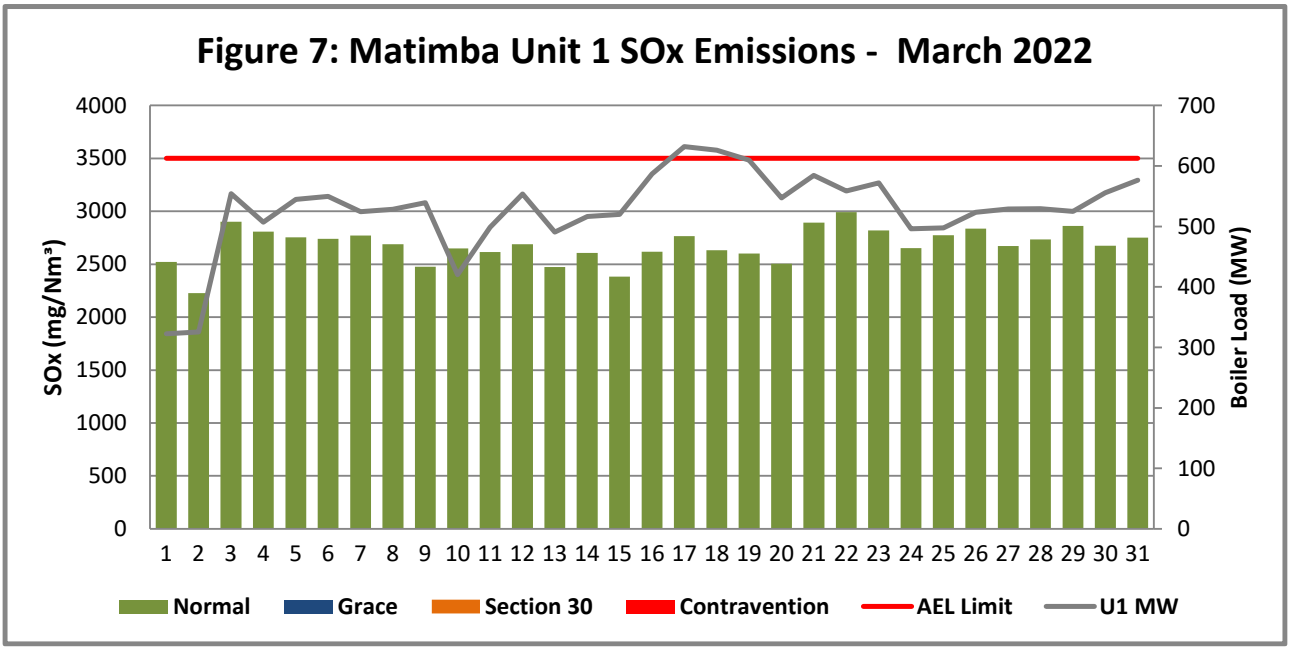

Figure 7: SO2 daily average emissions against emission limit for unit 1 for the month of March 2022

Interpretation:

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

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Unit 2 SO_2 Emissions

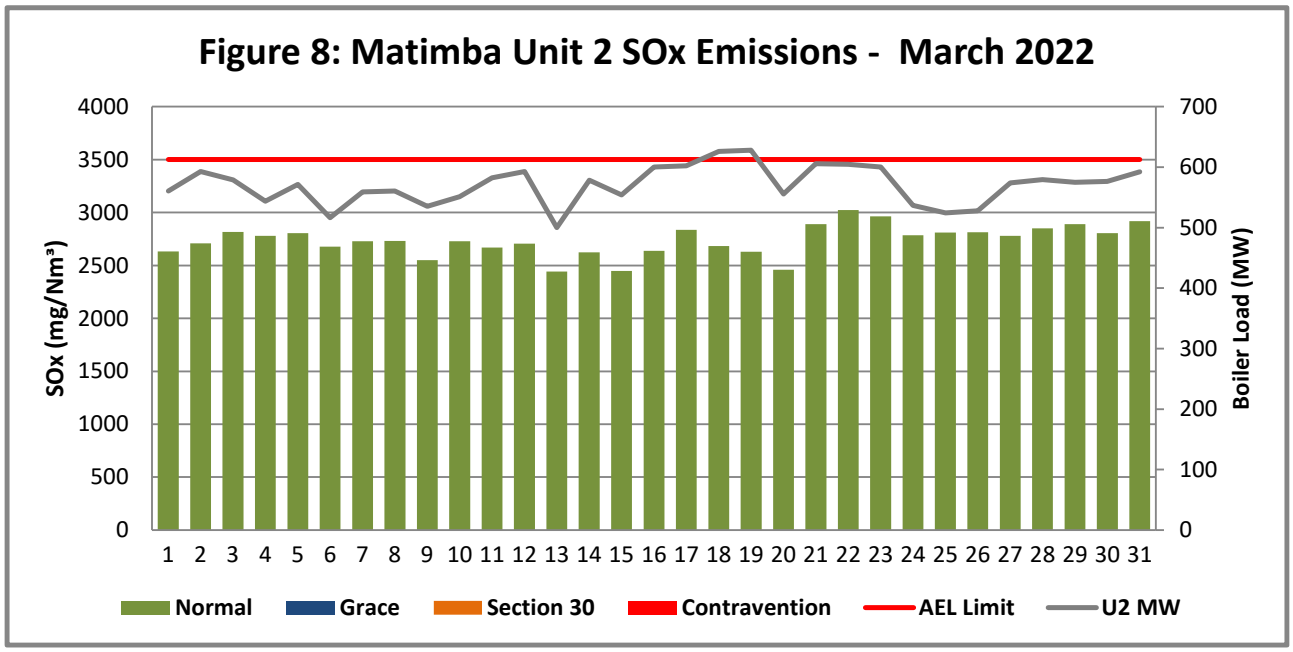

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of March 2022

Interpretation:

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

Unit 3 SO_2 Emissions

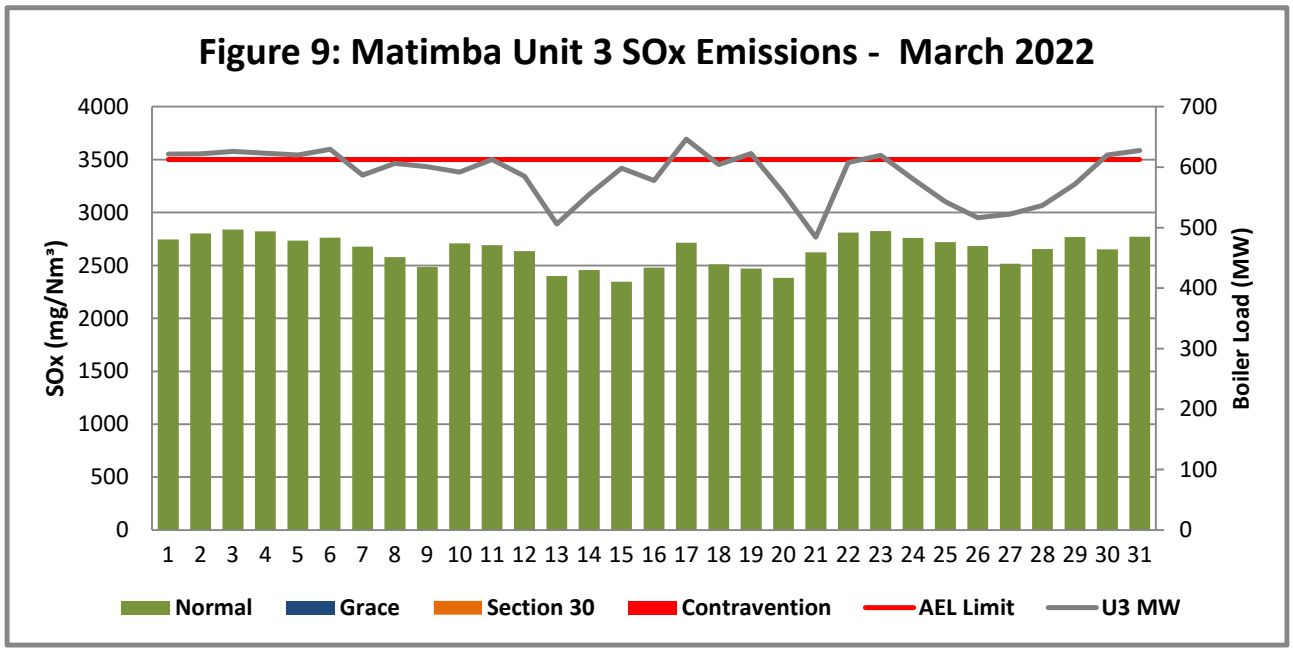

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of March 2022

Interpretation:

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

Unit 4 SO_2 Emissions

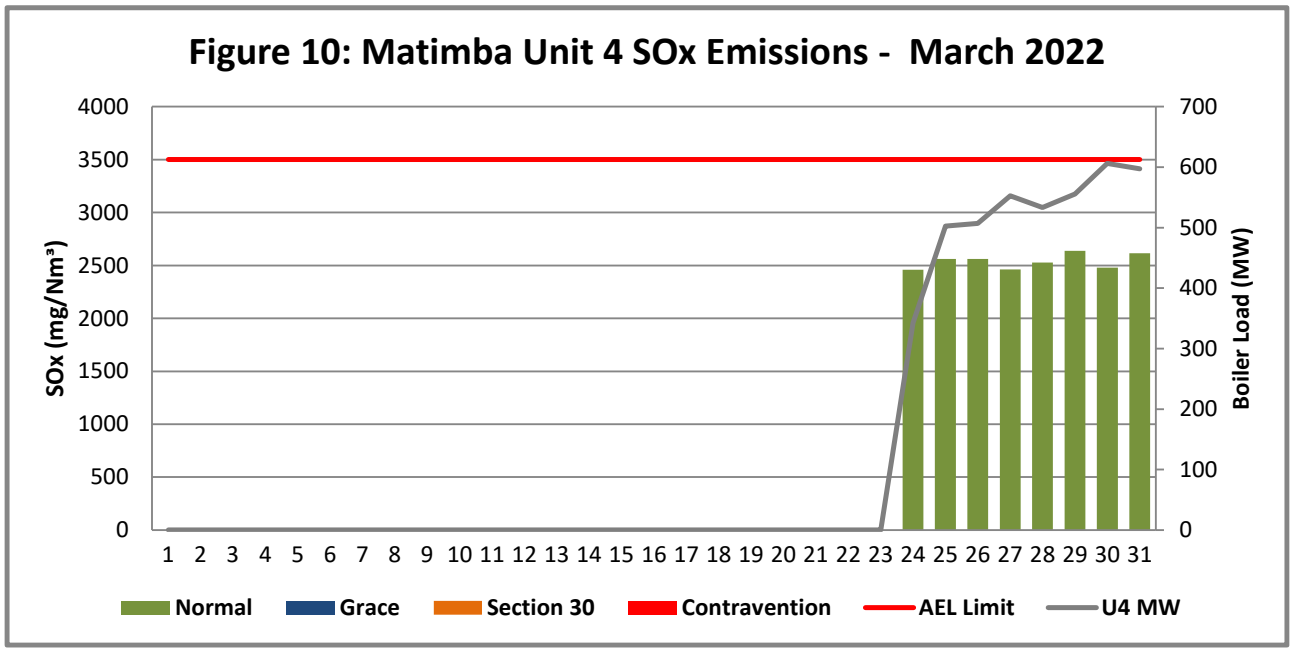

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of March 2022

Interpretation:

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

Unit 5 SO_2 Emissions

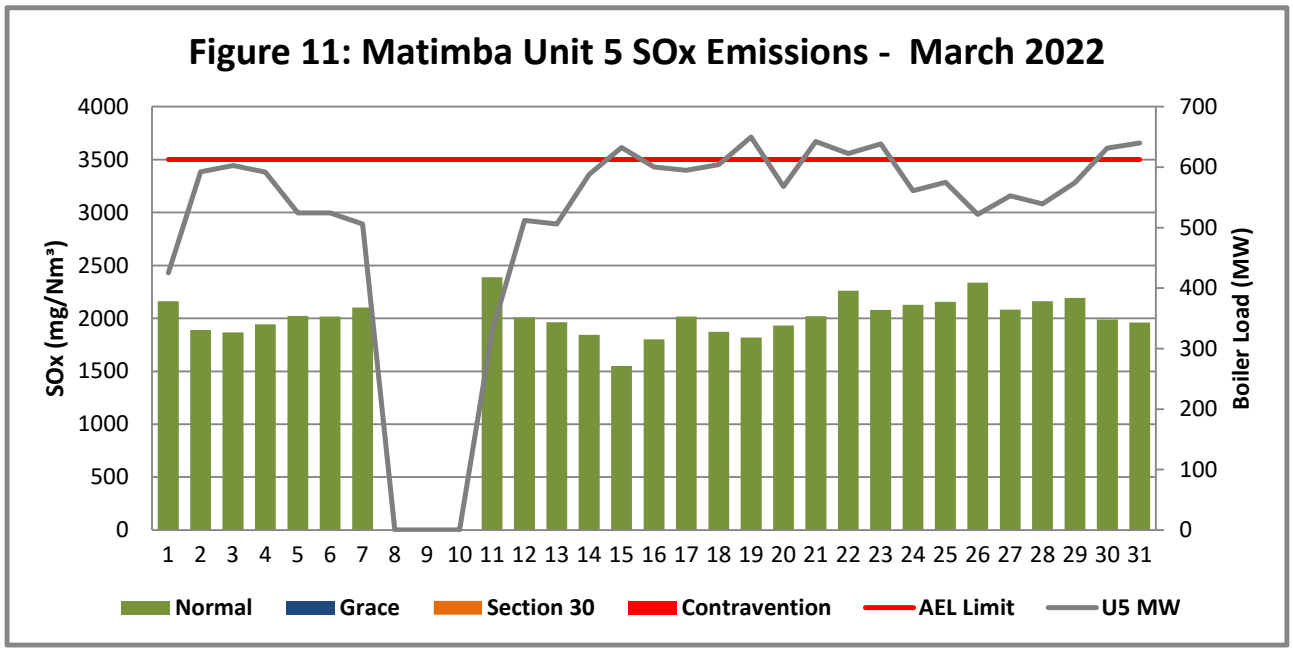

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of March 2022

Interpretation:

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

Unit 6 SO_2 Emissions

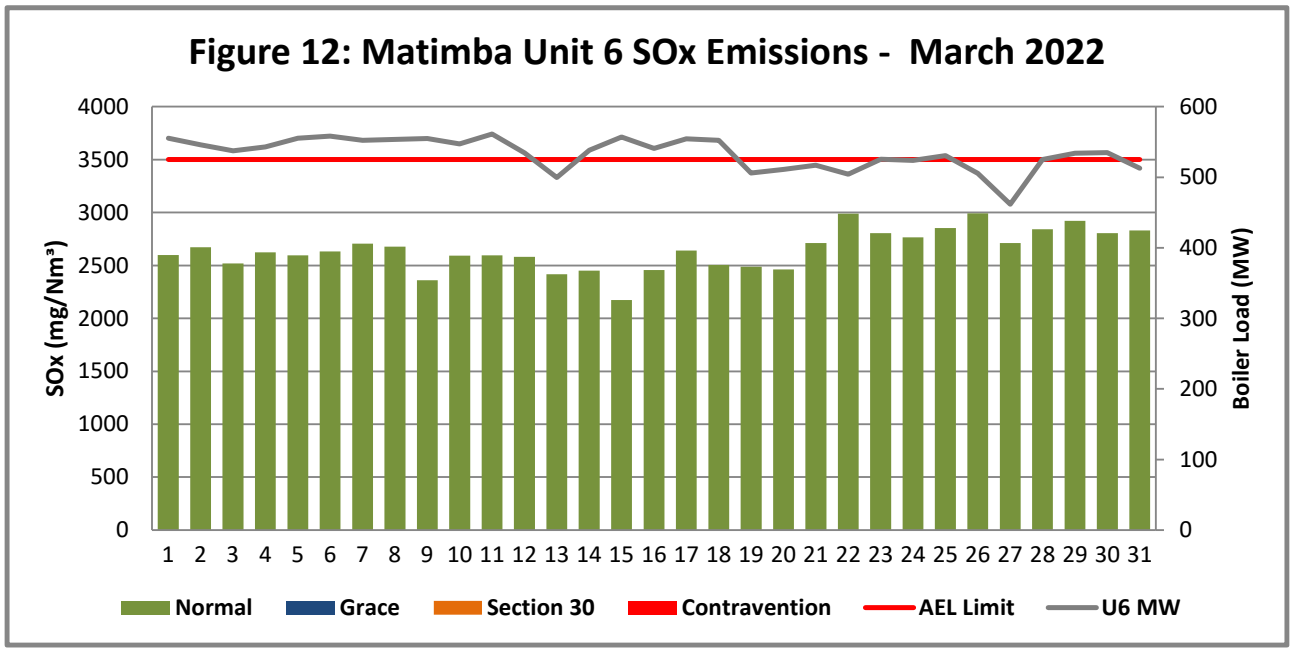

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of March 2022

Interpretation:

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

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Unit 1 NO_x Emissions

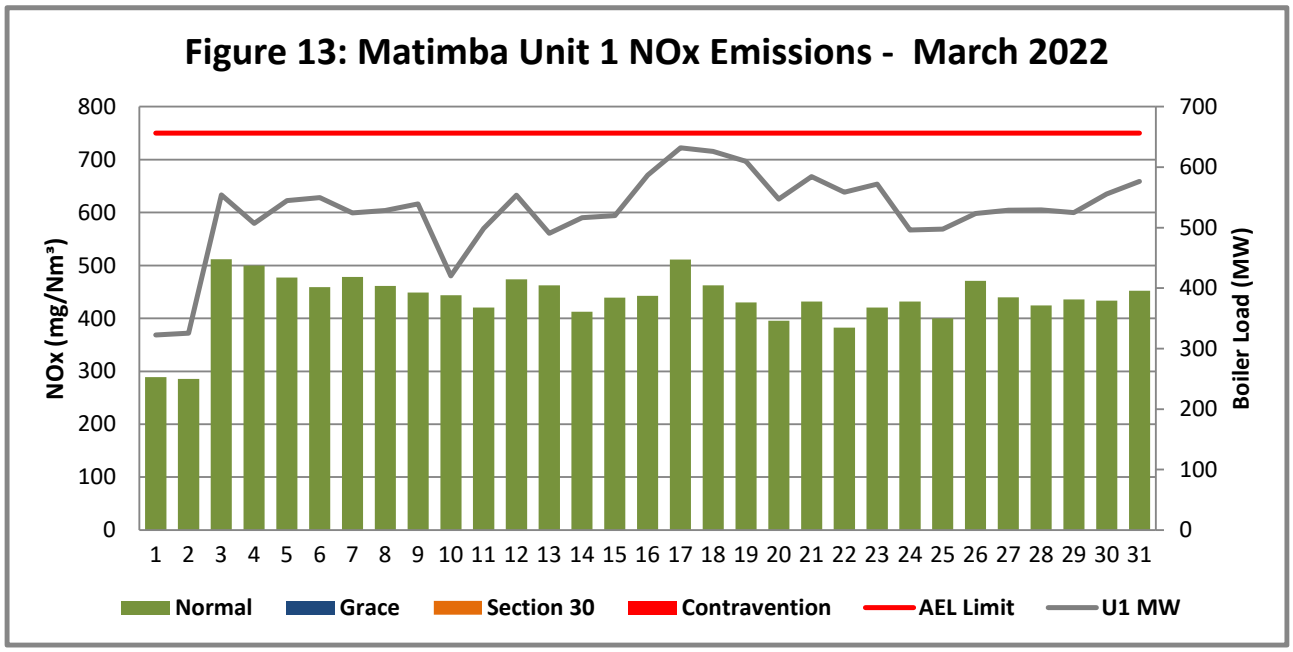

Figure 13: Figure 14: NOx daily average emissions against emission limit for unit 1 for the month of March 2022

Interpretation:

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

Unit 2 NO_x Emissions

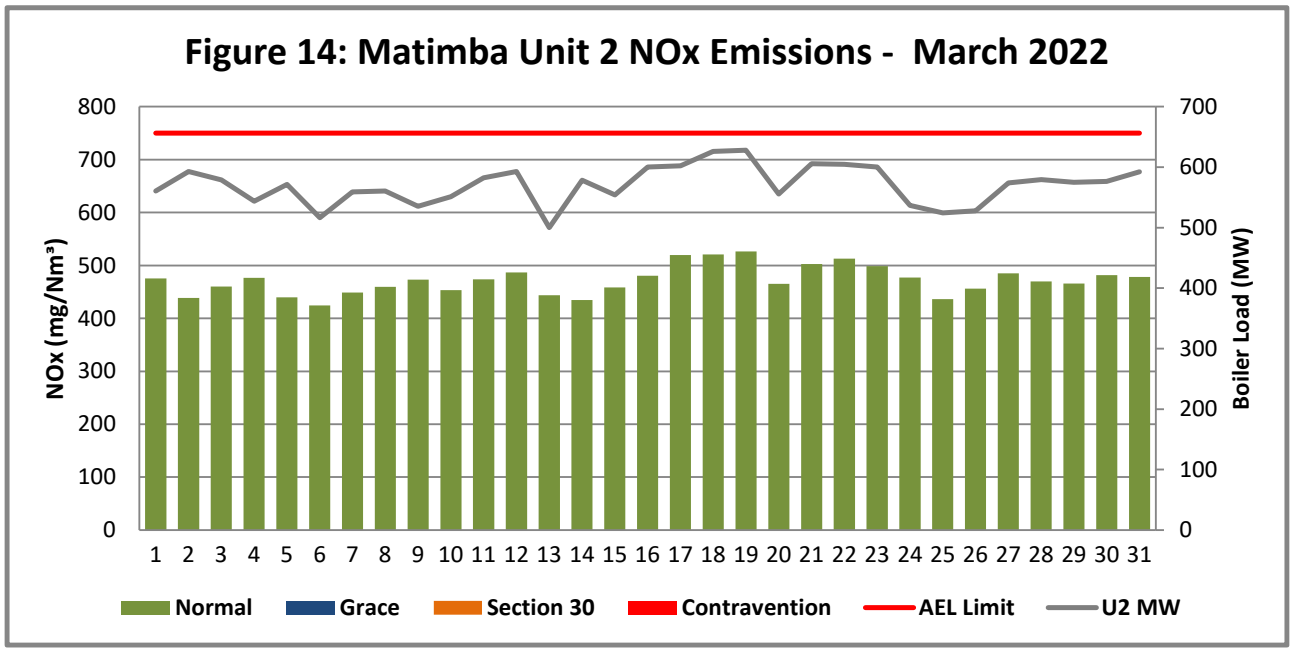

Figure 15: NOx daily average emissions against emission limit for unit 2 for the month of March 2022

Interpretation:

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

Unit 3 NO_x Emissions

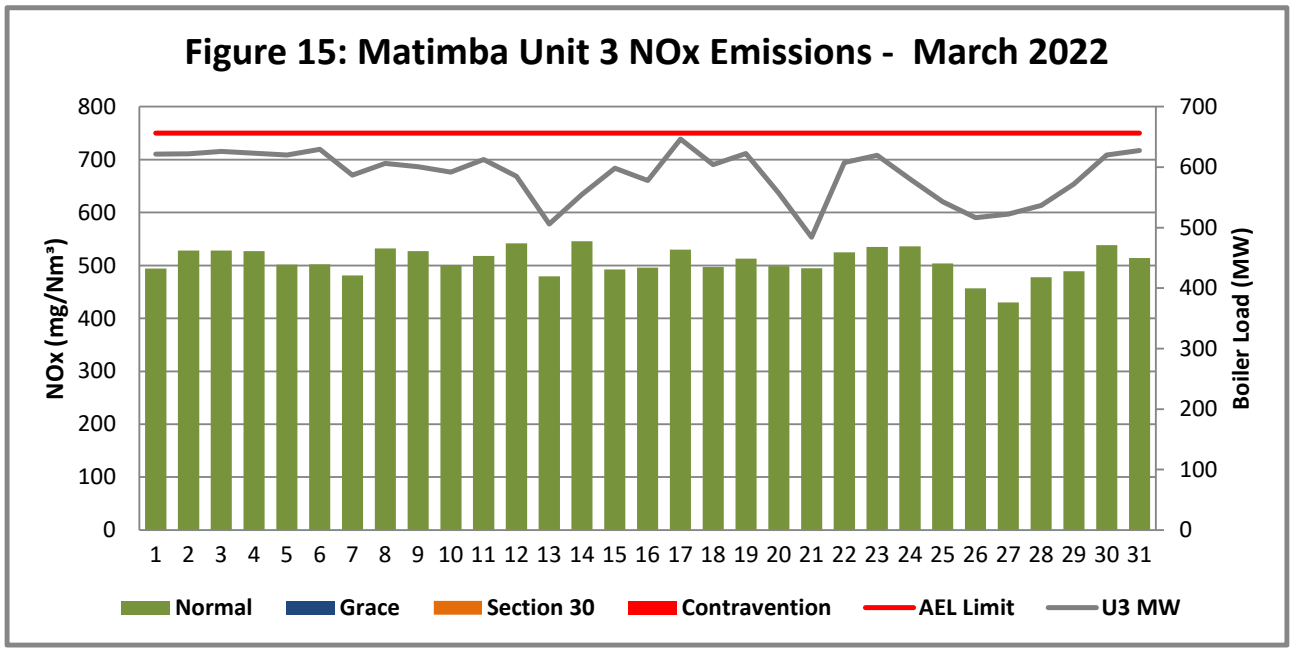

Figure 16: NOx daily average emissions against emission limit for unit 3 for the month of March 2022

Interpretation:

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

Unit 4 NO_x Emissions

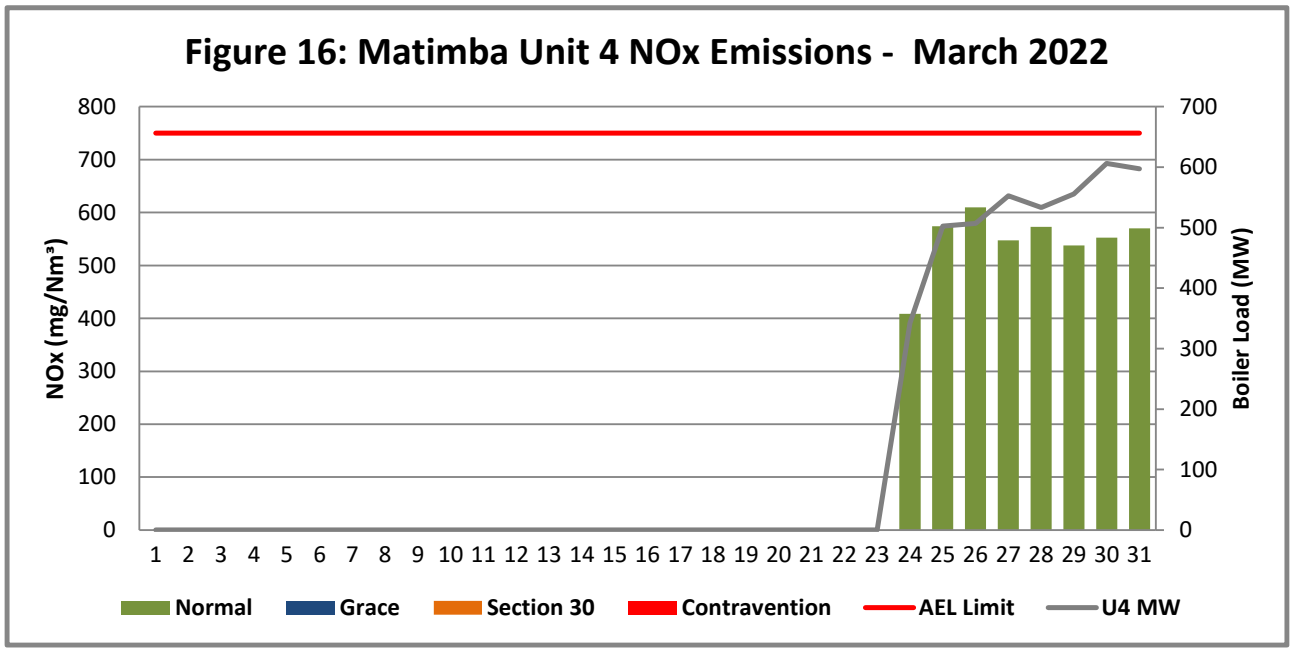

Figure 17: NOx daily average emissions against emission limit for unit 4 for the month of March 2022

Interpretation:

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

Unit 5 NO_x Emissions

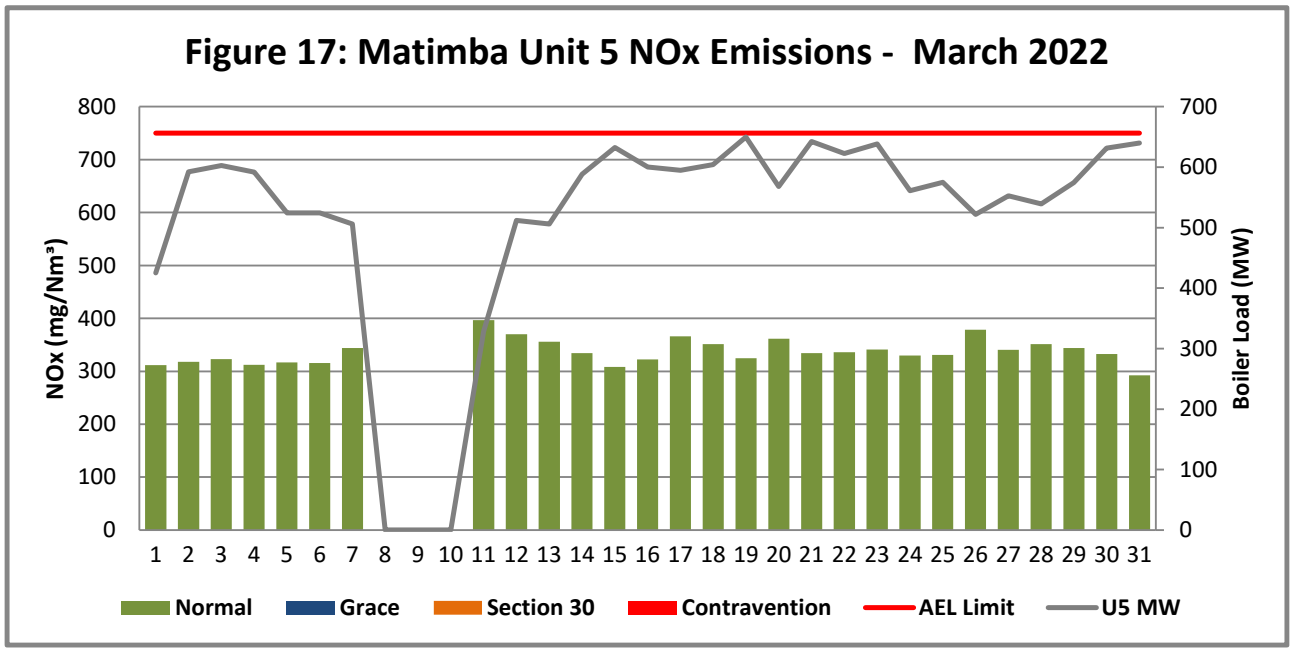

Figure 18: NOx daily average emissions against emission limit for unit 5 for the month of March 2022

Interpretation:

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

Unit 6 NO_x Emissions

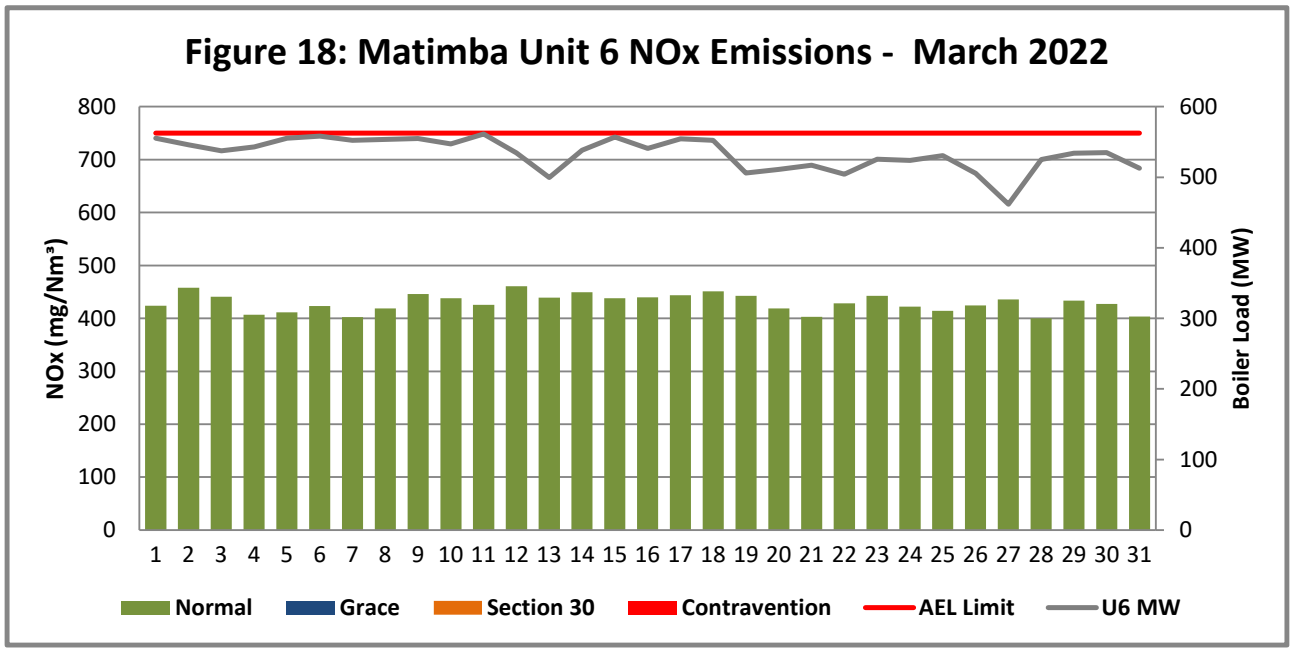

Figure 19: NOx daily average emissions against emission limit for unit 6 for the month of March 2022

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:	Wednesday, 13 April 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:	**March**	
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:	***744,655***	
Molecular weight of the fuel oil:	166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	**Data**	**Unit**
Daily average ambient temperature	23,67	°C
Daily maximum ambient temperature	30,21	°C
Daily minimum ambient temperature	17,89	°C
Daily ambient temperature range	12,31	°C
Daily total insolation factor	5,08	kWh/m²/day
Tank paint colour	***Grey/medium***	NA
Tank paint solar absorbtance	0,68	NA
FINAL OUTPUT:	**Result**	**Unit**
Breathing losses:	0,55	kg/month
Working losses:	0,02	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	**0,57**	**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 March 2022

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2022/03/01	7725	13226	14854	0	10111	13223
2022/03/02	7752	13990	14858	0	14041	12973
2022/03/03	13267	13714	14953	0	14341	12778
2022/03/04	12178	12837	14878	0	14079	12926
2022/03/05	13057	13487	14811	0	12506	13188
2022/03/06	13160	12194	15056	0	12479	13286
2022/03/07	12592	13193	13997	0	4272	13121
2022/03/08	12641	13252	14474	0	0	13177
2022/03/09	12958	12656	14399	0	0	13261
2022/03/10	10108	13012	14120	0	0	13012
2022/03/11	11886	13714	14626	0	3657	13394
2022/03/12	13301	14054	13995	0	12202	12750
2022/03/13	11769	11808	12085	0	12043	11903
2022/03/14	12369	13674	13250	0	13981	12824
2022/03/15	12476	13096	14271	0	15038	13266
2022/03/16	14023	14132	13758	0	14229	12857
2022/03/17	15149	14264	15491	0	14210	13212
2022/03/18	14991	14755	14425	0	14313	13139
2022/03/19	14645	14858	14832	0	15468	12009
2022/03/20	13149	13171	13340	0	13558	12146
2022/03/21	14004	14311	11570	0	15258	12305
2022/03/22	13369	14276	14496	0	14786	11988
2022/03/23	13690	14163	14778	0	15164	12491
2022/03/24	11931	12707	13854	3401	13377	12476
2022/03/25	11912	12385	12986	11945	13701	12655
2022/03/26	12533	12440	12333	12048	12414	12045
2022/03/27	12679	13533	12469	13152	13143	10974
2022/03/28	12689	13708	12829	12695	12830	12510
2022/03/29	12594	13559	13629	13211	13641	12658
2022/03/30	13273	13602	14801	14426	14998	12778
2022/03/31	13833	14006	14983	14241	15224	12130

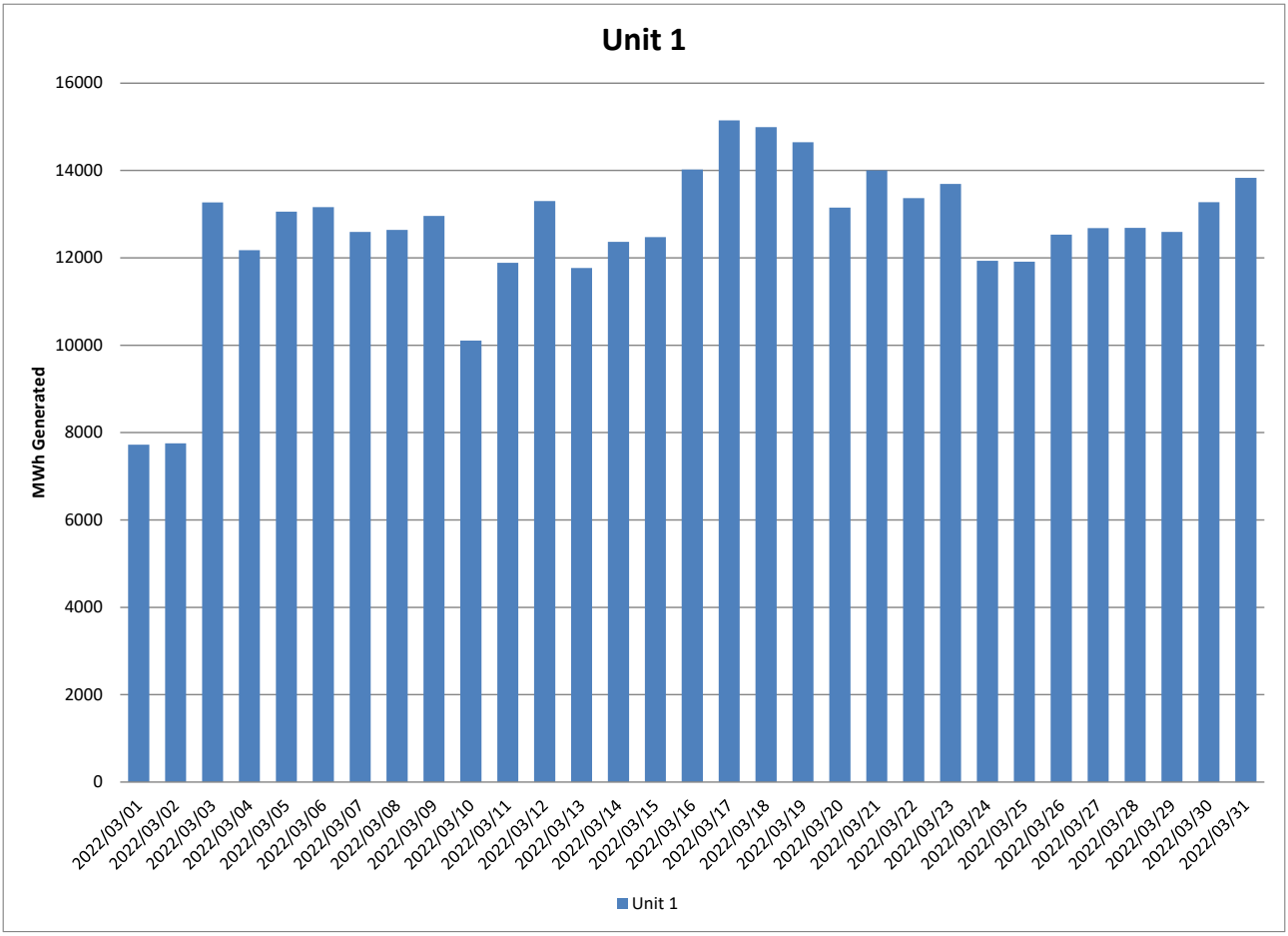

Figure 20: Unit 1 daily generated power in MWh for the month of March 2022

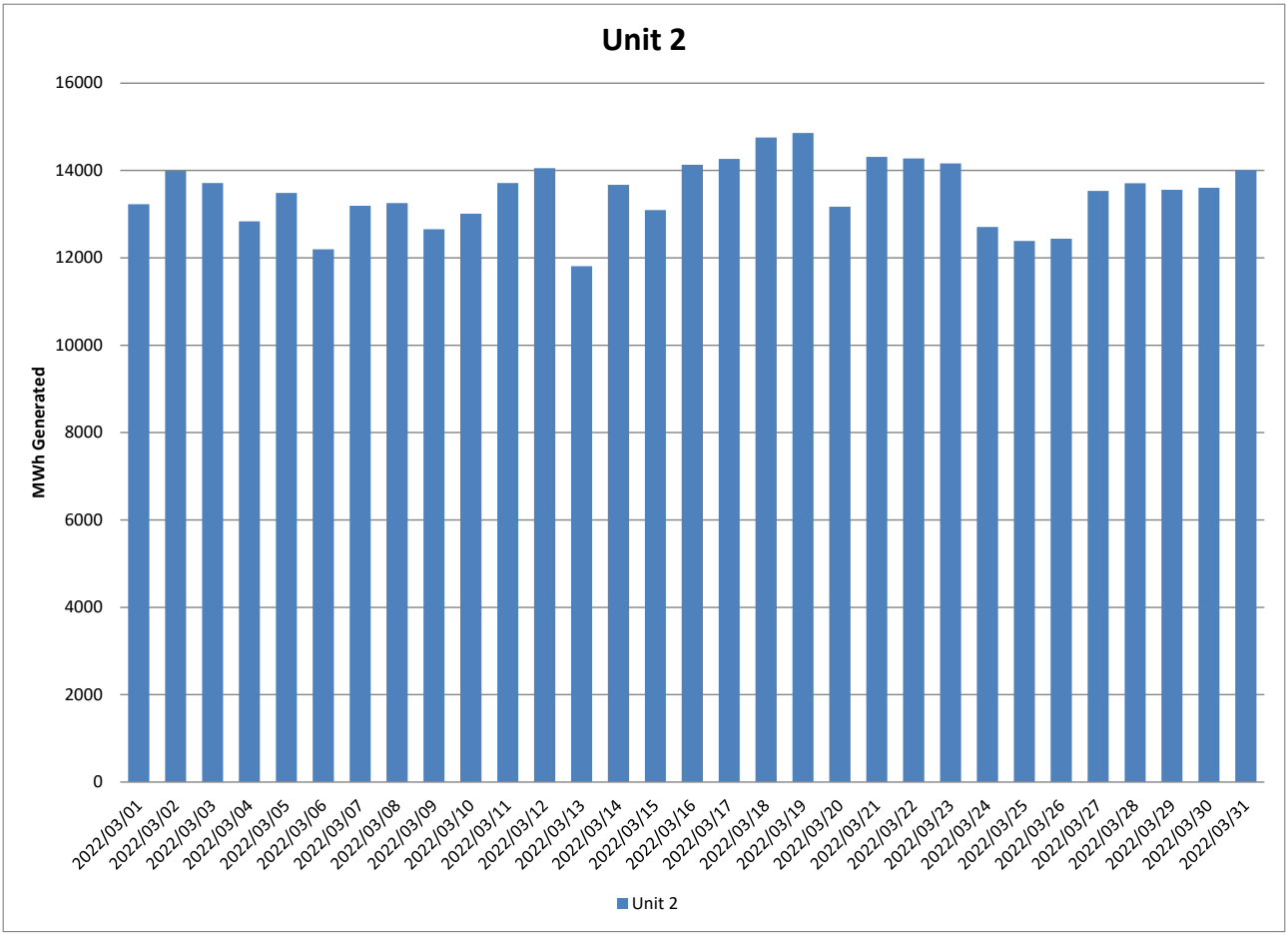

Figure 21: Unit 2 daily generated power in MWh for the month of March 2022

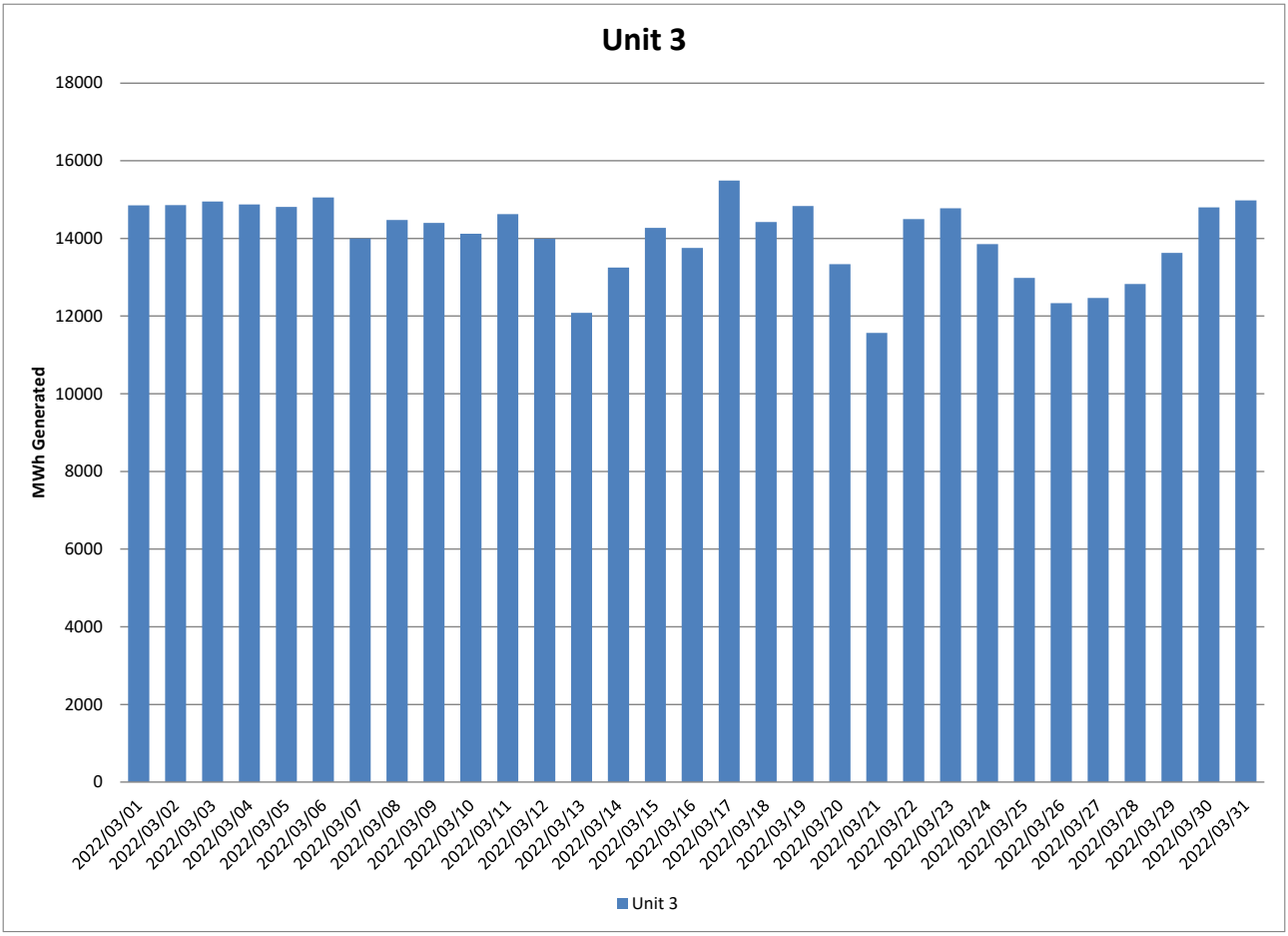

Figure 22: Unit 3 daily generated power in MWh for the month of March 2022

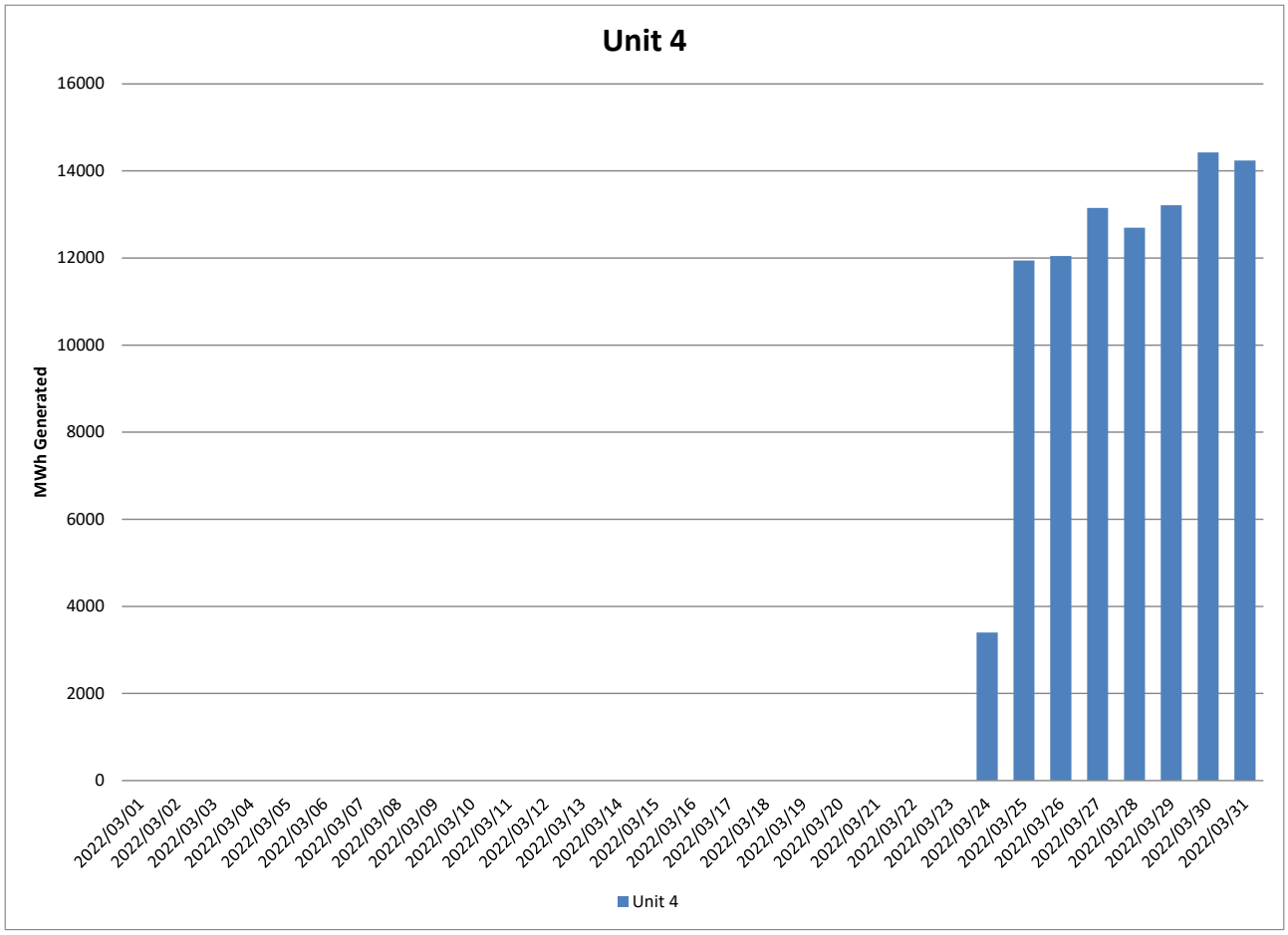

Figure 23: Unit 4 daily generated power in MWh for the month of March 2022

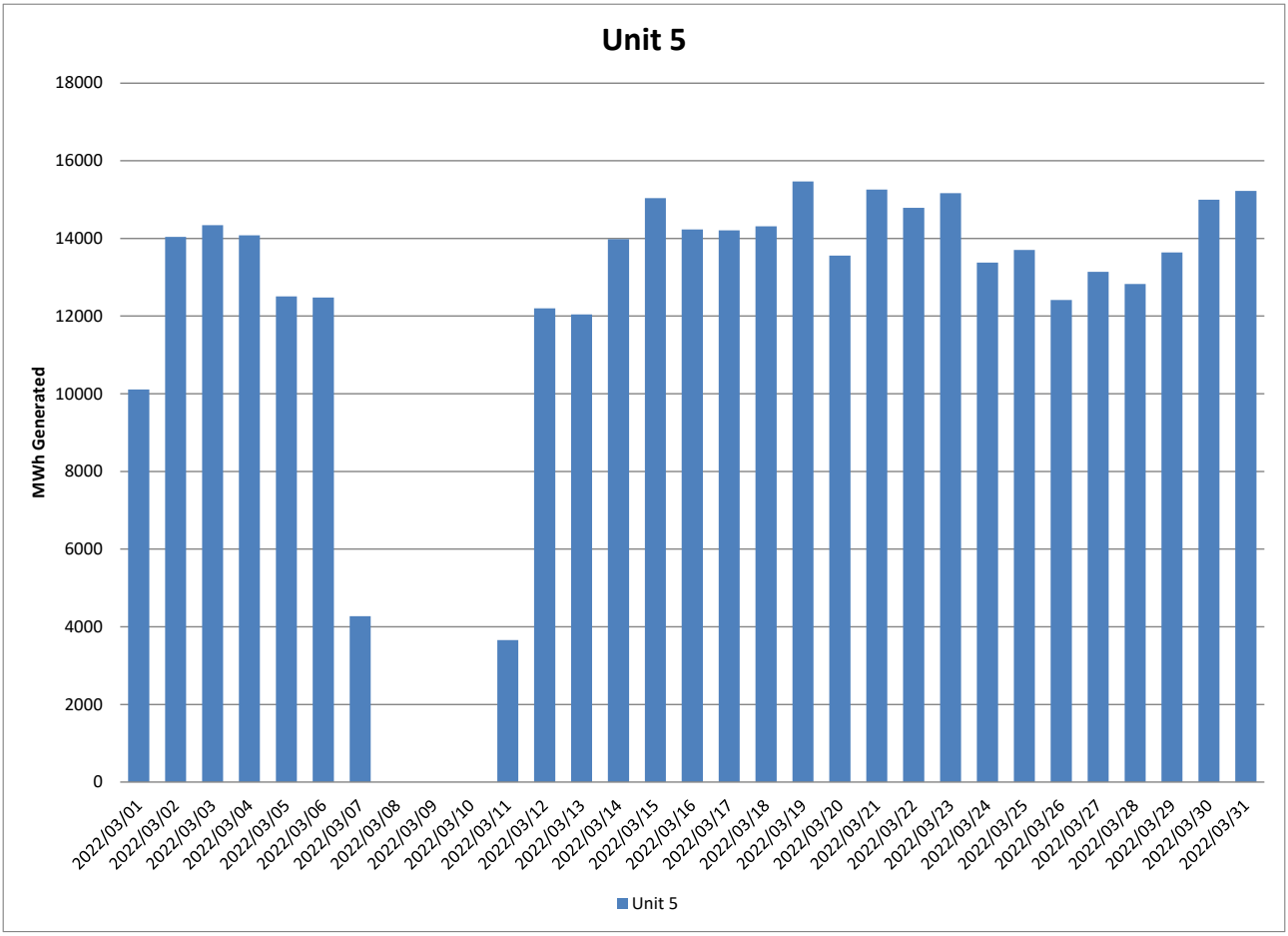

Figure 24: Unit 5 daily generated power in MWh for the month of March 2022

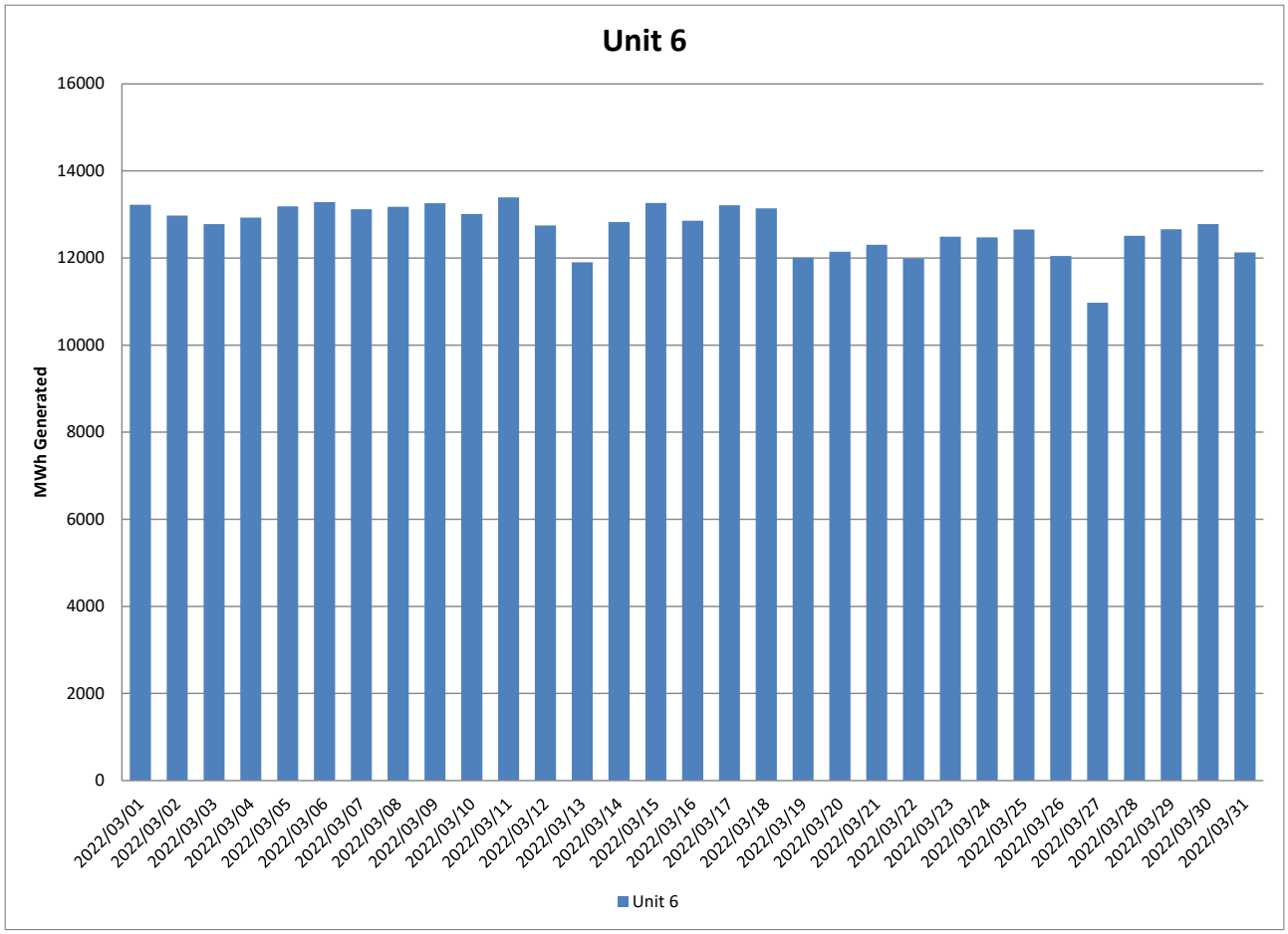

Figure 25: Unit 6 daily generated power in MWh for the month of March 2022

2.6 Pollutant Tonnages

The emitted pollutant tonnages for March 2022 are provided in table 6. Averaged Quality Assurance level 2 (QAL 2) values were used for CO_2 data for Unit 1, averaged data was used for oxygen data for 1 to 3 March 2022 due to the monitor readings being unreliable. Averaged Quality Assurance level 2 (QAL 2) values were used for CO_2 and oxygen data for Unit 2 and Oxygen data for unit 3. CO_2 Values for unit 4 and unit 5 was calculated as per balance based on the O_2 values. These values were used due to the monitor providing unreliable values. Matimba is currently in the process of implementing recommended changes on this monitor to improve the reliability of the data.

Table 6: Pollutant tonnages for the month of March 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	66,4	4 360,4	713,7
Unit 2	38,2	9 937,5	1 714,3
Unit 3	52,5	6 298,8	1 208,8
Unit 4	17,0	1 336,1	293,2
Unit 5	36,1	3 700,3	619,5
Unit 6	38,9	5 917,8	963,0
SUM	249,2	31 551,0	5 512,5

2.7 Reference values

Table 7: Reference values for data provided, March 2022

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	9,78	7,70	7,72	6,12	8,24	8,14
Moisture	%	4,78	4,87	5,19	3,73	5,29	3,21
Velocity	m/s	23,3	34,7	29,8	24,0	26,5	27,9
Temperature	^{o}C	133,9	132,2	131,9	133,9	122,0	124,9
Pressure	mBar	933,3	1 191,1	914,6	919,7	934,2	921,7

2.8 Continuous Emission Monitors

2.8.1 Reliability

CO_2 monitor reliability for units 1, 2, 4, 5 and 6 performed below the required 80% reliability as per the AEL. The monitors for these units were 100% available for March 2022 however the data received were removed and replaced with calculated values and averaged values due to values received from the monitors not being reliable.

Averaged Quality Assurance level 2 (QAL 2) values were used for CO_2 data for Unit 1, averaged data was used for oxygen data for 1 to 3 March 2022 due to the monitor readings being unreliable. Averaged Quality Assurance level 2 (QAL 2) values were used for CO_2 and oxygen data for Unit 2 and Oxygen data for unit 3. CO_2 Values for unit 4 and unit 5 was calculated as per balance based on the O_2 values.

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

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100,0	100,0	99,3	0,0
Unit 2	100,0	99,6	99,7	0,0
Unit 3	100,0	100,0	100,0	100,0
Unit 4	100,0	100,0	100,0	0,0
Unit 5	100,0	100,0	100,0	0,0
Unit 6	100,0	100,0	100,0	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

- 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

- U 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

2.8.3 Sampling dates and times

Continuous

2.9 Units Start-up information

Table 9: Start-up information

Unit	4	
Fires in	2022/03/23	15H54
Synchronization with Grid	2022/03/24	02H56
Emissions below limit	2022/03/24	07H27
Fires in to synchronization	11,03	HOURS
Synchronization to < Emission limit	4,52	HOURS

Unit	4	
Fires in	2022/03/24	10H34
Synchronization with Grid	2022/03/24	15H18
Emissions below limit	2022/03/24	17H12
Fires in to synchronization	4,73	HOURS
Synchronization to < Emission limit	1,9	HOURS

Unit	5	
Fires in	2022/03/11	07H21
Synchronization with Grid	2022/03/11	12H34
Emissions below limit	2022/03/11	14H52
Fires in to synchronization	5,22	HOURS
Synchronization to < Emission limit	2,3	HOURS

2.10 Emergency generation

Table 10: Emergency generation

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Emergency Generation hours declared by national Control	308	308	308	41	208	308
Emergency Hours declared including hours after stand down	329	329	329	47	229	329
Days over the Limit during Emergency Generation	0	0	0	0	0	0

No exceedances occurred in March 2022.

2.11 Complaints register

Table 11: 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
Pieter Pieterse	Normal ash dump operations were altered as a result of ash disposal space constraints	Average fugitive dust fallout from March to December 2021 in direction of property where complaint originated from: 494 mg/m^2/day	N/A	Acquire additional resources to manage dust suppression system.	Completed
				Connect additional dust suppression equipment (pipeline)	31 March 2022
Manketti Lodge	Dumping and storage of ash at the emergency ash offloading area and increased particulate matter emissions from stacks.	Average fugitive dust fallout from November 2021 to February 2022 in direction of property where complaint originated from: 933 mg/m^2/day and 728 mg/m^2/day	N/A	Investigate feasibility of installing dust suppression system at the emergency ash offloading facility.	13 July 2022

2.12 Air quality improvements and social responsibility conducted

2.12.1 Air quality improvements

None

2.12.2 Social responsibility conducted

None

2.13 Ambient air quality monitoring

There were no exceedances recorded in the reporting period.

Ambient NO_2 concentrations at Marapong monitoring site show influence of emissions from low level sources in the area and ambient SO_2, $PM_{2.5}$ and PM_{10} concentrations are contributed to by emissions from both low level and high-level sources.

The average data recovery for the period was 81.6% and the station availability was 100%.

Detailed results can be found in Attachment 1, “Marapong Monthly Report_March 2022”.

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

- All precipitator fields in service.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 3

- All precipitator fields in service.
- Unit 3 Variable speed drive failed and was replaced.

Unit 4

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

Unit 5

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

Unit 6

- All precipitator fields in service.
- 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 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. S23º 40' 2.8" E027º 36' 34.8" 175m from ground level and 75m from the top.
    b. Gas:
        i. S23º 40' 2.8" E027º 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. S23º 40' 14.8" E027º 36' 47.5" 175m from ground level and 75m from the top.
    b. Gas:
        i. S23º 40' 14.8" E027º 36' 47.5" 100m from ground level and 150m from the top.
    c. Stack height
        i. 250 meter consist of 3 flues

3. Attachments

N/A

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

Obakeng Mabotja
GENERAL MANAGER: MATIMBA POWER STATION