Eskom	Matimba Power Station Emissions report	Matimba Power Station

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

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Compiled by	Functional Responsibility	Authorized by
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Environmental Officer	**Environmental Manager**	**General Manager**
Date: 2022/07/20	Date: 29/07/2022	Date: 2022/07/29

Content

Figures

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 June 2022.

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

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	1 194 472
	Fuel Oil	Tons/month	1 200	572,363
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	MW	4000	2893

The consumption rates for the month of June 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%	99,93%
Unit 3	Electrostatic Precipitator	100%	99,87%
Unit 4	Electrostatic Precipitator	100%	99,93%
Unit 5	Electrostatic Precipitator	100%	99,93%
Unit 6	Electrostatic Precipitator	100%	99,96%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	93,43%
Unit 2	SO_3 Plant	100%	98,61%
Unit 3	SO_3 Plant	100%	93,54%
Unit 4	SO_3 Plant	100%	97,62%
Unit 5	SO_3 Plant	100%	92,36%
Unit 6	SO_3 Plant	100%	94,72%

Flue gas conditioning plant availability was below the required 100% for all six (06) units due to maintenance and low energy production rates.

2.3 Energy source characteristics

Table 3: Energy Source Material Characteristics.

	Characteristic	Stipulated Range (Unit)	Monthly Average Content
Coal burned	**Sulphur Content**	1.6%	1,15%
	Ash Content	40%	34,46%

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

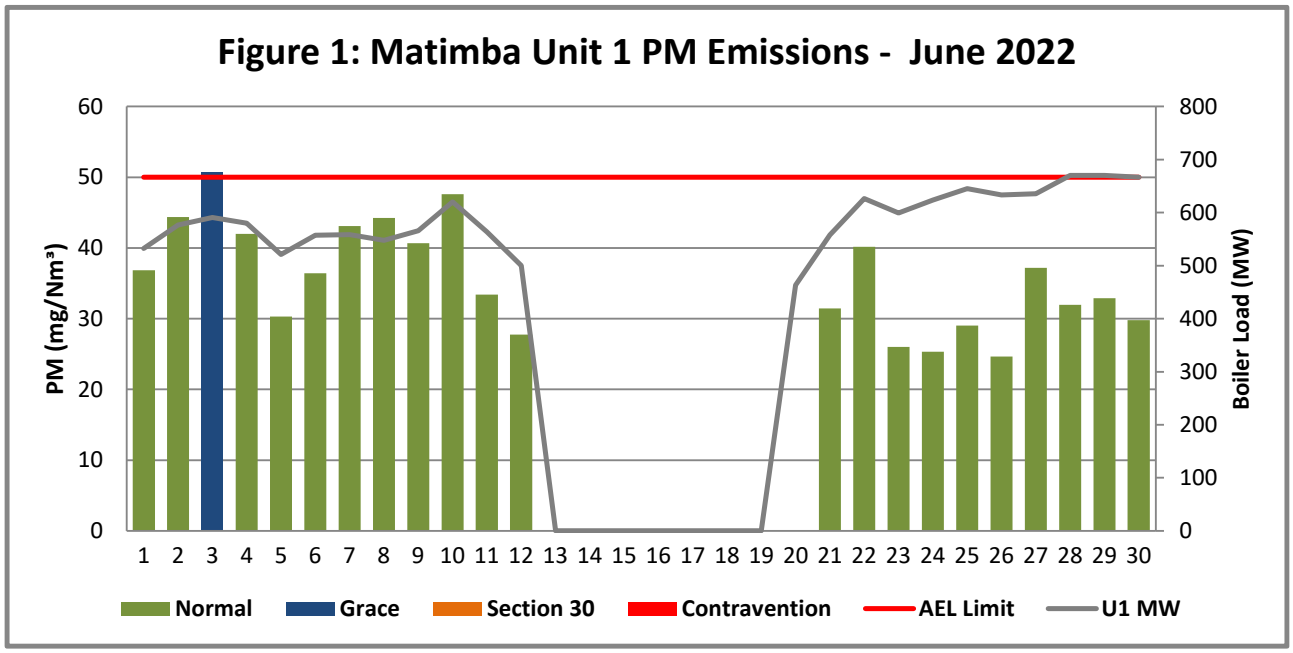

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of June 2022

Interpretation:

Unit 1 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 3 June 2022. The exceedance was due to breakdowns on the flue gas conditioning plant. The plant was repaired, and emissions returned to below the limit. The exceedance remained within the 48-hour grace period.

Unit 2 Particulate Emissions

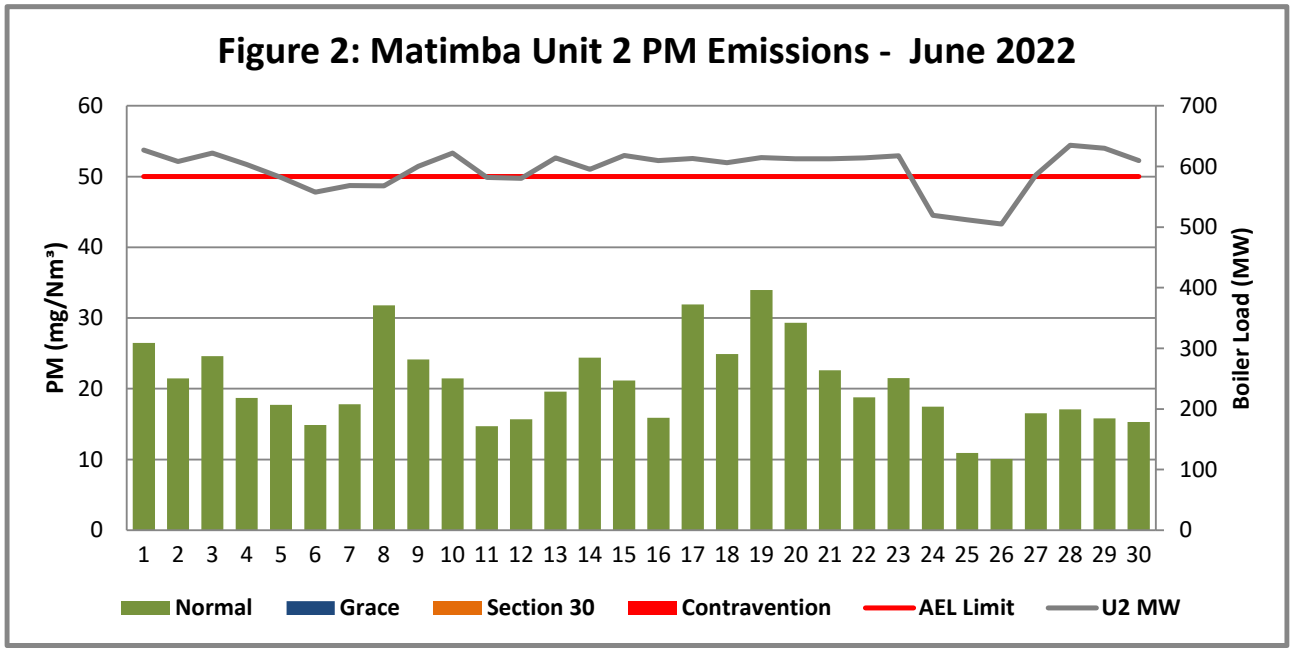

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of June 2022

Interpretation:

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

Unit 3 Particulate Emissions

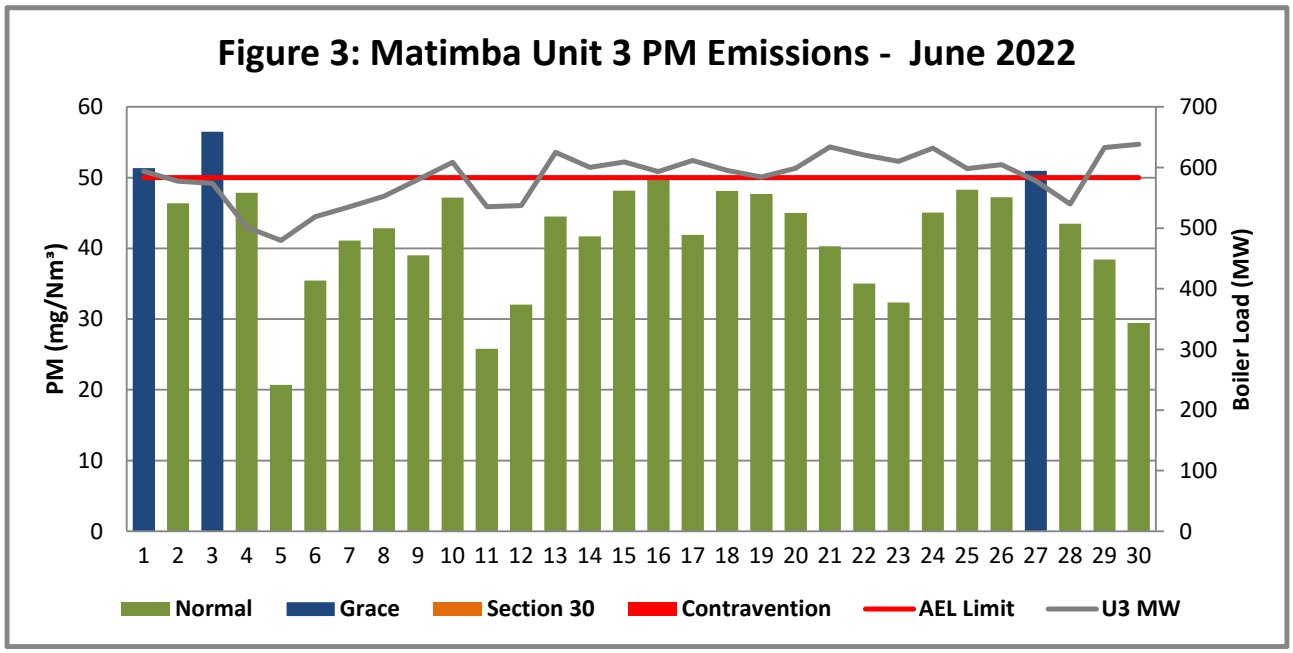

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of June 2022

Interpretation:

Unit 3 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 1 June 2022, 3 June 2022, and 27 June 2022. The exceedances were due to breakdowns on the ash removal system leading to ash backlog within the flue gas cleaning system and reducing the efficiency of the abatement technology (electrostatic precipitator fields). The defective plants were repaired, and the exceedances remained within the 48-hour grace period.

Unit 4 Particulate Emissions

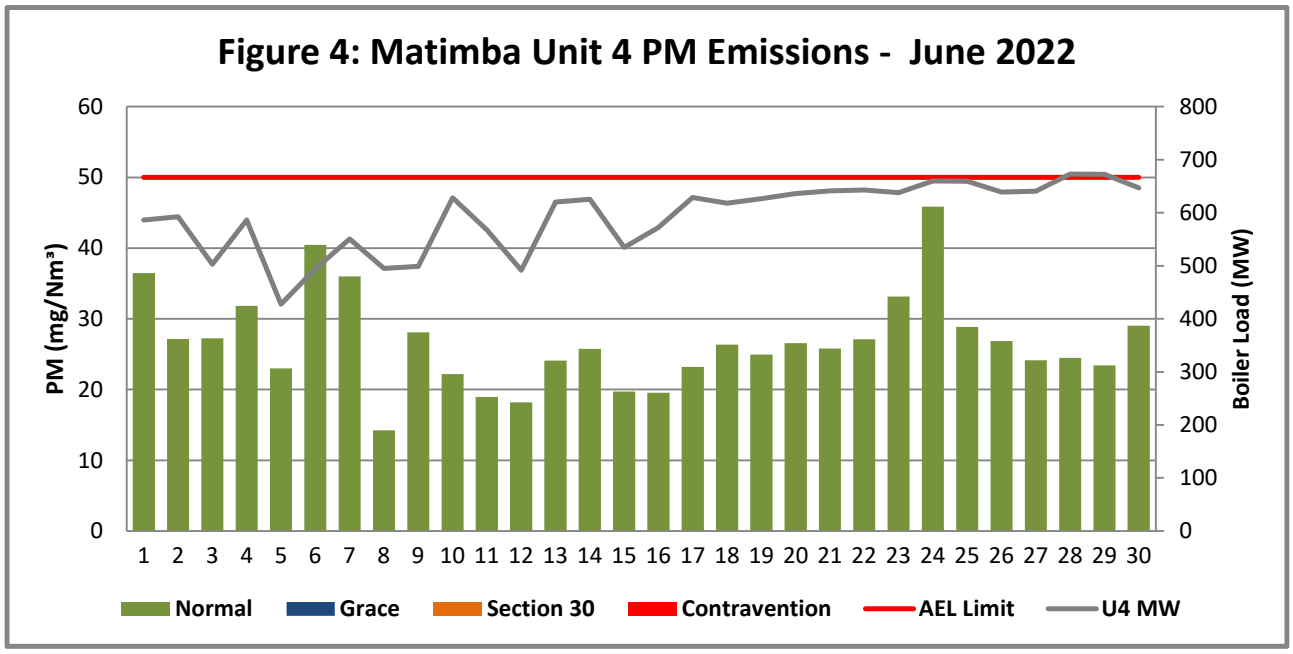

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of June 2022

Interpretation:

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

Unit 5 Particulate Emissions

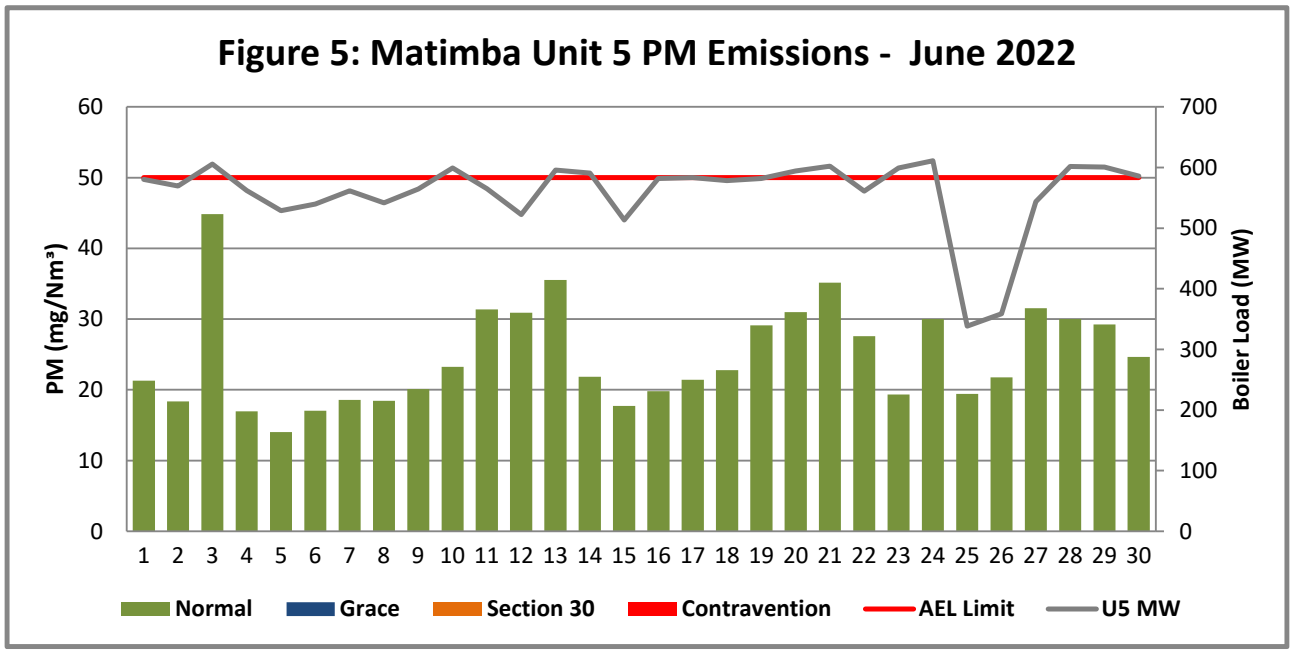

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of June 2022

Interpretation:

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

Unit 6 Particulate Emissions

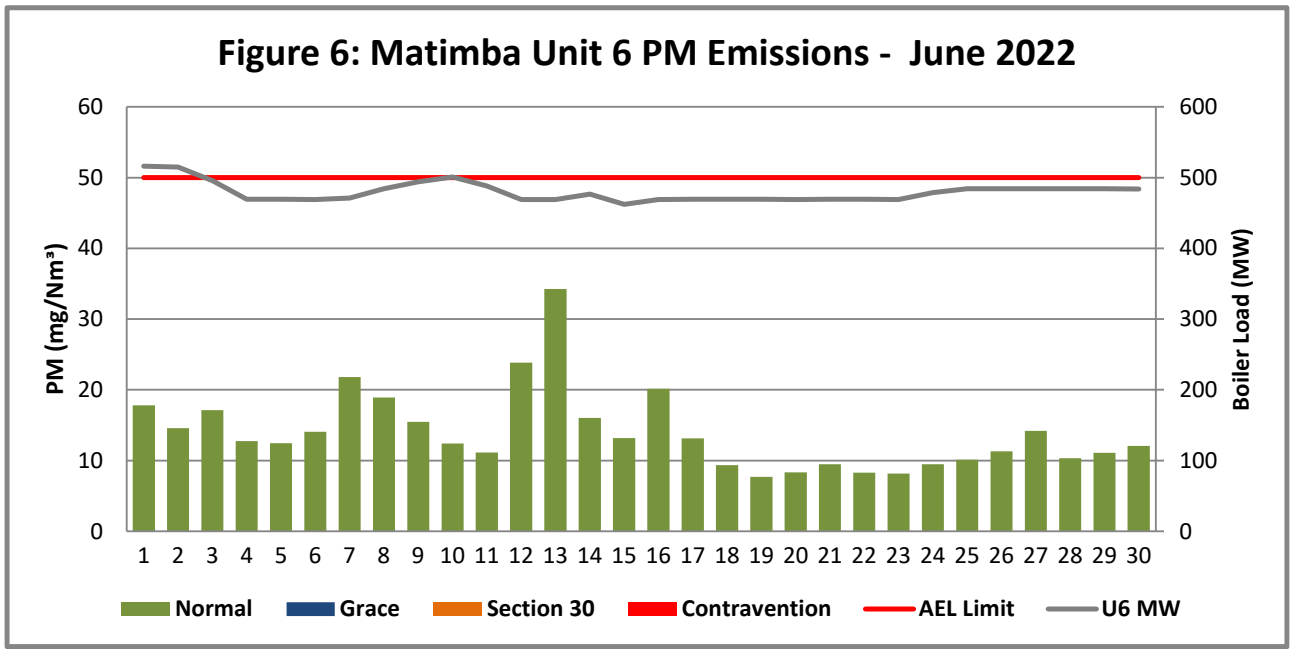

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of June 2022

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

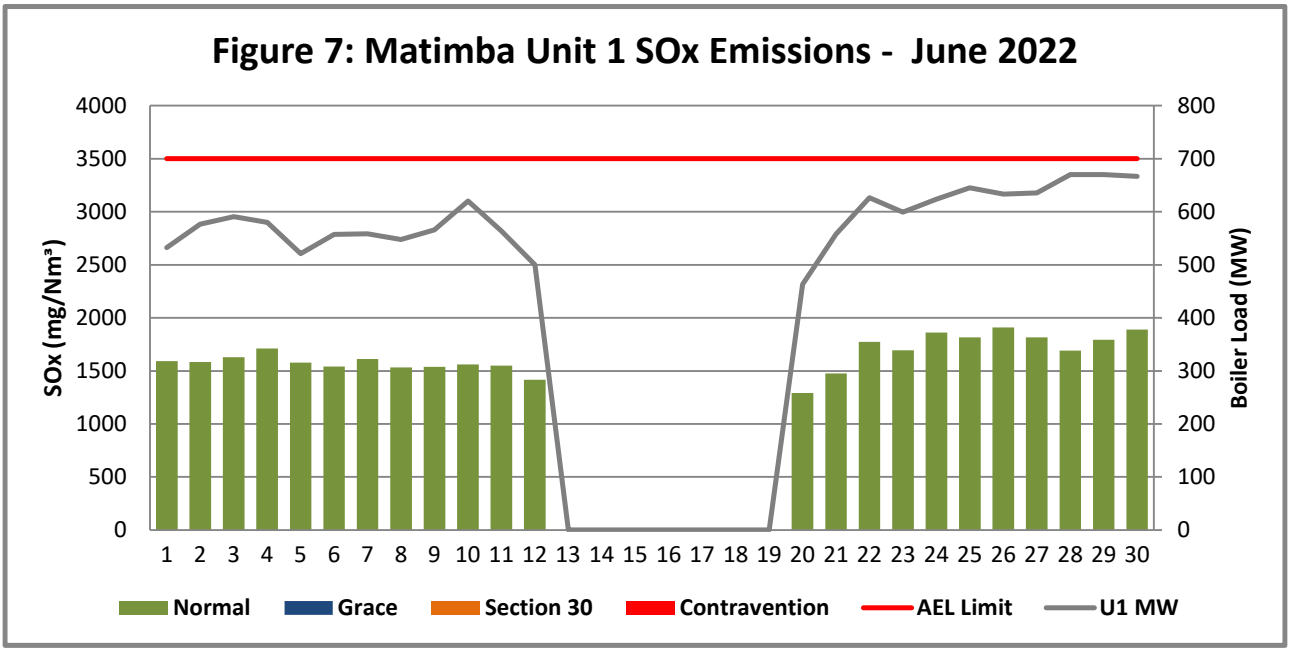

Figure 7: SO2 daily average emissions against emission limit for unit 1 for the month of June 2022

Interpretation:

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

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Unit 2 SO_2 Emissions

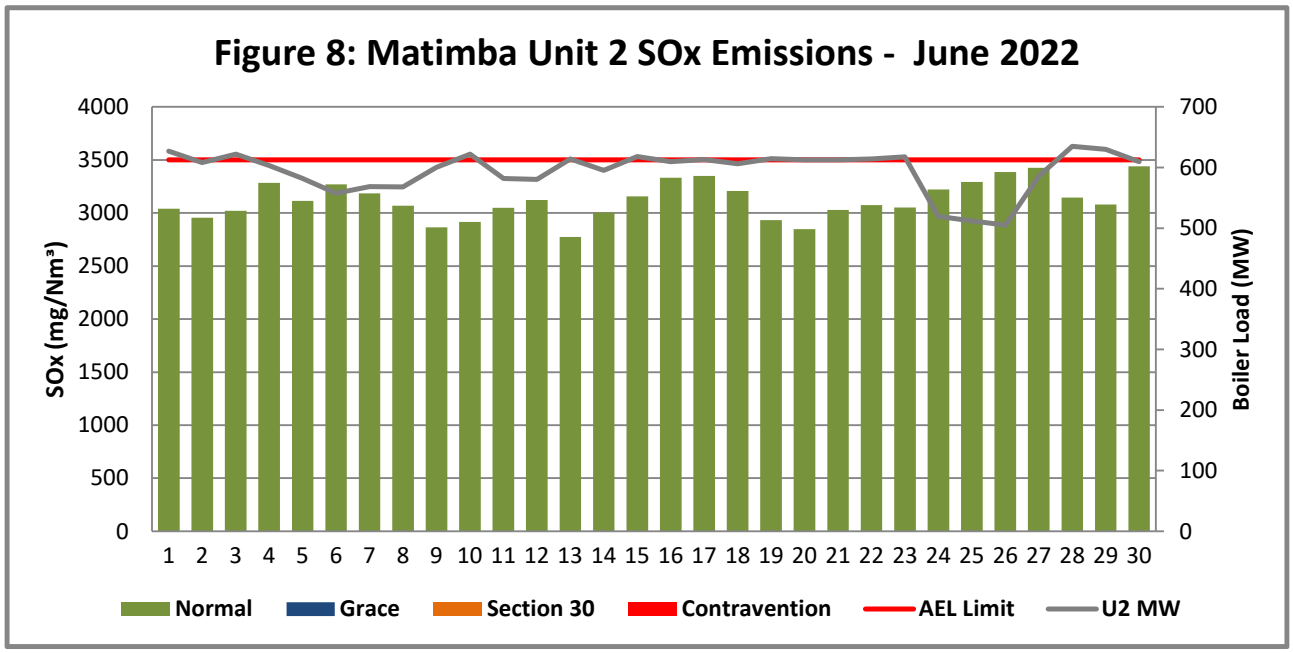

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of June 2022

Interpretation:

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

Unit 3 SO_2 Emissions

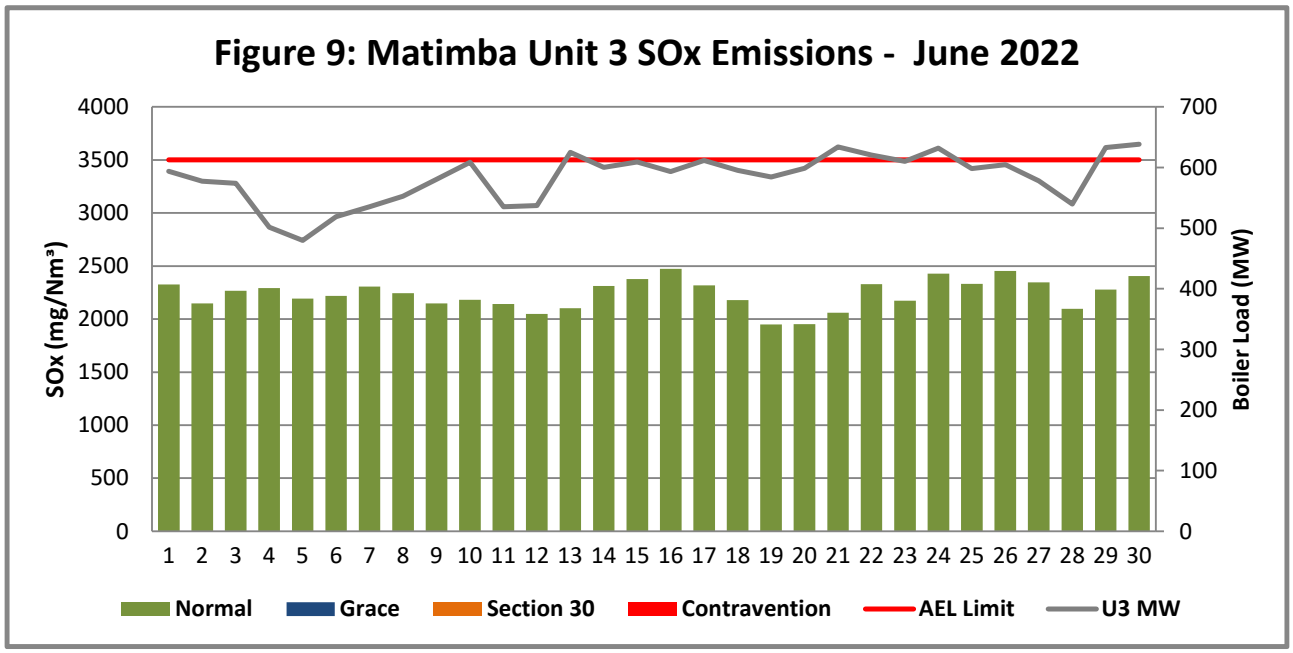

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of June 2022

Interpretation:

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

Unit 4 SO_2 Emissions

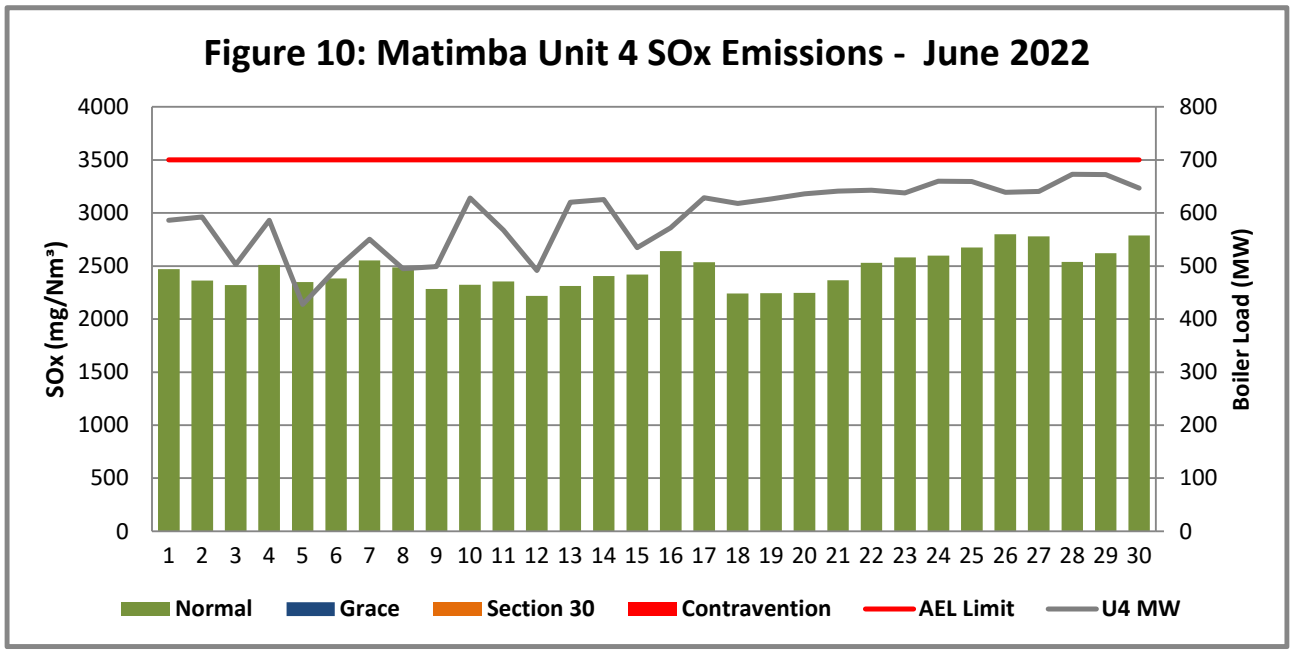

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of June 2022

Interpretation:

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

Unit 5 SO_2 Emissions

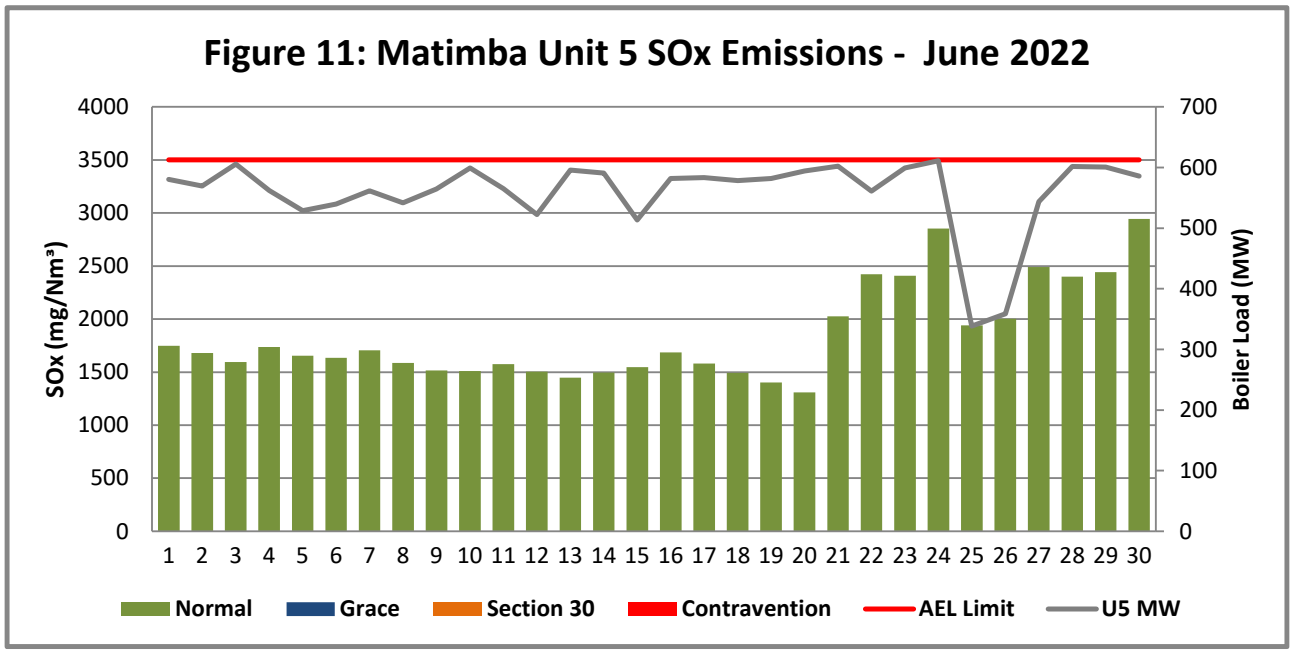

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of June 2022

Interpretation:

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

Unit 6 SO_2 Emissions

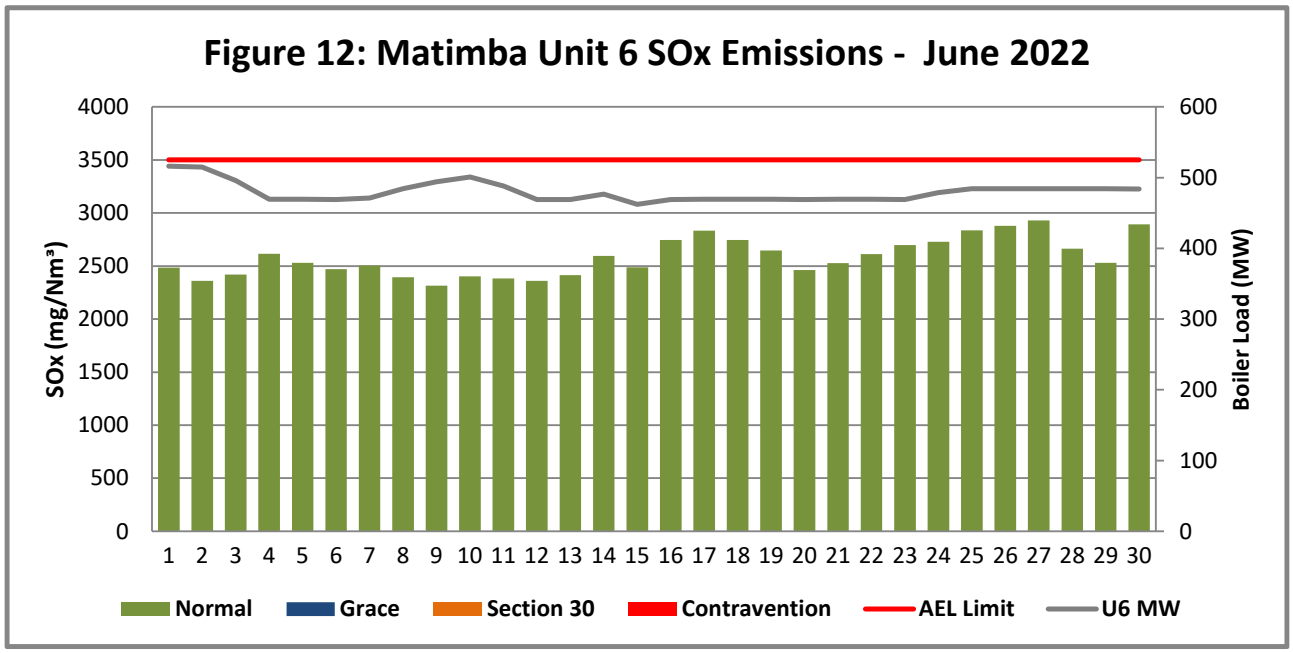

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of June 2022

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

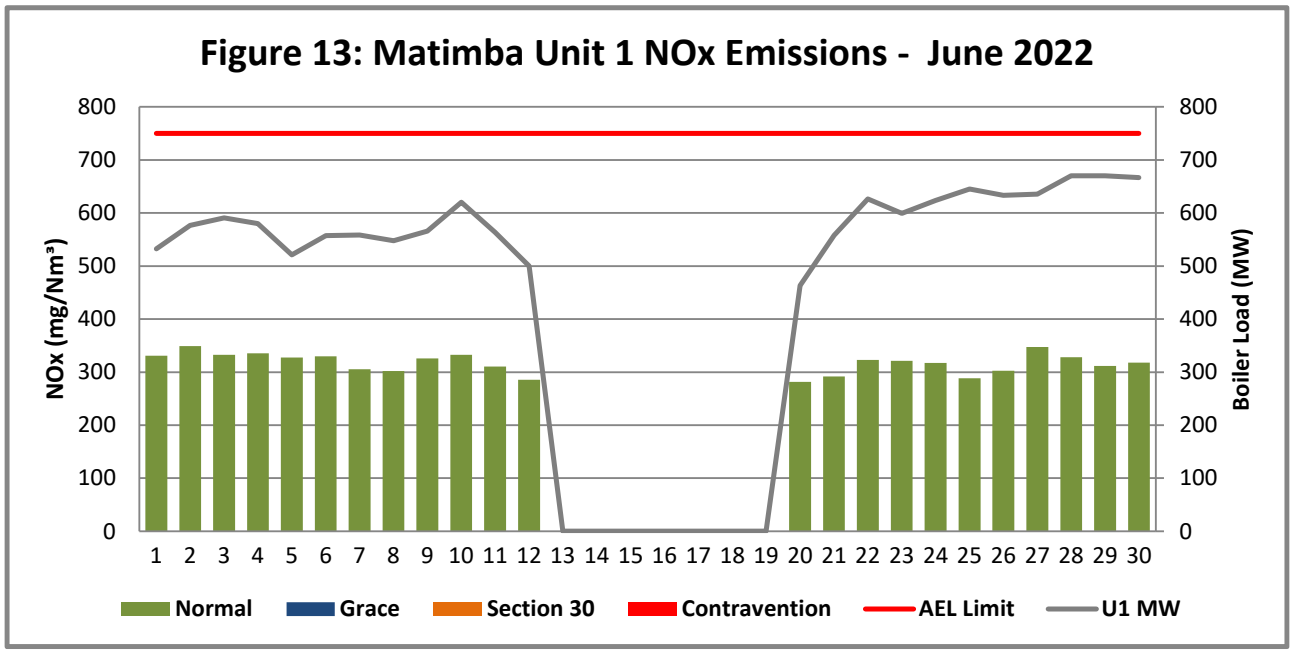

Figure 13: Figure 14: NOx daily average emissions against emission limit for unit 1 for the month of June 2022

Interpretation:

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

Unit 2 NO_x Emissions

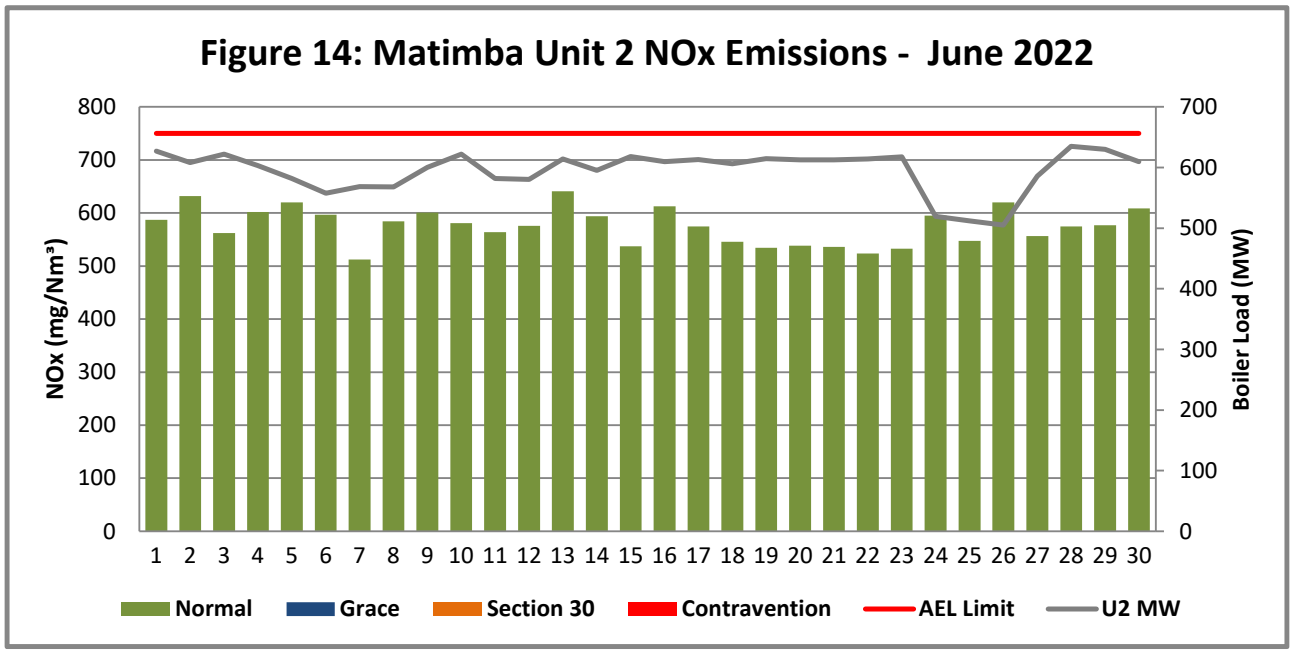

Figure 15: NOx daily average emissions against emission limit for unit 2 for the month of June 2022

Interpretation:

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

Unit 3 NO_x Emissions

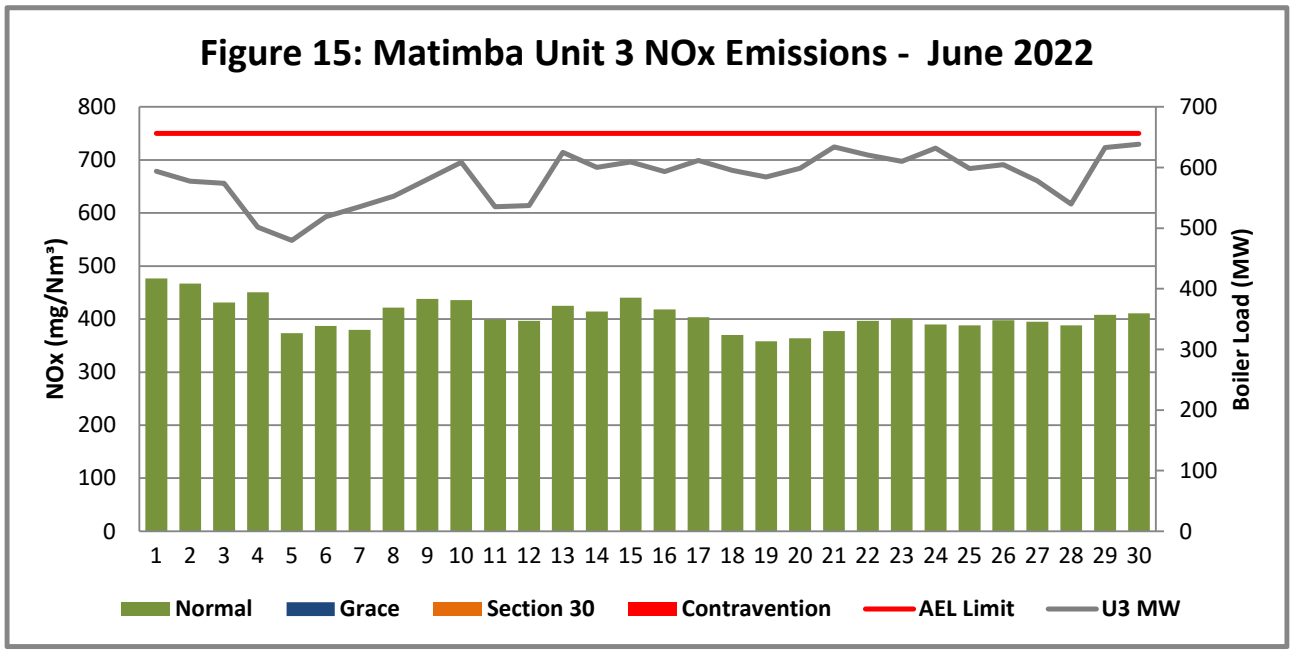

Figure 16: NOx daily average emissions against emission limit for unit 3 for the month of June 2022

Interpretation:

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

Unit 4 NO_x Emissions

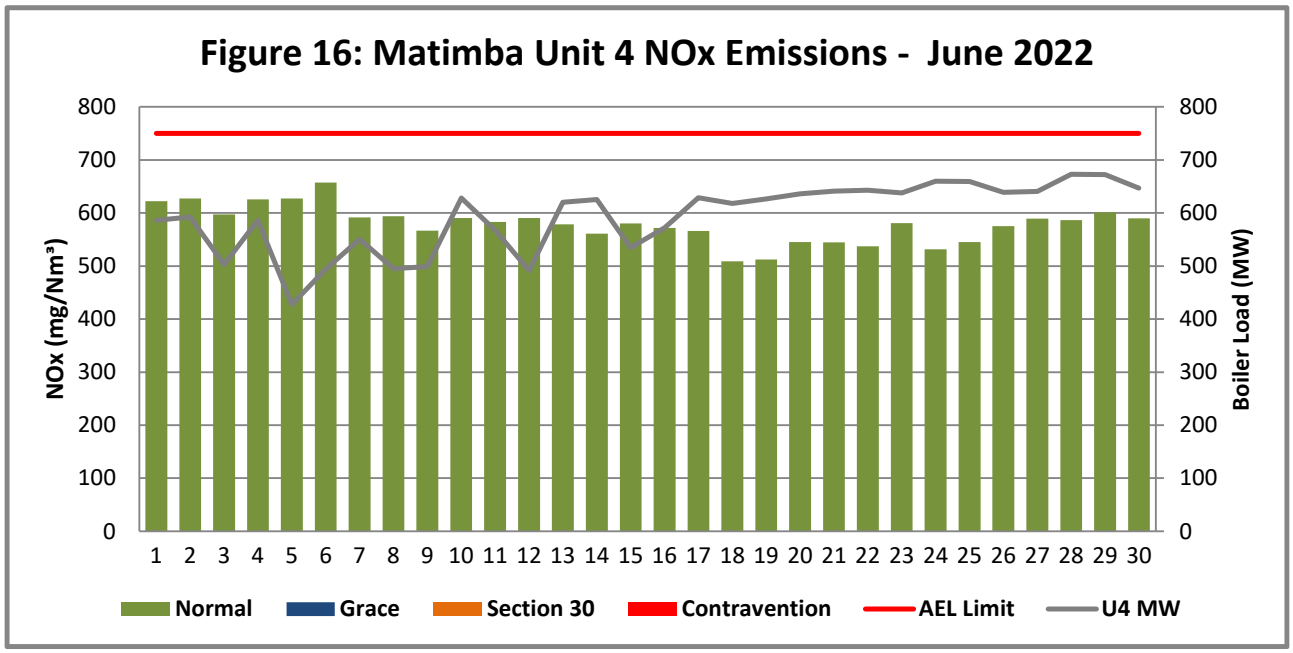

Figure 17: NOx daily average emissions against emission limit for unit 4 for the month of June 2022

Interpretation:

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

Unit 5 NO_x Emissions

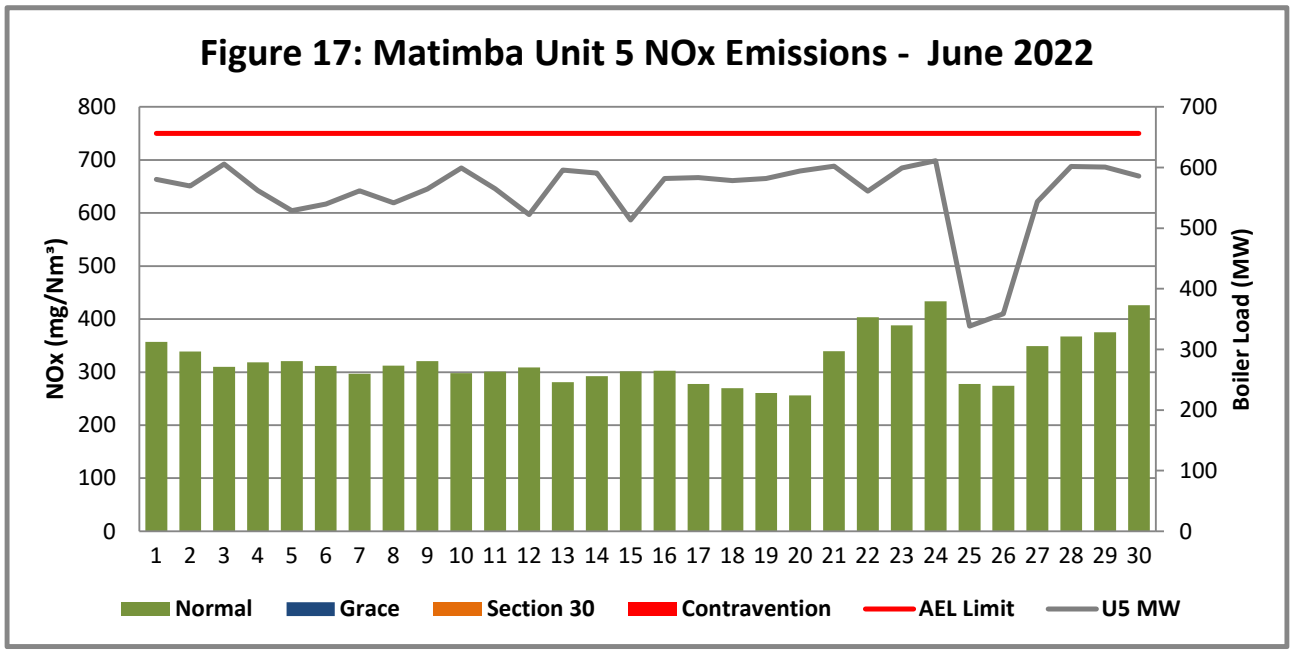

Figure 18: NOx daily average emissions against emission limit for unit 5 for the month of June 2022

Interpretation:

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

Unit 6 NO_x Emissions

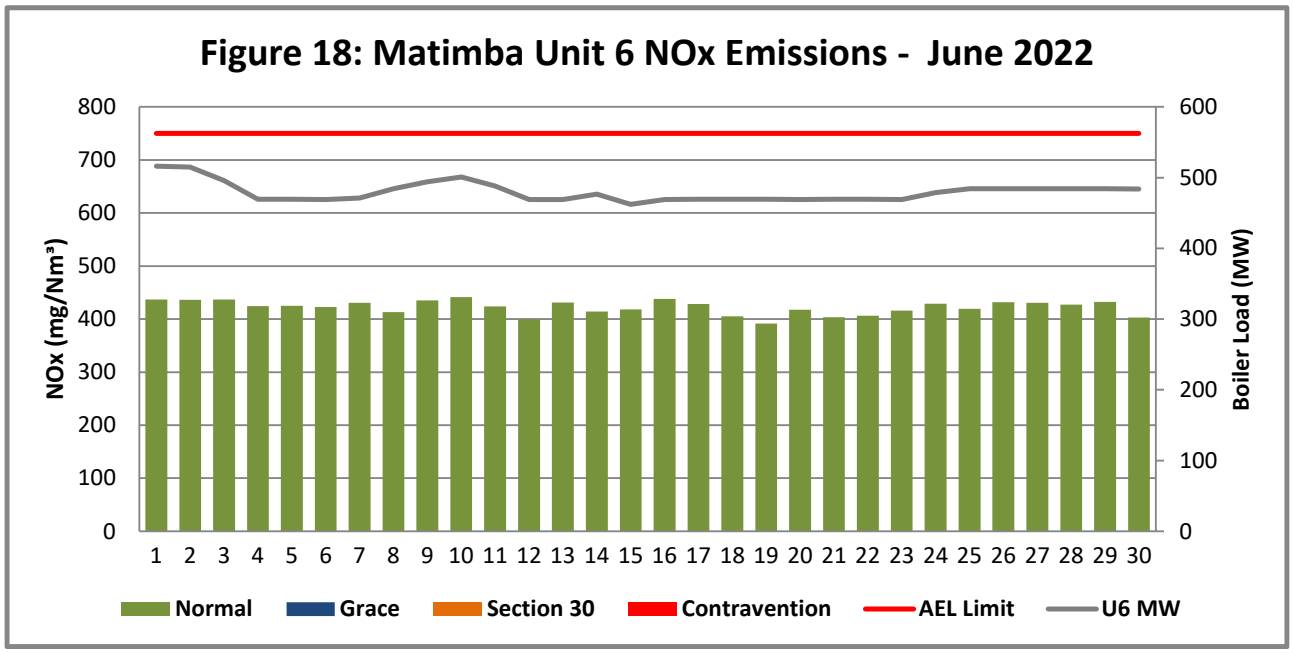

Figure 19: NOx daily average emissions against emission limit for unit 6 for the month of June 2022

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:	Tuesday, 12 July 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:	**June**	
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:	***572,363***	
Molecular weight of the fuel oil:	166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	**Data**	**Unit**
Daily average ambient temperature	16,61	°C
Daily maximum ambient temperature	25,19	°C
Daily minimum ambient temperature	9,38	°C
Daily ambient temperature range	15,81	°C
Daily total insolation factor	3,45	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):	**0,55**	**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 June 2022

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2022/06/01	12726	14819	14218	14014	13787	12236
2022/06/02	13825	14369	13792	14163	13552	12250
2022/06/03	14158	14692	13700	12024	14403	11776
2022/06/04	13890	14261	8765	14003	13374	11147
2022/06/05	12487	13744	11418	10273	12588	11146
2022/06/06	13343	13191	12381	11788	12842	11144
2022/06/07	13397	13428	12787	8826	13362	11187
2022/06/08	13121	13418	13189	11918	12892	11495
2022/06/09	13507	14169	13848	11867	13426	11722
2022/06/10	14879	14733	14522	15042	14232	11893
2022/06/11	13542	13763	12796	13559	13473	11596
2022/06/12	10937	13725	12807	11726	12411	11134
2022/06/13	0	14527	14902	14773	14136	11132
2022/06/14	0	14075	14377	15038	14099	11316
2022/06/15	0	14589	14487	12777	12164	10967
2022/06/16	0	14439	14218	13634	13885	11138
2022/06/17	0	14510	14602	15015	13879	11142
2022/06/18	0	14331	14173	14728	13738	11139
2022/06/19	0	14541	13989	14999	13865	11138
2022/06/20	3447	14469	14253	15151	14110	11138
2022/06/21	13332	14495	15155	15358	14353	11140
2022/06/22	15035	14518	14824	15332	12993	11140
2022/06/23	14338	14582	14551	15222	14228	11138
2022/06/24	14941	12307	15101	15761	14555	11354
2022/06/25	15439	12116	14312	15755	8146	11497
2022/06/26	15169	11940	14403	15268	8534	11492
2022/06/27	15221	13795	13857	15311	12848	11500
2022/06/28	16056	15014	12829	16081	14318	11496
2022/06/29	16044	14892	15117	16073	14288	11499
2022/06/30	15968	14415	15244	15460	13945	11491

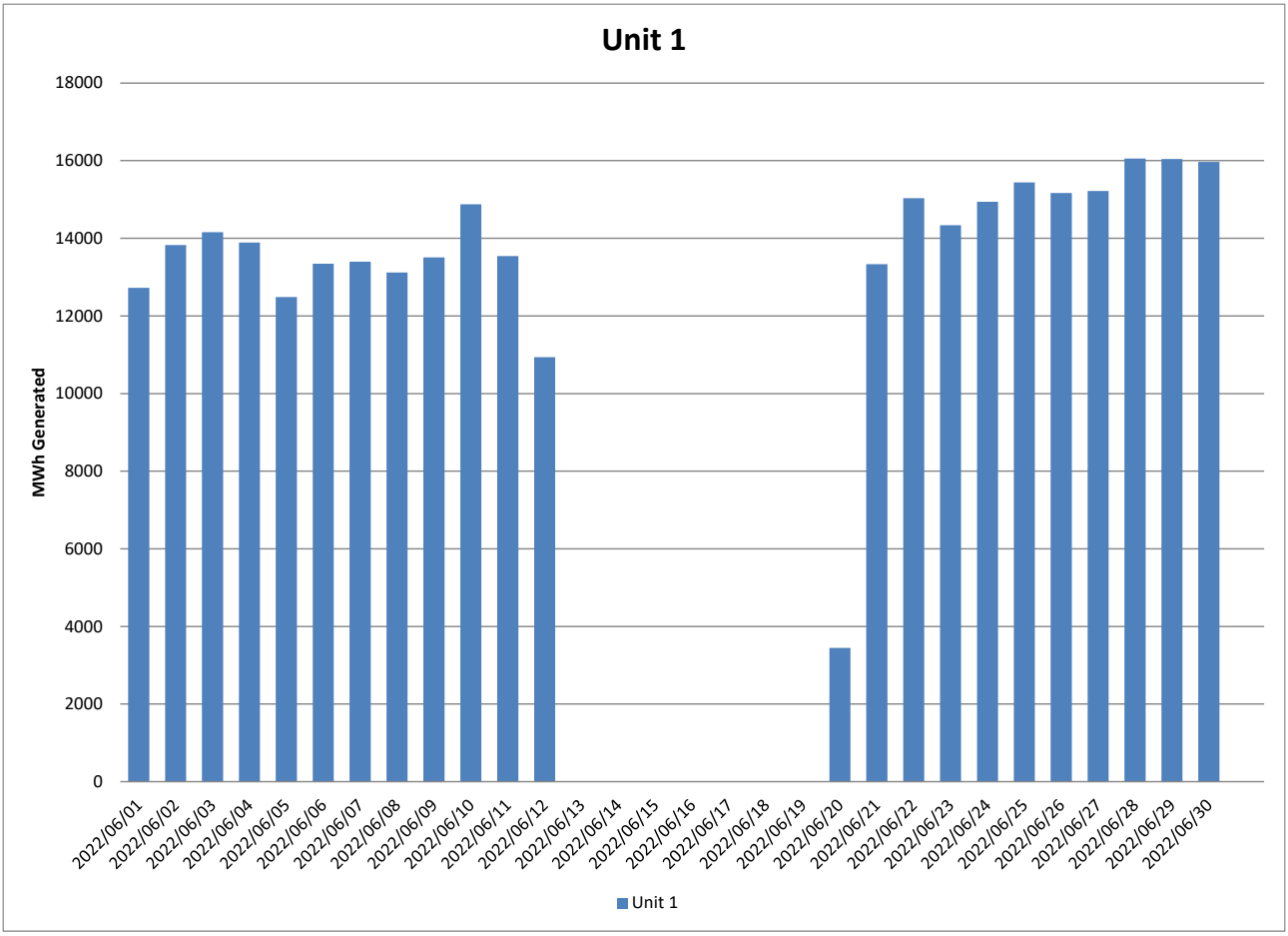

Figure 20: Unit 1 daily generated power in MWh for the month of June 2022

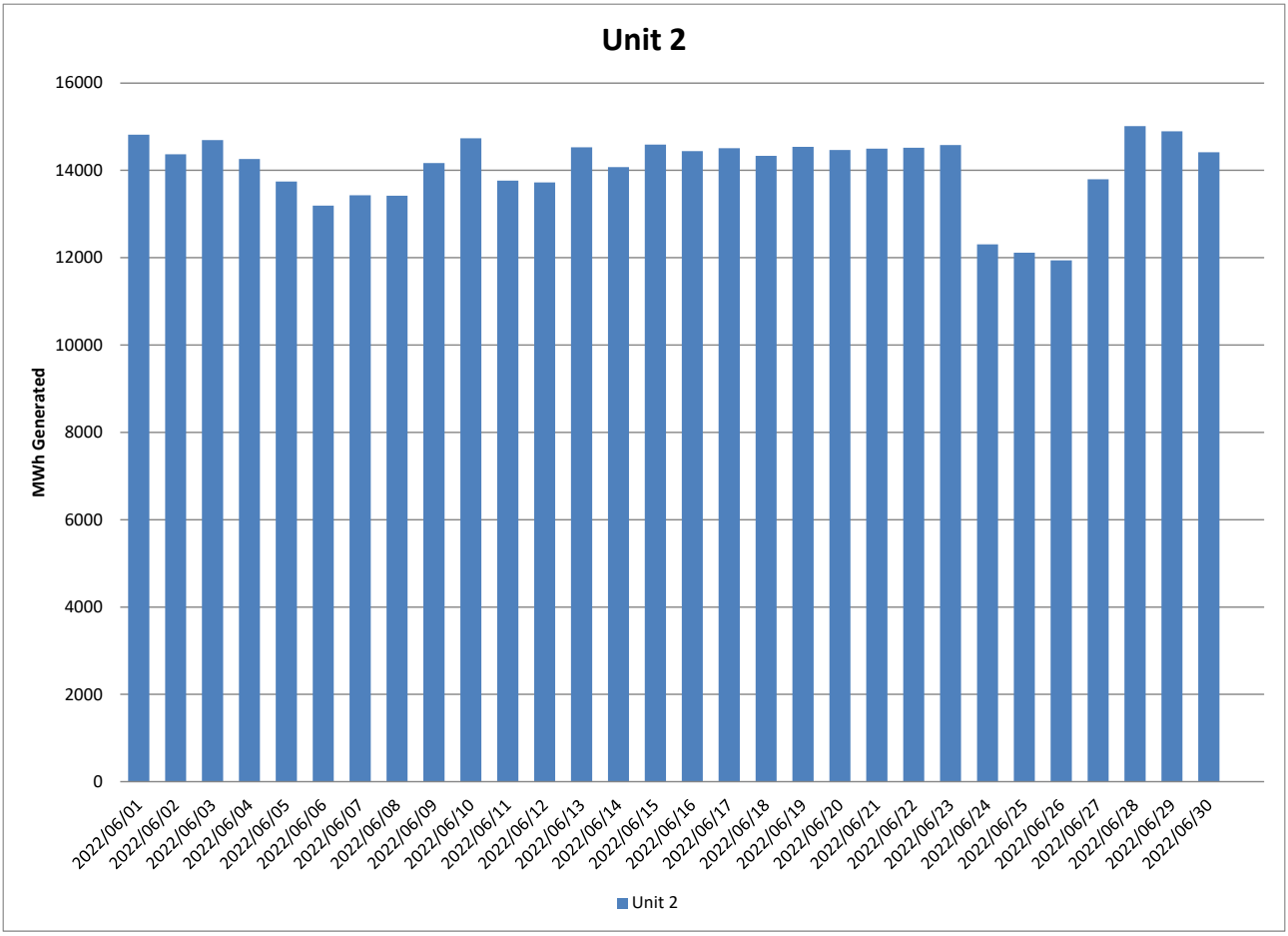

Figure 21: Unit 2 daily generated power in MWh for the month of June 2022

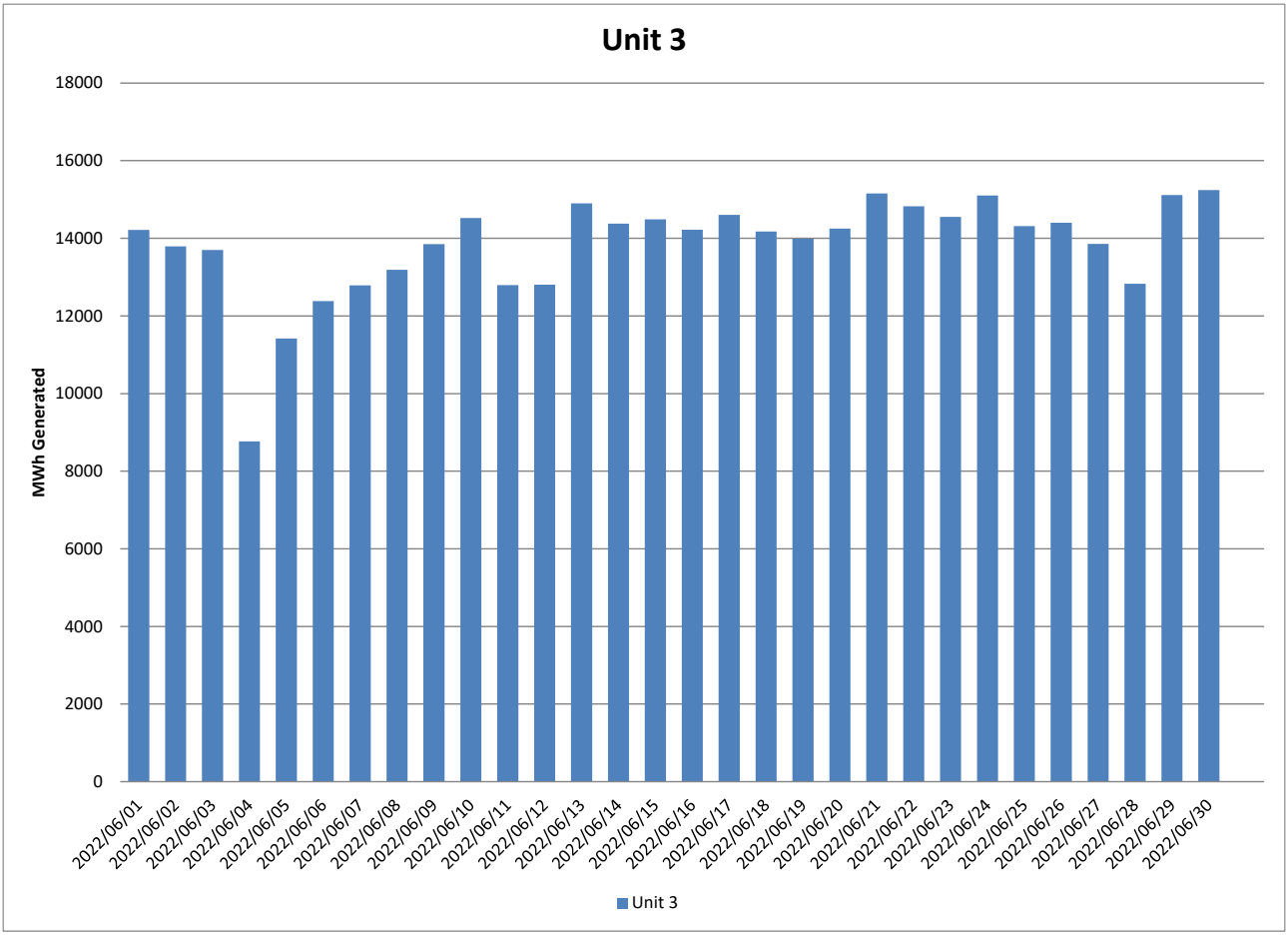

Figure 22: Unit 3 daily generated power in MWh for the month of June 2022

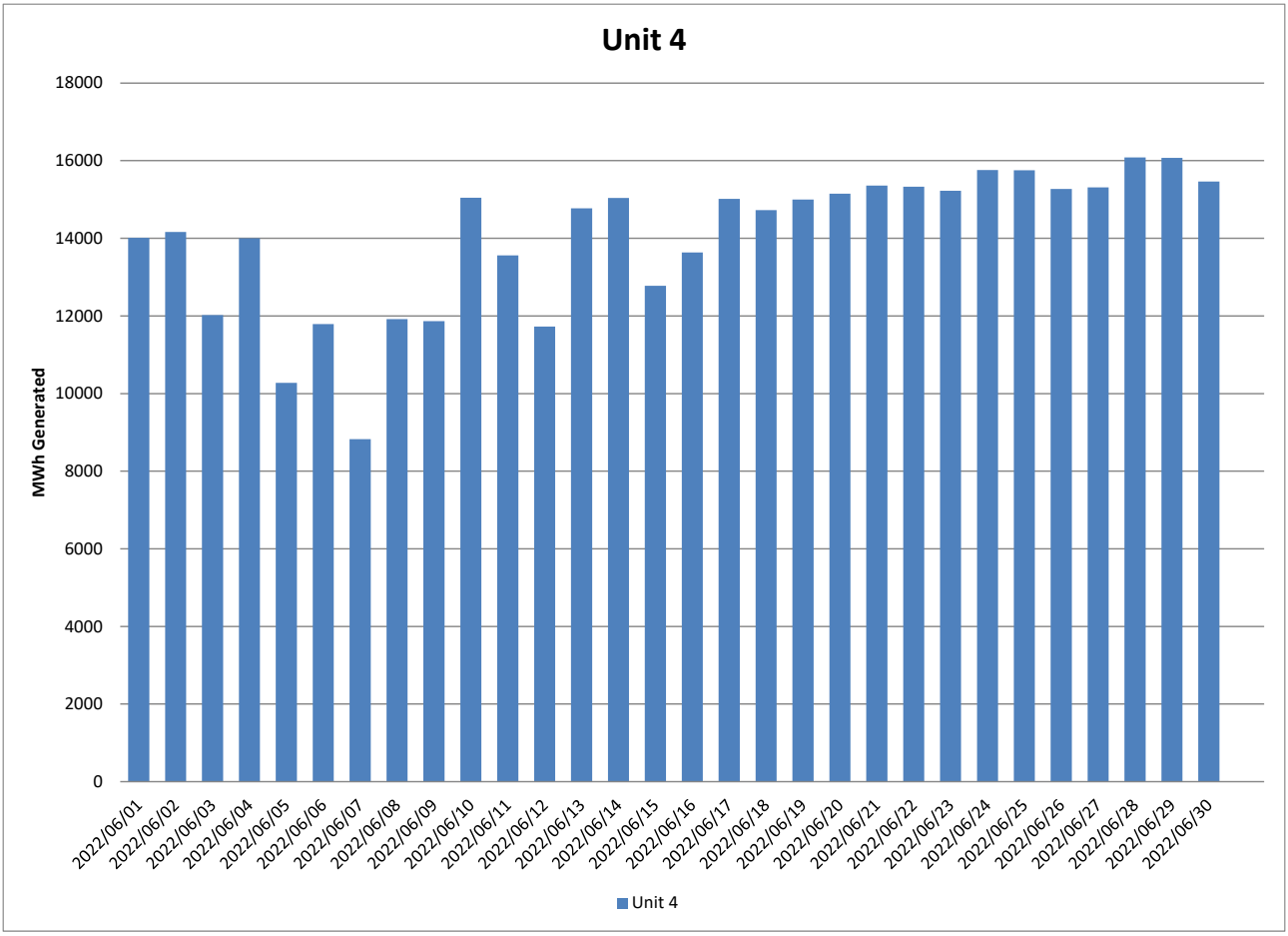

Figure 23: Unit 4 daily generated power in MWh for the month of June 2022

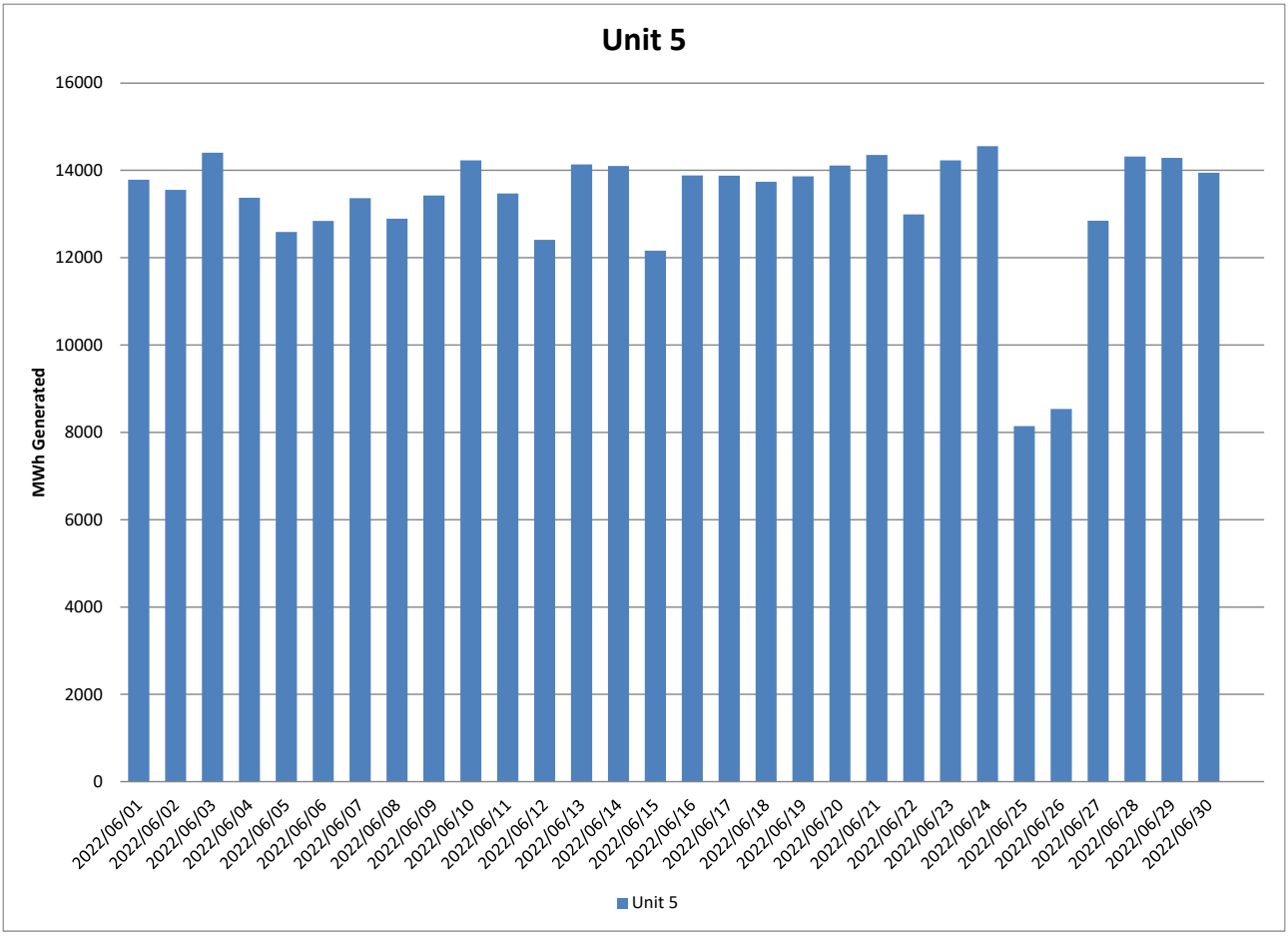

Figure 24: Unit 5 daily generated power in MWh for the month of June 2022

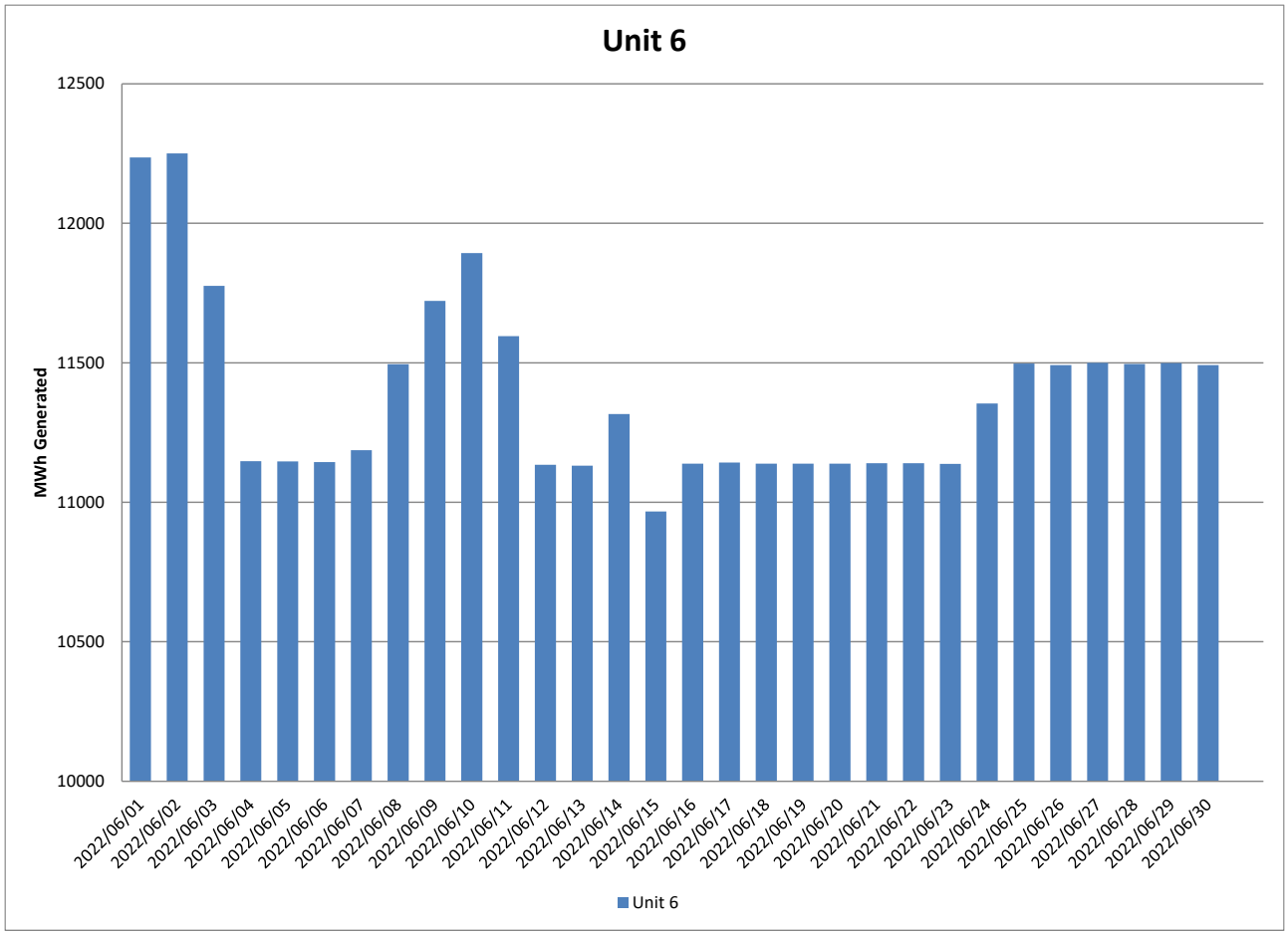

Figure 25: Unit 6 daily generated power in MWh for the month of June 2022

2.6 Pollutant Tonnages

The emitted pollutant tonnages for June 2022 are provided in table 6. CO_2 values for units 3 and 4 were calculated per balance, using O_2 values, due to analyser providing unreliable data. Averaged values were used for O_2 data for Units 5 and 6 from 17 to 30 June 2022 due to the analysers being defective and 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 6: Pollutant tonnages for the month of June 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	55,4	2 682,4	512,9
Unit 2	41,5	8 703,2	1 605,8
Unit 3	82,7	5 579,4	1 012,3
Unit 4	47,0	4 779,2	1 116,2
Unit 5	43,2	3 906,5	682,8
Unit 6	22,9	4 883,9	799,9
SUM	292,5	30 534,7	5 729,9

2.7 Reference values

Table 7: Reference values for data provided, June 2022

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	6,54	10,36	6,45	6,70	7,50	9,25
Moisture	%	4,69	4,62	5,42	3,82	4,97	2,88
Velocity	m/s	24,8	34,1	29,2	24,5	25,6	26,3
Temperature	^{o}C	135,0	130,0	126,2	133,3	119,4	123,8
Pressure	mBar	935,9	1 194,0	917,7	870,6	934,8	928,2

2.8 Continuous Emission Monitors

2.8.1 Reliability

CO_2 values for units 3 and 4 were calculated per balance, using O_2 values, due to analyser providing unreliable data. Averaged values were used for O_2 data for Units 5 and 6 from 17 to 30 June 2022 due to the analysers being defective and providing unreliable data.

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

Associated Unit/Stack	PM	SO_2	NO
Unit 1	100,0	100,0	96,4
Unit 2	100,0	92,2	92,2
Unit 3	100,0	100,0	100,0
Unit 4	100,0	100,0	100,0
Unit 5	100,0	100,0	100,0
Unit 6	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

Table 9: 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

2.9 Units Start-up information

Table 10: Start-up information

Unit	1	
Fires in	2022/06/20	10H54
Synchronization with Grid	2022/06/20	16H31
Emissions below limit	2022/06/20	23H37
Fires in to synchronization	5,62	HOURS
Synchronization to < Emission limit	7,1	HOURS

Unit	3	
Fires in	2022/06/04	14H45
Synchronization with Grid	2022/06/04	16H53
Emissions below limit	2022/06/04	20H02
Fires in to synchronization	2,13	HOURS
Synchronization to < Emission limit	3,15	HOURS

Unit	4	
Fires in	2022/06/07	17H57
Synchronization with Grid	2022/06/07	20H05
Emissions below limit	2022/06/07	23H28
Fires in to synchronization	2,13	HOURS
Synchronization to < Emission limit	3,38	HOURS

Unit	5	
Fires in	2022/06/22	08H24
Synchronization with Grid	2022/06/22	08H47
Emissions below limit	2022/06/22	08H47
Fires in to synchronization	0,38	HOURS
Synchronization to < Emission limit	0	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	125	312	312	304	311	312
Emergency Hours declared including hours after stand down	147	334	334	326	333	334
Days over the Limit during Emergency Generation	1	0	2	0	0	0

Unit 1 exceeded the 50mg/Nm^3 limit for one day during emergency generation, on 3 June 2022. Unit 3 exceeded the 50mg/Nm^3 limit for two days during emergency generation, on 1 and 3 June 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

2.12.2 Social responsibility conducted

None

2.13 Ambient air quality monitoring

Eight exceedances of the $PM_{2.5}$ daily limit and fourteen exceedances for the PM_{10} daily limit occurred during the period under review. The SO_2 national ambient air quality hourly standard was exceeded once and three exceedances of the SO_2 national ambient air quality 10-minute limit were recorded.

The average data recovery for the period was 99.4% and the station availability was 99.7%.

Ambient NO2, PM2.5 and PM10 concentrations at Marapong monitoring site show influence of emissions from low level sources in the area and ambient SO2 concentrations are contributed to by emissions from high level sources.

Detailed results can be found in Attachment 1, “Marapong Monthly Report_June 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 methods 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

Marapong Monthly Report_June 2022

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