Eskom	Matimba Power Station Emissions 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 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 July 2022.

During the period under review, seven 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	1 216 009
	Fuel Oil	Tons/month	1 200	498,923
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	MW	4000	2930,61

The consumption rates for the month of July 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%	99,91%
Unit 2	Electrostatic Precipitator	100%	99,93%
Unit 3	Electrostatic Precipitator	100%	99,88%
Unit 4	Electrostatic Precipitator	100%	99,90%
Unit 5	Electrostatic Precipitator	100%	99,94%
Unit 6	Electrostatic Precipitator	100%	99,96%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	95,3%
Unit 2	SO_3 Plant	100%	97,31%
Unit 3	SO_3 Plant	100%	96,10%
Unit 4	SO_3 Plant	100%	96,24%
Unit 5	SO_3 Plant	100%	99,85%
Unit 6	SO_3 Plant	100%	98,46%

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

2.3 Energy source characteristics

Table 3: Energy Source Material Characteristics.

	Characteristic	Stipulated Range (Unit)	Monthly Average Content
Coal burned	**Sulphur Content**	1.6%	1,22%
	Ash Content	40%	35,59%

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

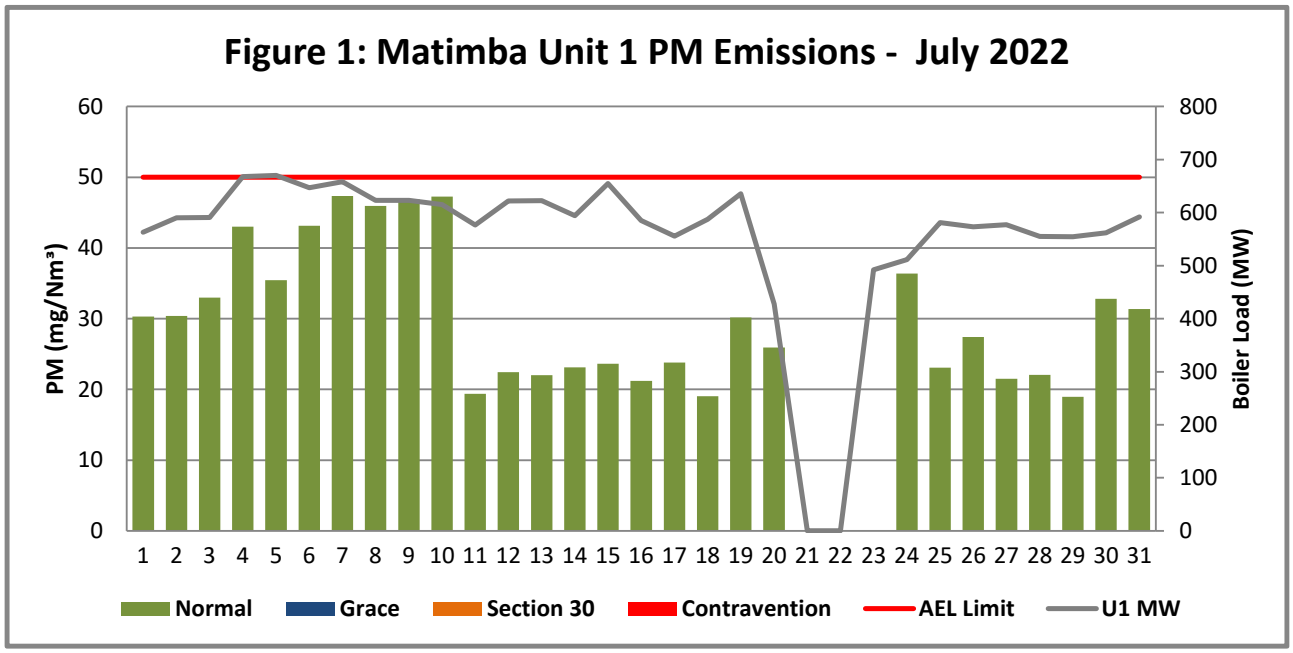

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of July 2022

Interpretation:

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

Unit 2 Particulate Emissions

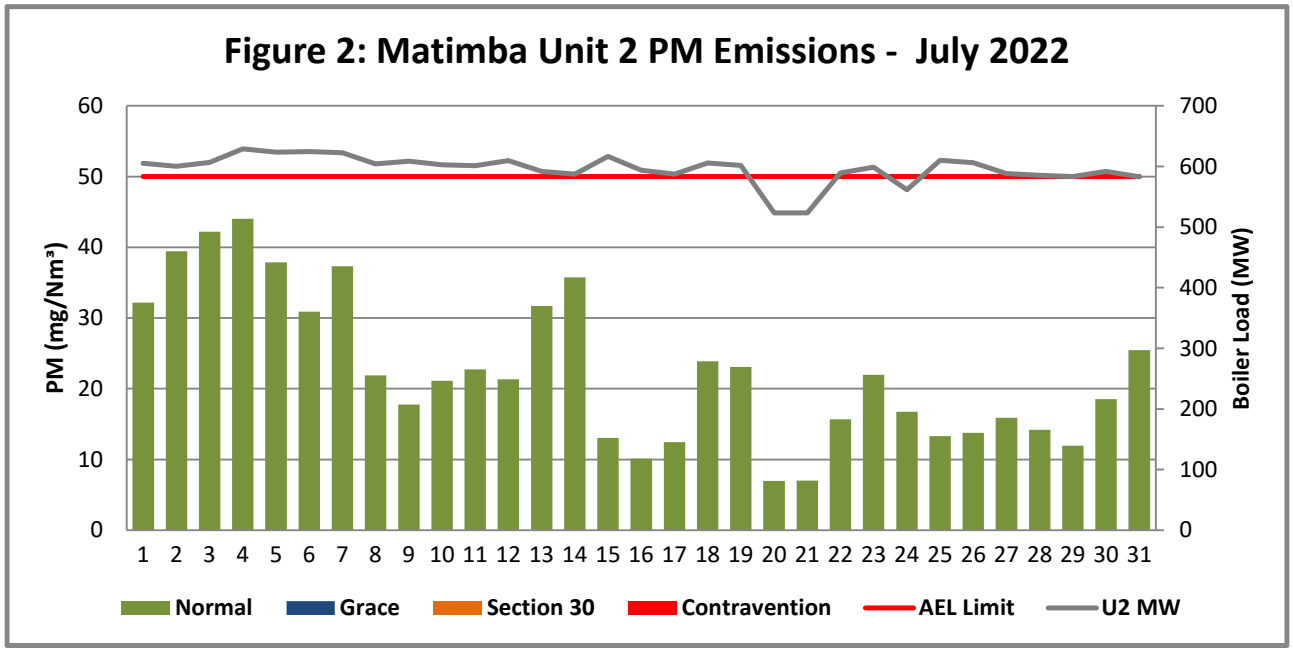

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of July 2022

Interpretation:

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

Unit 3 Particulate Emissions

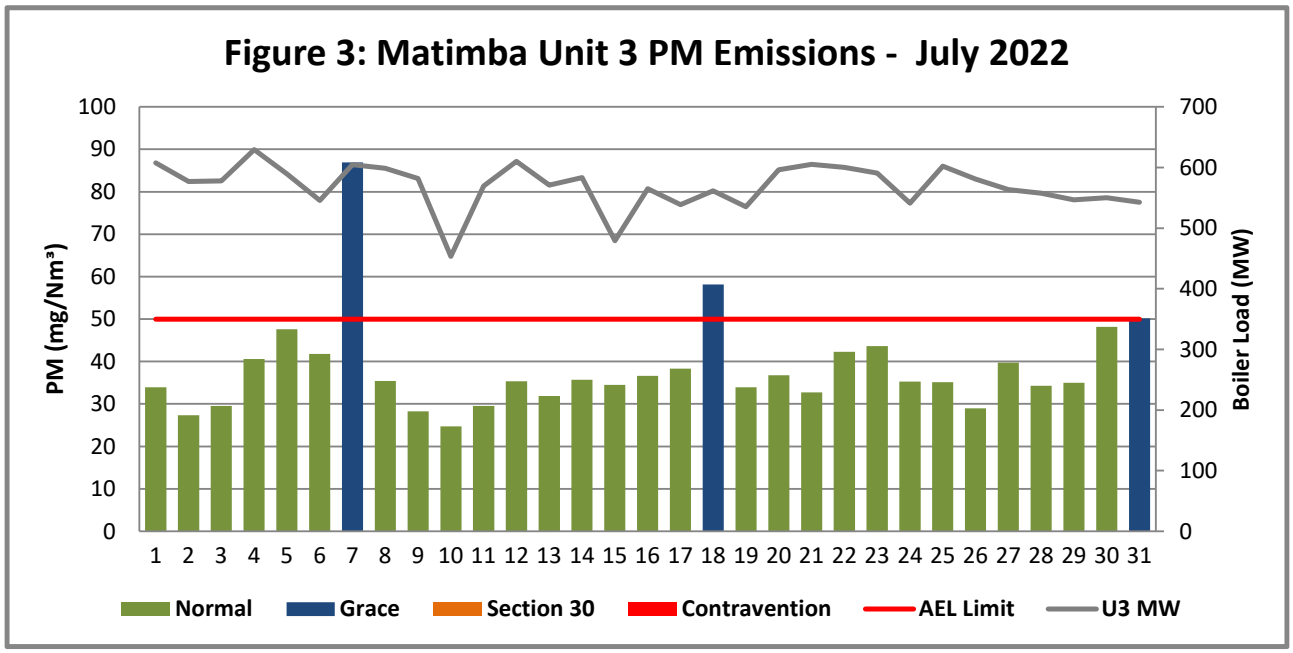

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of July 2022

Interpretation:

Unit 3 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 7 July 2022, 18 July 2022, and 31 July 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

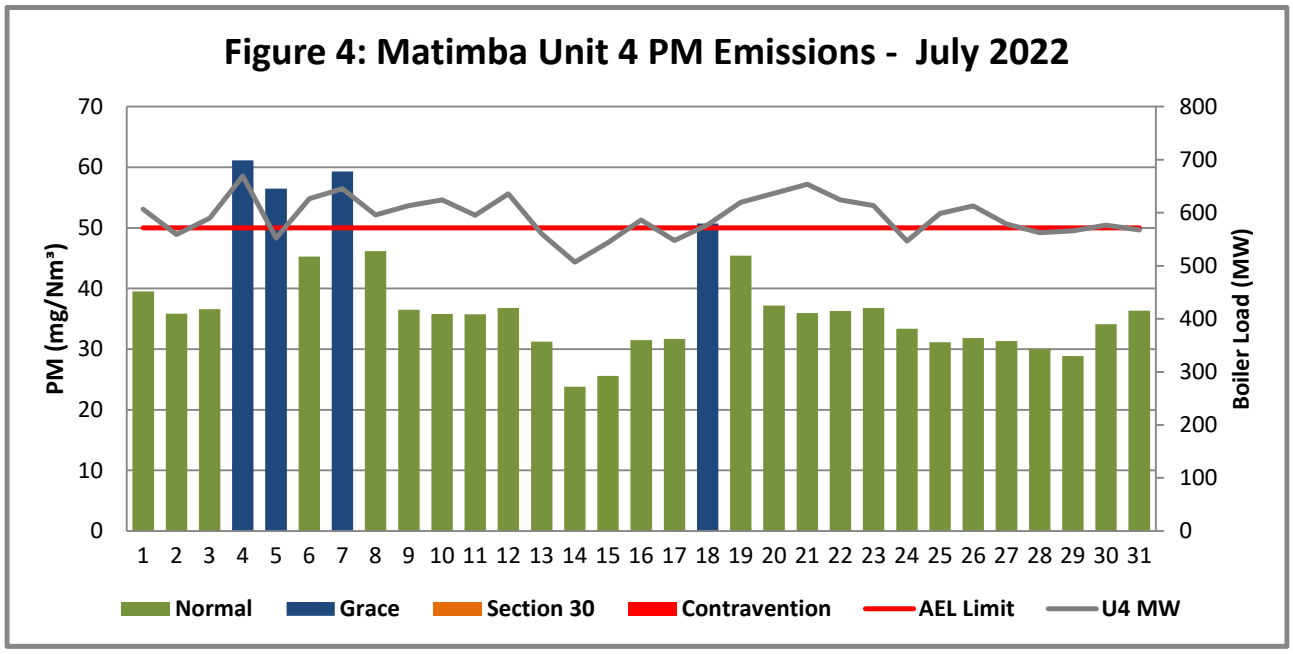

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of July 2022

Interpretation:

Unit 4 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 4 July 2022, 5 July 2022, 7 July 2022, and 18 July 2022. The exceedances on 4, 5 and 7 July 2022 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 exceedance on 18 July 2022 was due to a breakdown on the flue gas conditioning plant. The defective plants were repaired, and the exceedances remained within the 48-hour grace period.

Unit 5 Particulate Emissions

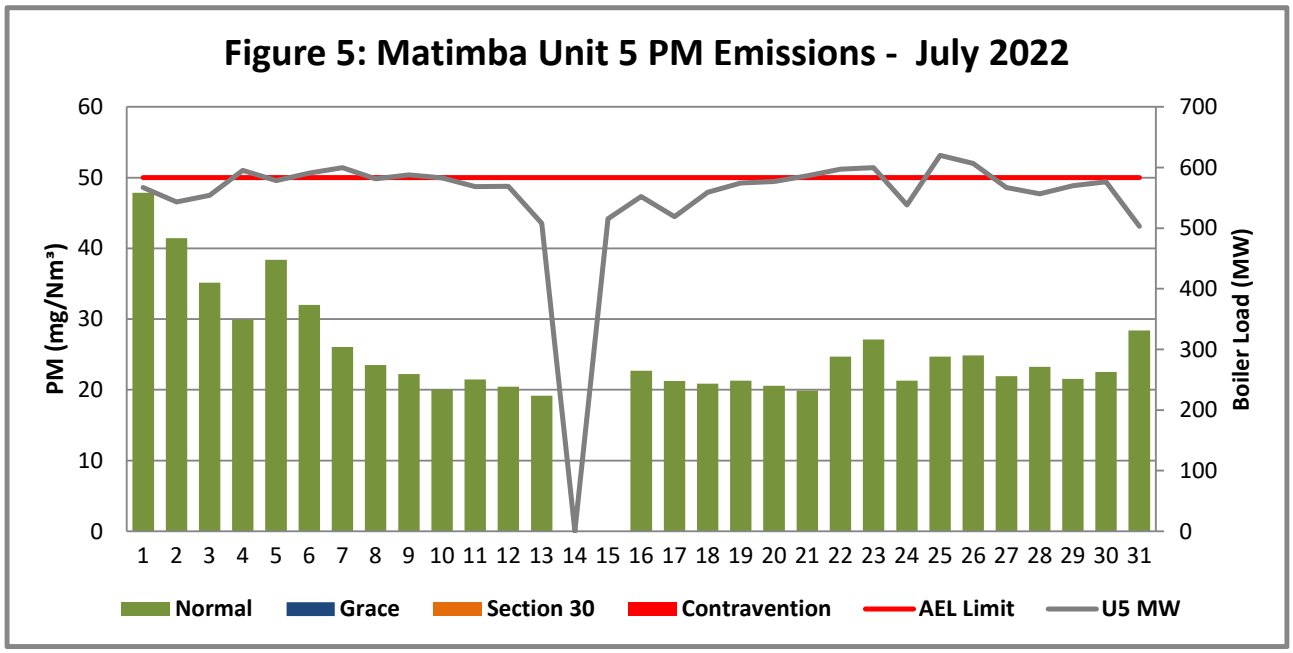

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of July 2022

Interpretation:

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

Unit 6 Particulate Emissions

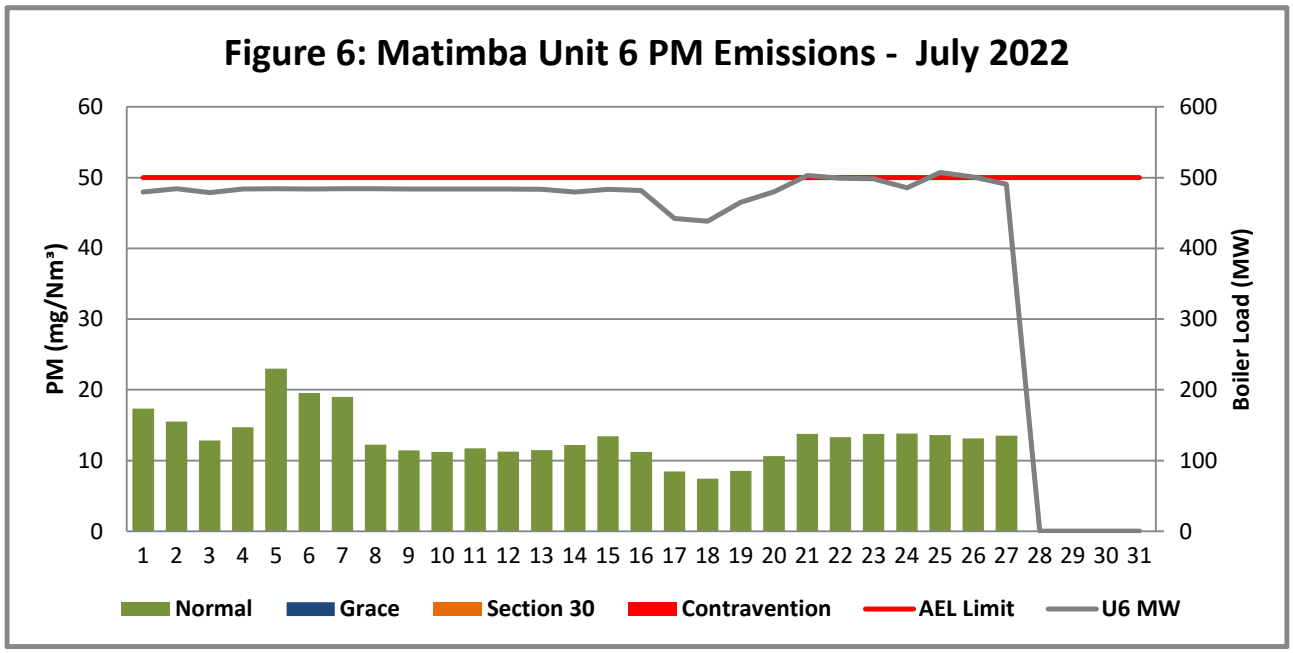

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of July 2022

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

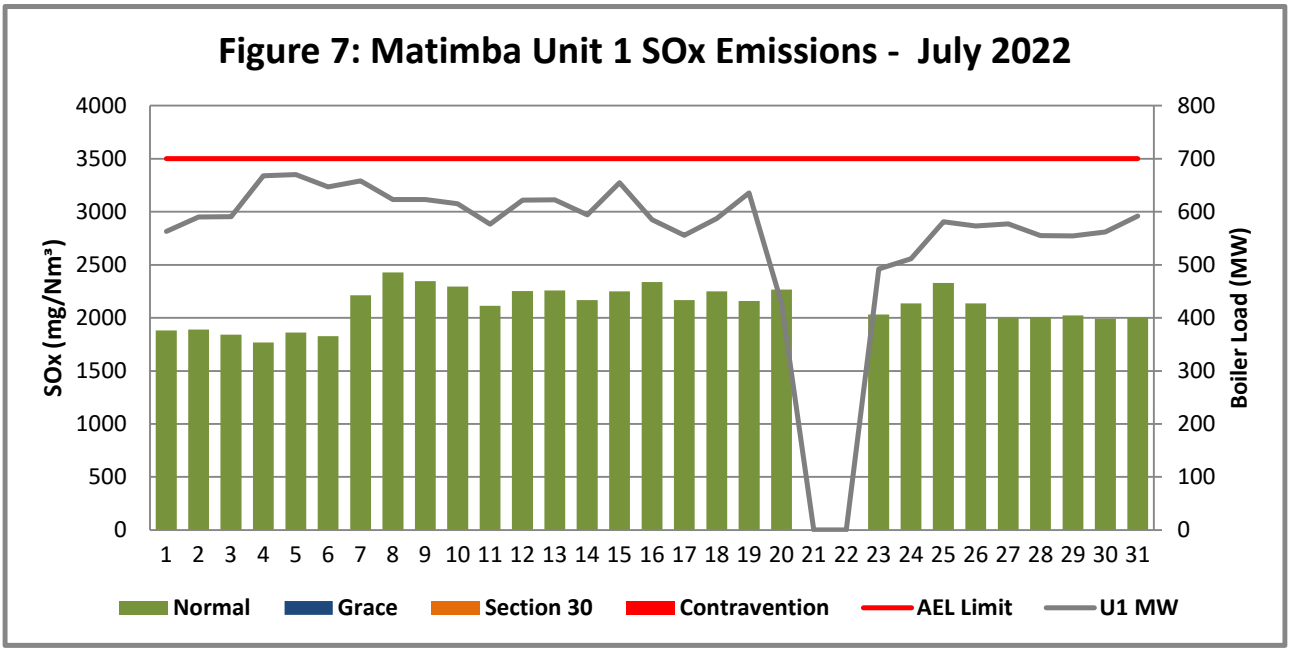

Figure 7: SO2 daily average emissions against emission limit for unit 1 for the month of July 2022

Interpretation:

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

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Unit 2 SO_2 Emissions

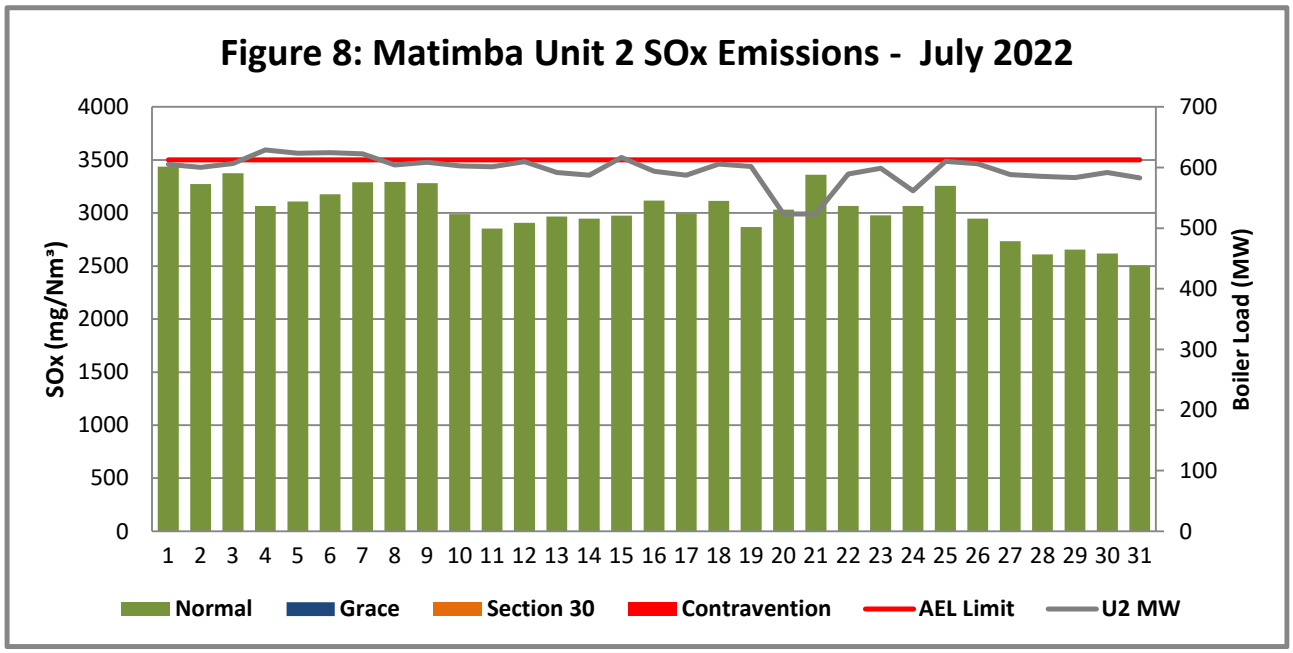

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of July 2022

Interpretation:

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

Unit 3 SO_2 Emissions

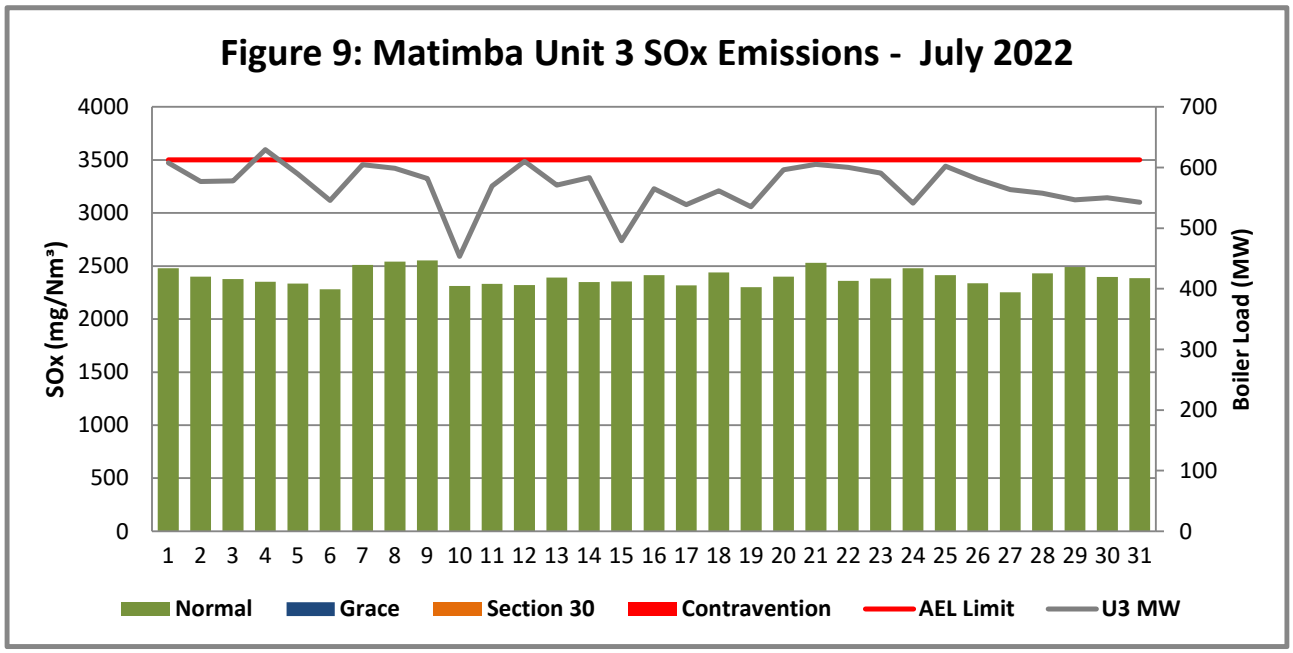

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of July 2022

Interpretation:

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

Unit 4 SO_2 Emissions

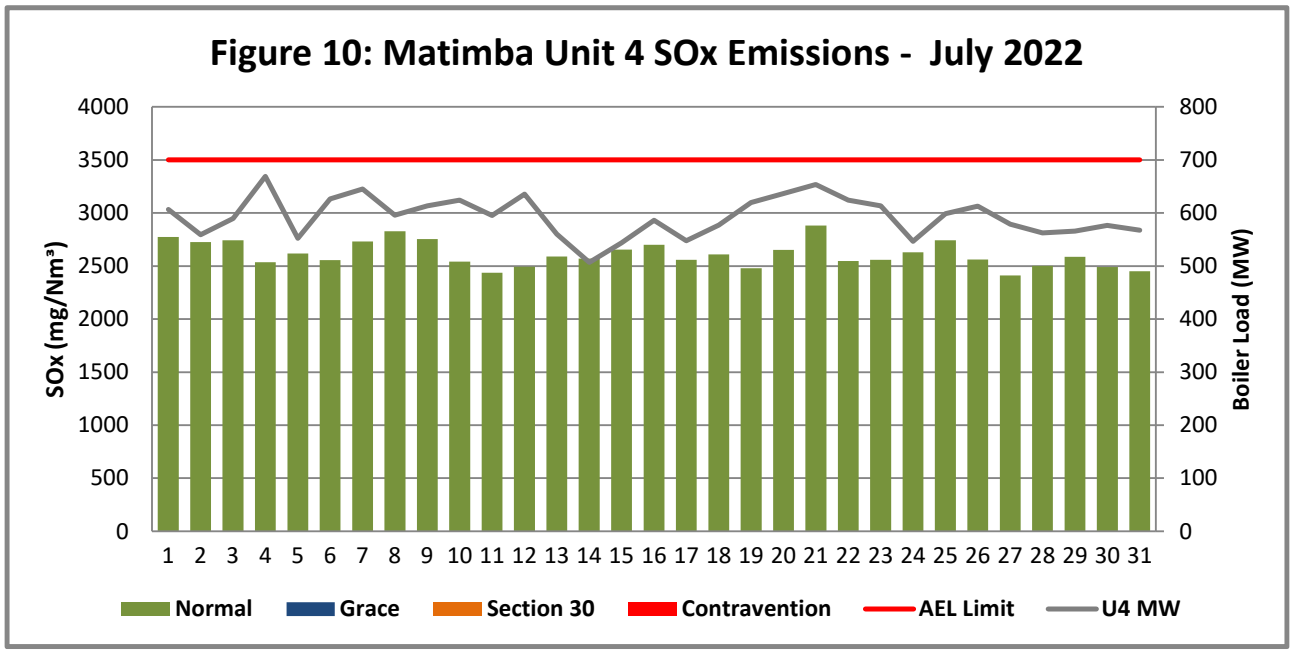

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of July 2022

Interpretation:

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

Unit 5 SO_2 Emissions

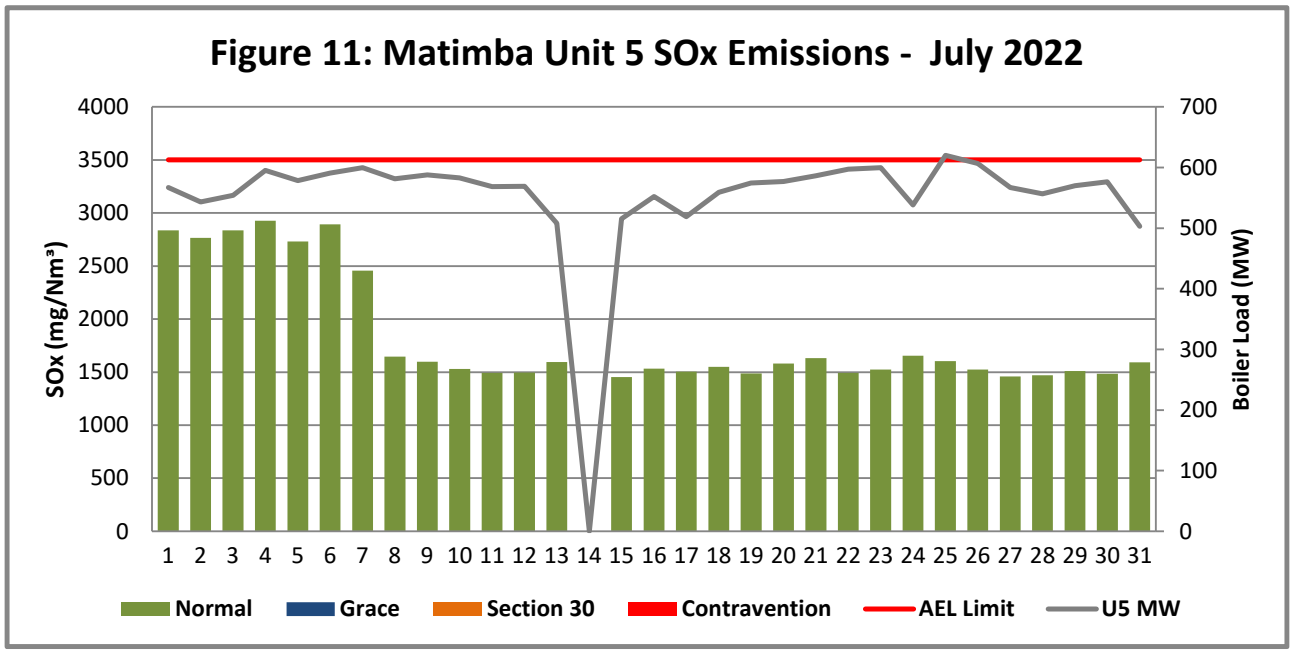

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of July 2022

Interpretation:

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

Unit 6 SO_2 Emissions

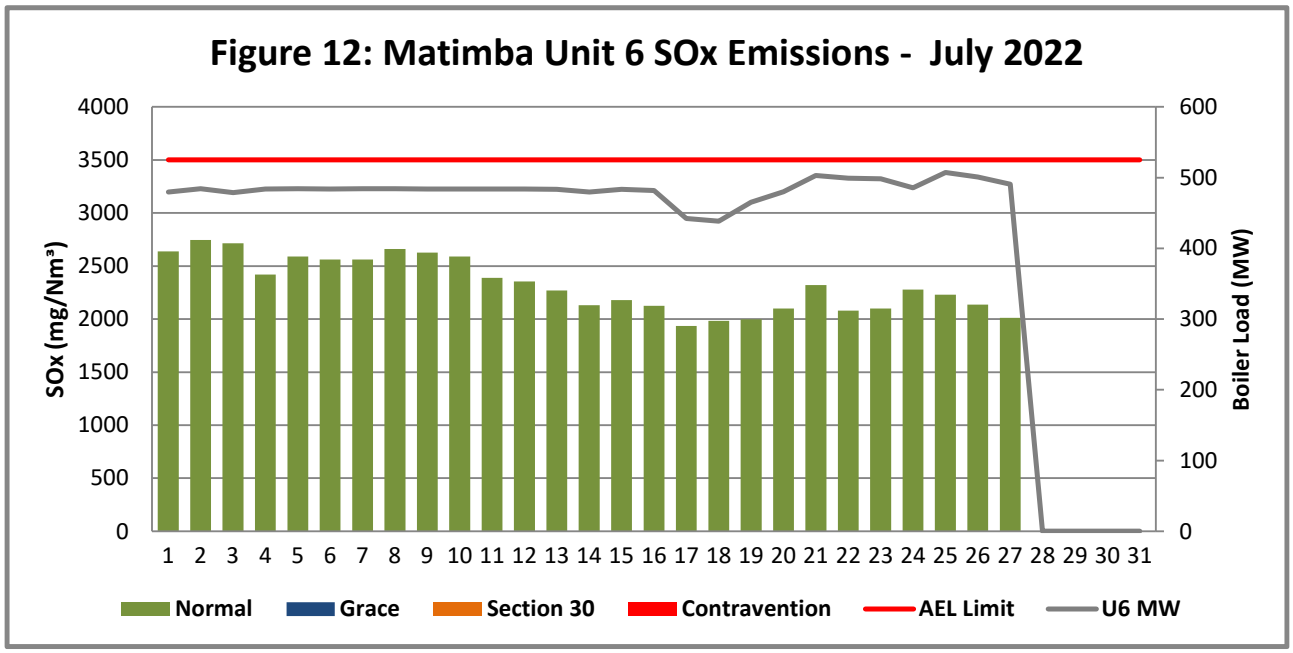

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of July 2022

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

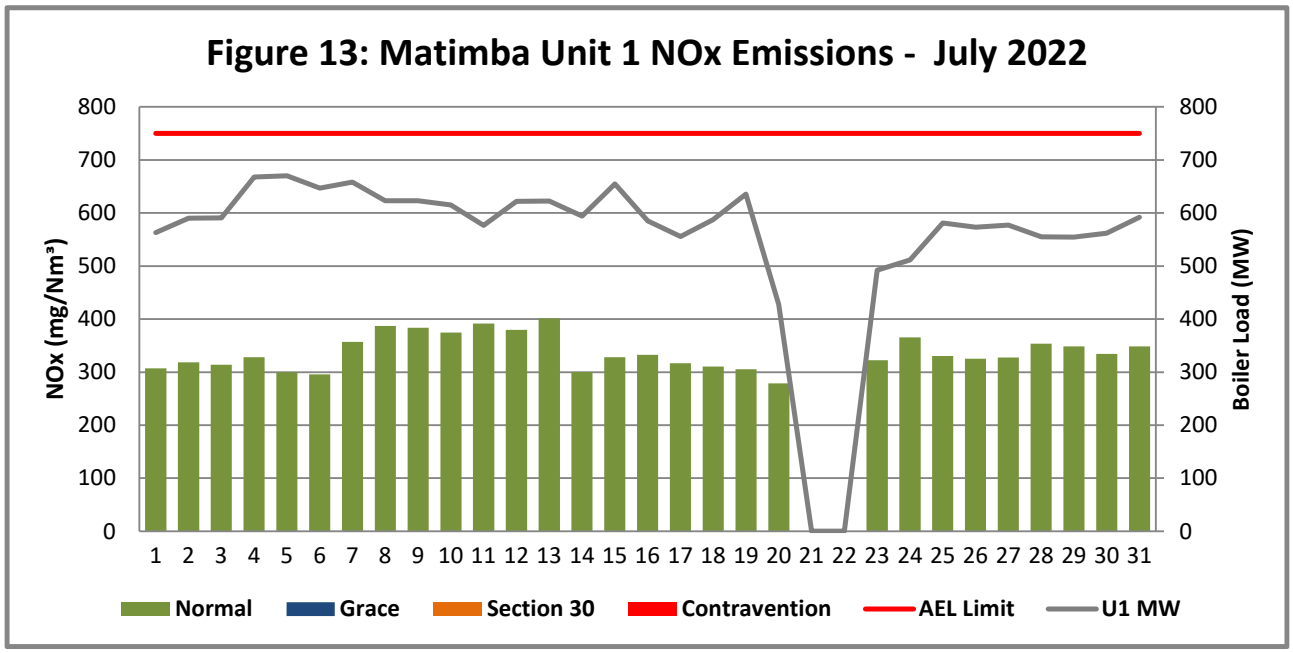

Figure 13: Figure 14: NOx daily average emissions against emission limit for unit 1 for the month of July 2022

Interpretation:

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

Unit 2 NO_x Emissions

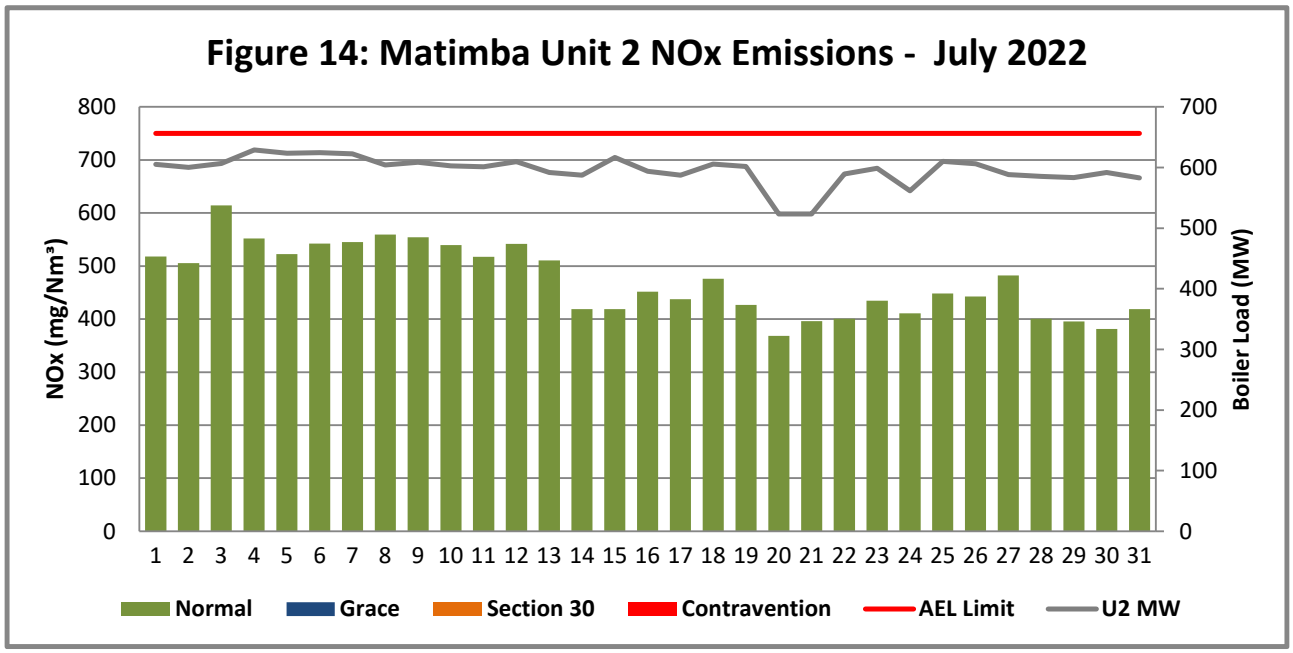

Figure 15: NOx daily average emissions against emission limit for unit 2 for the month of July 2022

Interpretation:

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

Unit 3 NO_x Emissions

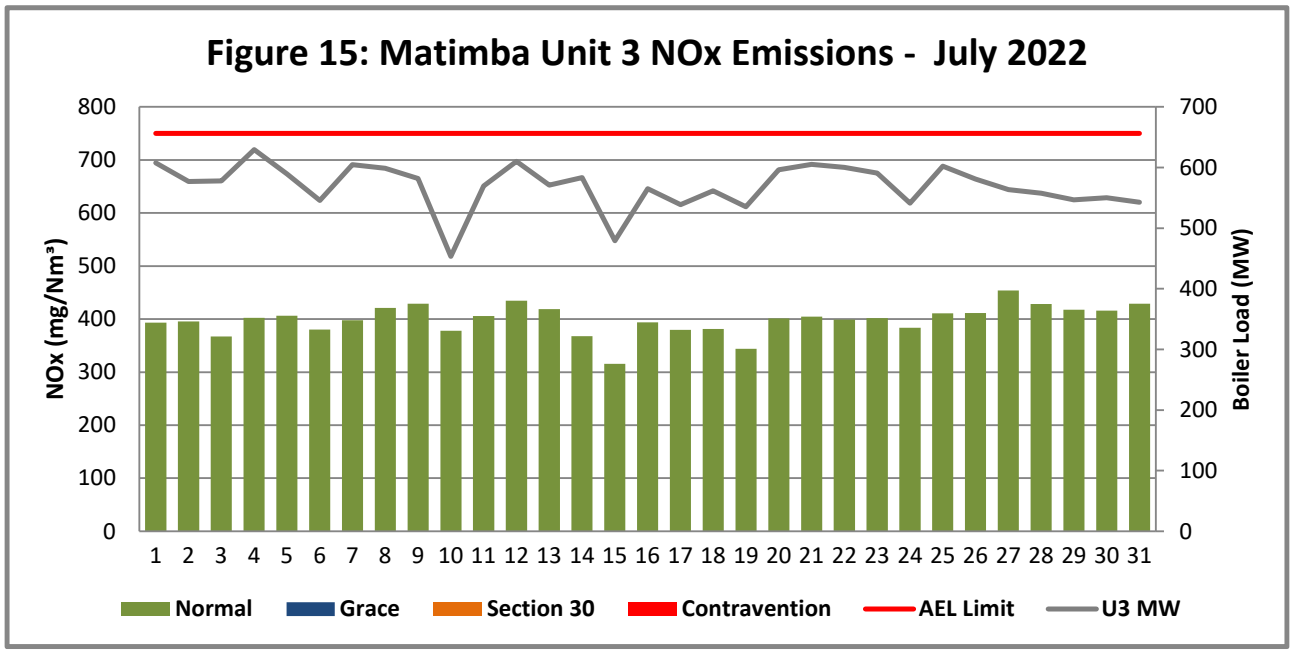

Figure 16: NOx daily average emissions against emission limit for unit 3 for the month of July 2022

Interpretation:

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

Unit 4 NO_x Emissions

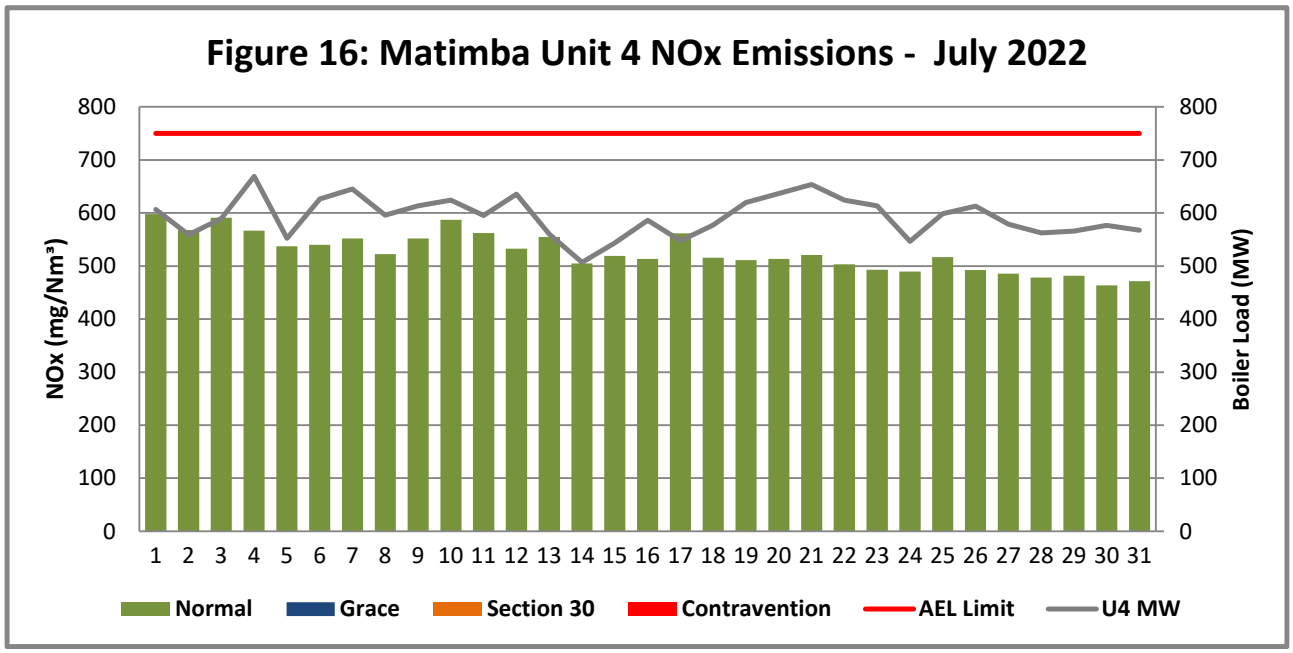

Figure 17: NOx daily average emissions against emission limit for unit 4 for the month of July 2022

Interpretation:

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

Unit 5 NO_x Emissions

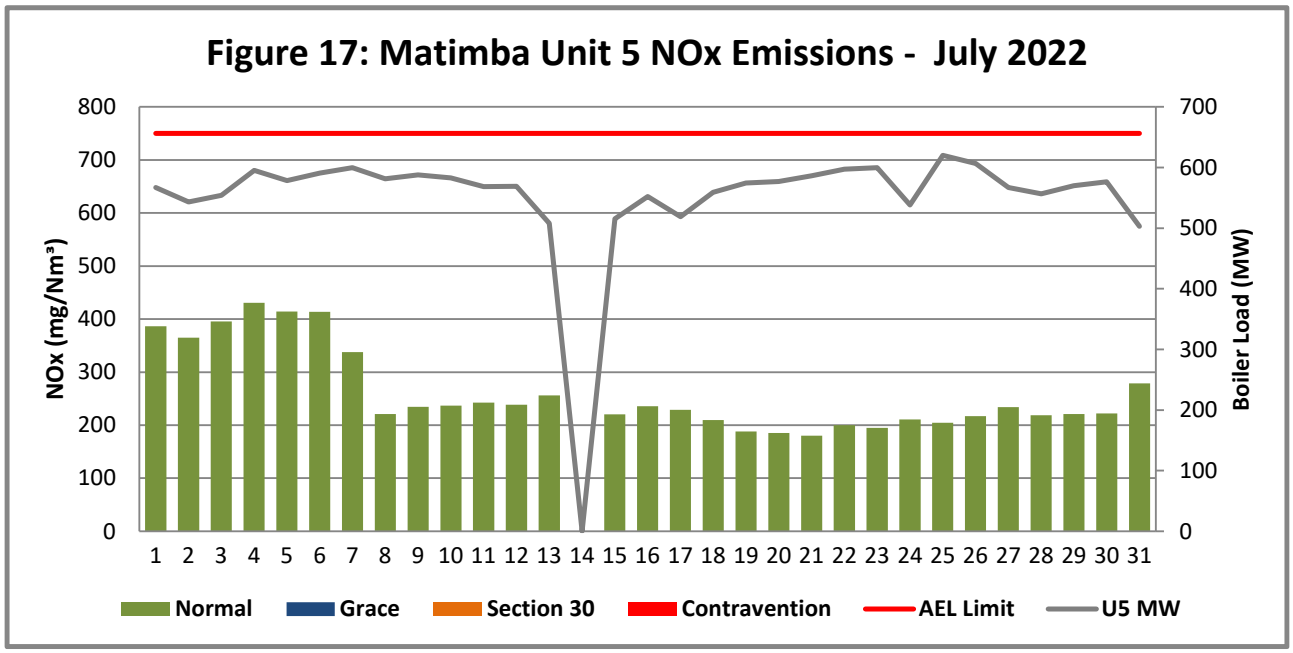

Figure 18: NOx daily average emissions against emission limit for unit 5 for the month of July 2022

Interpretation:

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

Unit 6 NO_x Emissions

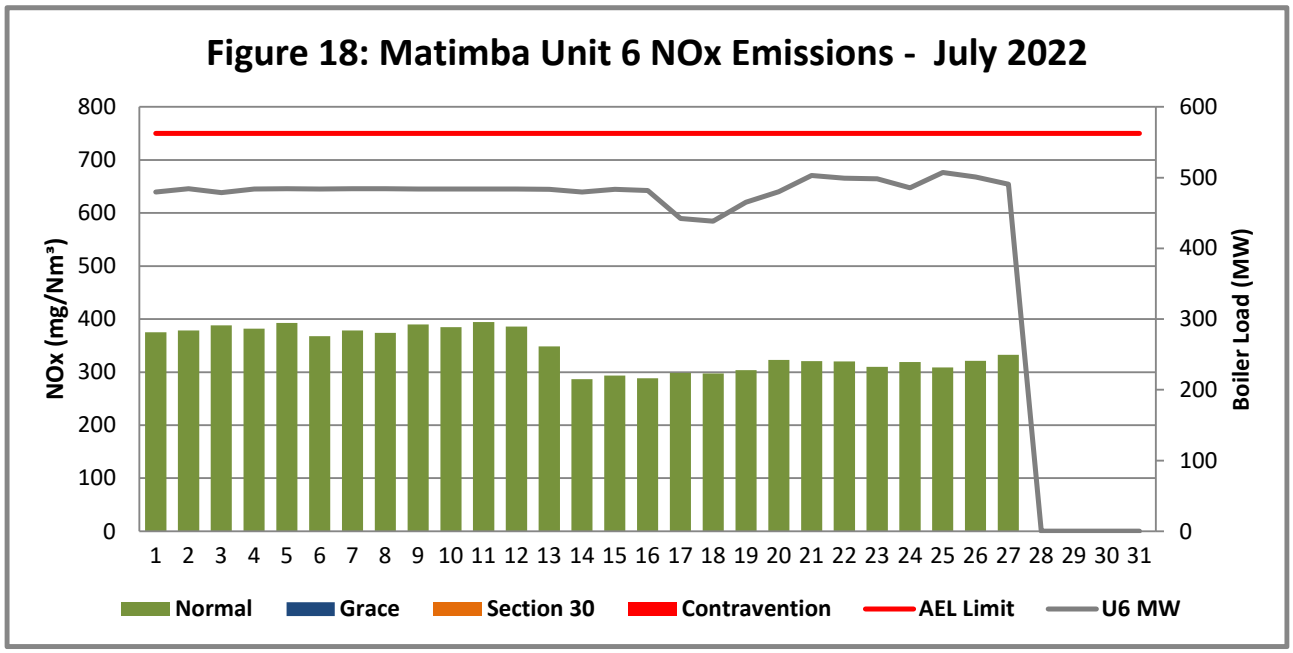

Figure 19: NOx daily average emissions against emission limit for unit 6 for the month of July 2022

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

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:	**July**		
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:		***498,923***	
Molecular weight of the fuel oil:		166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH		**Data**	**Unit**
Daily average ambient temperature		17,66	°C
Daily maximum ambient temperature		25,87	°C
Daily minimum ambient temperature		10,47	°C
Daily ambient temperature range		15,40	°C
Daily total insolation factor		3,47	kWh/m²/day
Tank paint colour		***Grey/medium***	NA
Tank paint solar absorbtance		0,68	NA
FINAL OUTPUT:		**Result**	**Unit**
Breathing losses:		0,53	kg/month
Working losses:		0,01	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 July 2022

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2022/07/01	13519	14307	14451	14495	13459	11379
2022/07/02	14163	14191	13821	13366	12945	11493
2022/07/03	14084	14321	13744	14023	13157	11357
2022/07/04	16016	14880	15031	16025	14200	11482
2022/07/05	16029	14733	14095	13220	13712	11488
2022/07/06	15498	14759	13042	14897	14056	11488
2022/07/07	15780	14730	14463	15429	14277	11500
2022/07/08	14963	14284	14304	14290	13828	11498
2022/07/09	14890	14384	13907	14627	13963	11490
2022/07/10	14802	14247	10813	14949	13913	11484
2022/07/11	13824	14212	13542	14162	13481	11480
2022/07/12	14882	14413	14603	15217	13576	11487
2022/07/13	14951	13993	13661	13415	6201	11472
2022/07/14	14168	13867	13872	12096	0	11381
2022/07/15	15710	14586	11459	12963	6061	11482
2022/07/16	14050	14103	13540	14028	13146	11461
2022/07/17	13337	13925	12861	13111	12378	10551
2022/07/18	14036	14330	13407	13801	13263	10447
2022/07/19	15270	14254	12779	14802	13698	11076
2022/07/20	1865	12370	14206	15156	13694	11432
2022/07/21	0	12385	14478	15670	13965	11997
2022/07/22	0	13913	14275	14858	14147	11867
2022/07/23	4425	14164	14170	14717	14322	11851
2022/07/24	12255	13273	12914	13059	12807	11536
2022/07/25	13919	14469	14377	14309	14727	12037
2022/07/26	13729	14390	13871	14643	14442	11904
2022/07/27	13826	13908	13432	13829	13482	11524
2022/07/28	13305	13845	13343	13439	13240	0
2022/07/29	13325	13846	13053	13522	13560	0
2022/07/30	13394	14032	13132	13732	13666	0
2022/07/31	14180	13790	12927	13564	6017	0

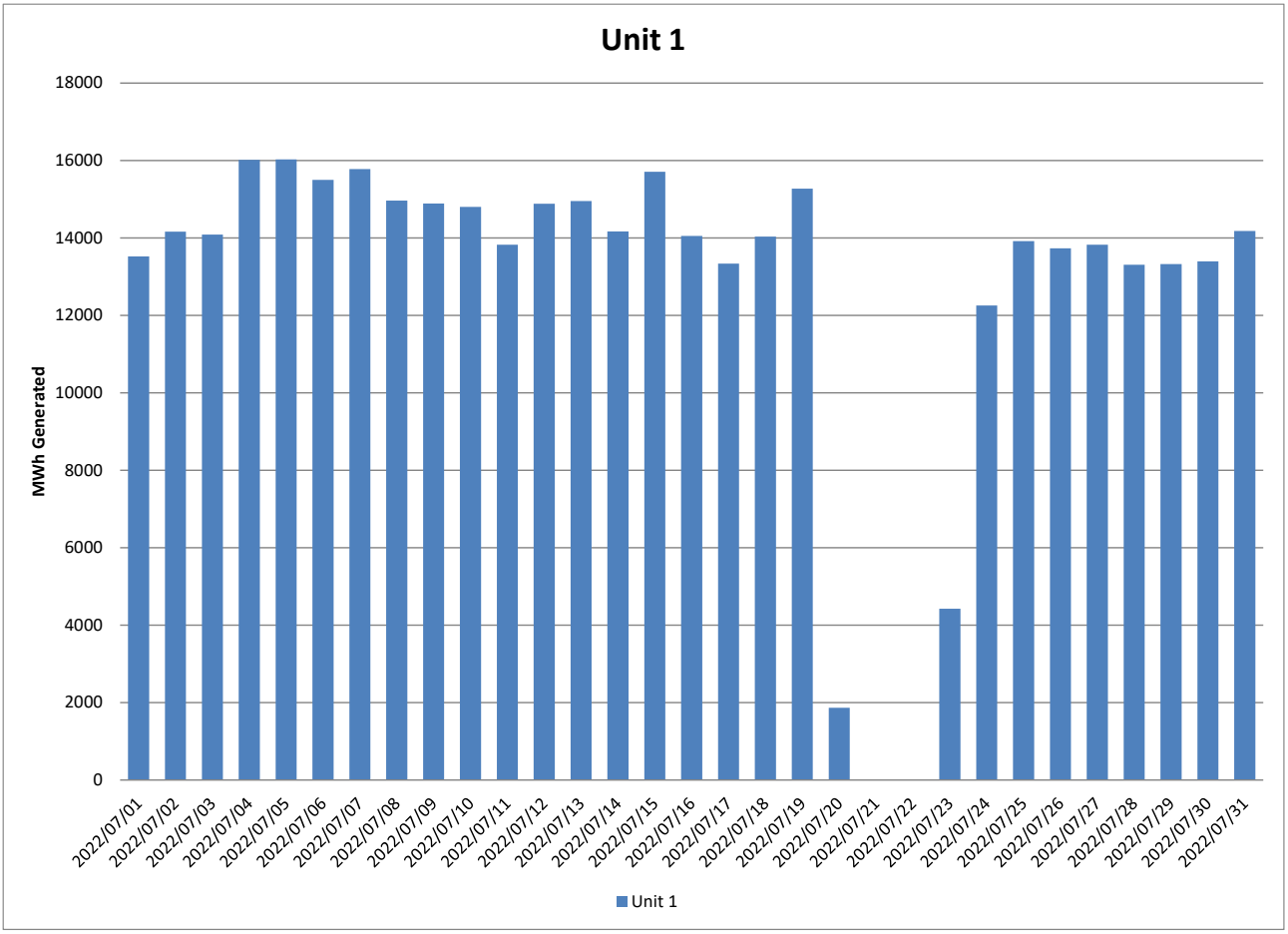

Figure 20: Unit 1 daily generated power in MWh for the month of July 2022

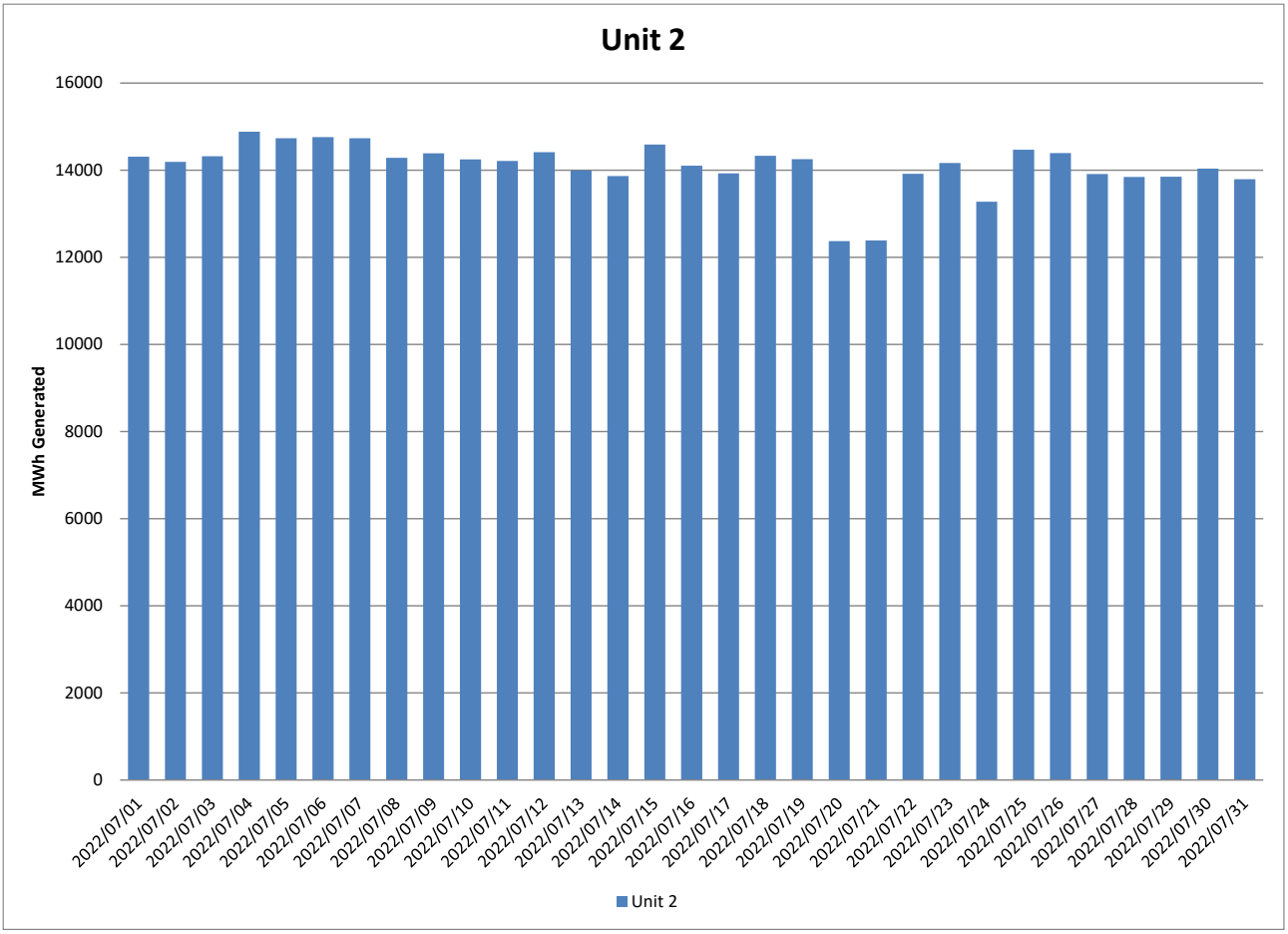

Figure 21: Unit 2 daily generated power in MWh for the month of July 2022

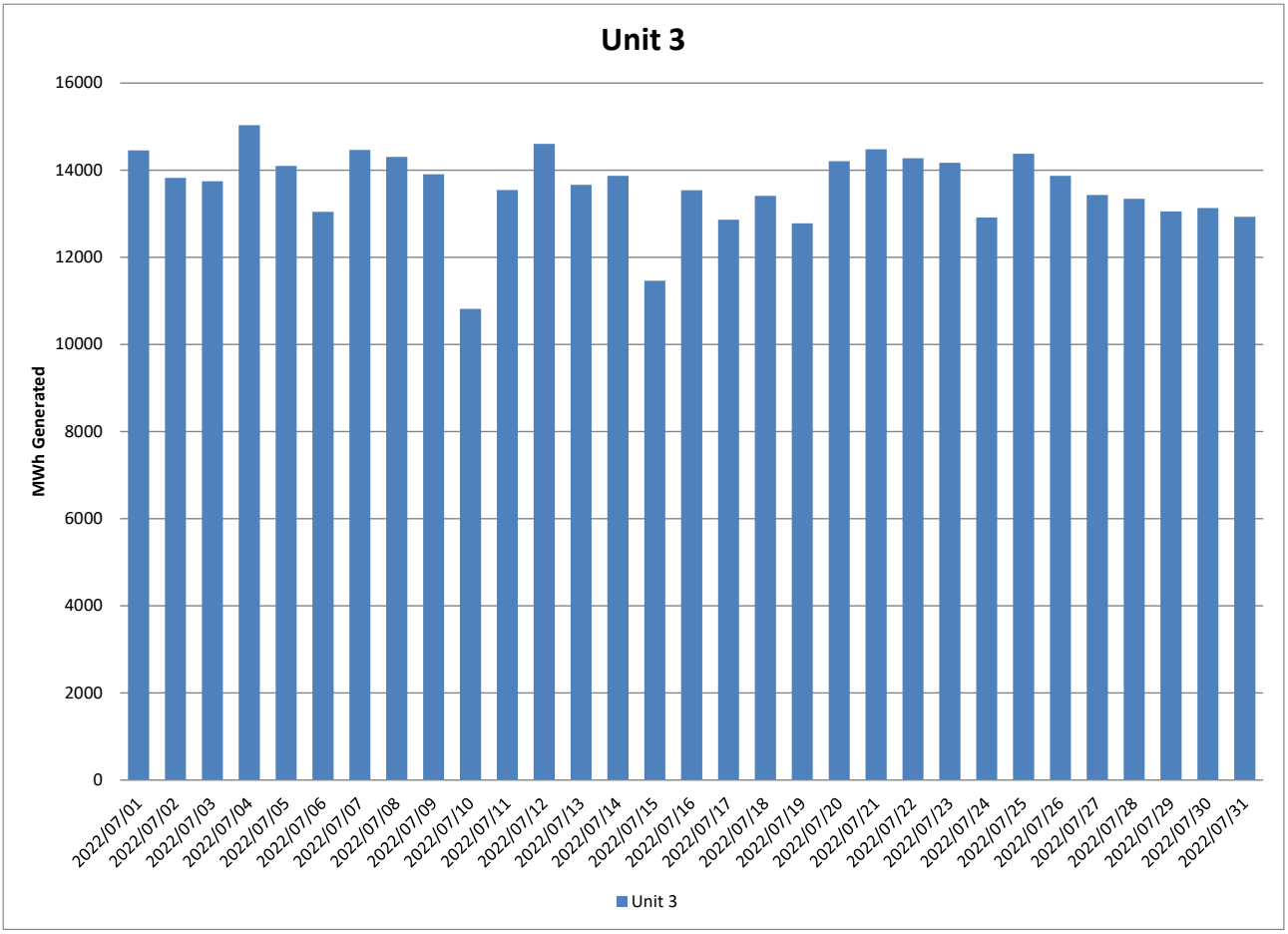

Figure 22: Unit 3 daily generated power in MWh for the month of July 2022

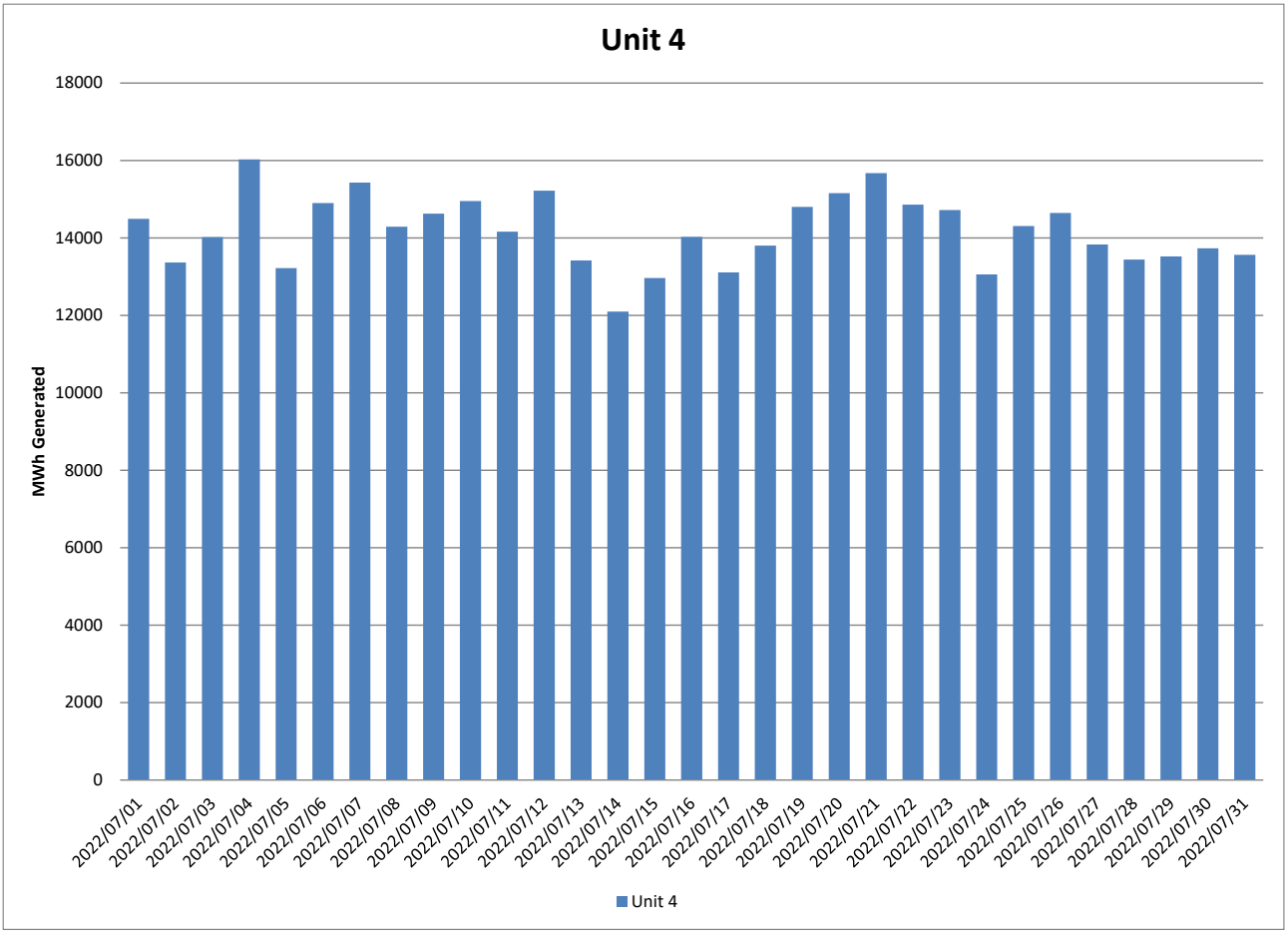

Figure 23: Unit 4 daily generated power in MWh for the month of July 2022

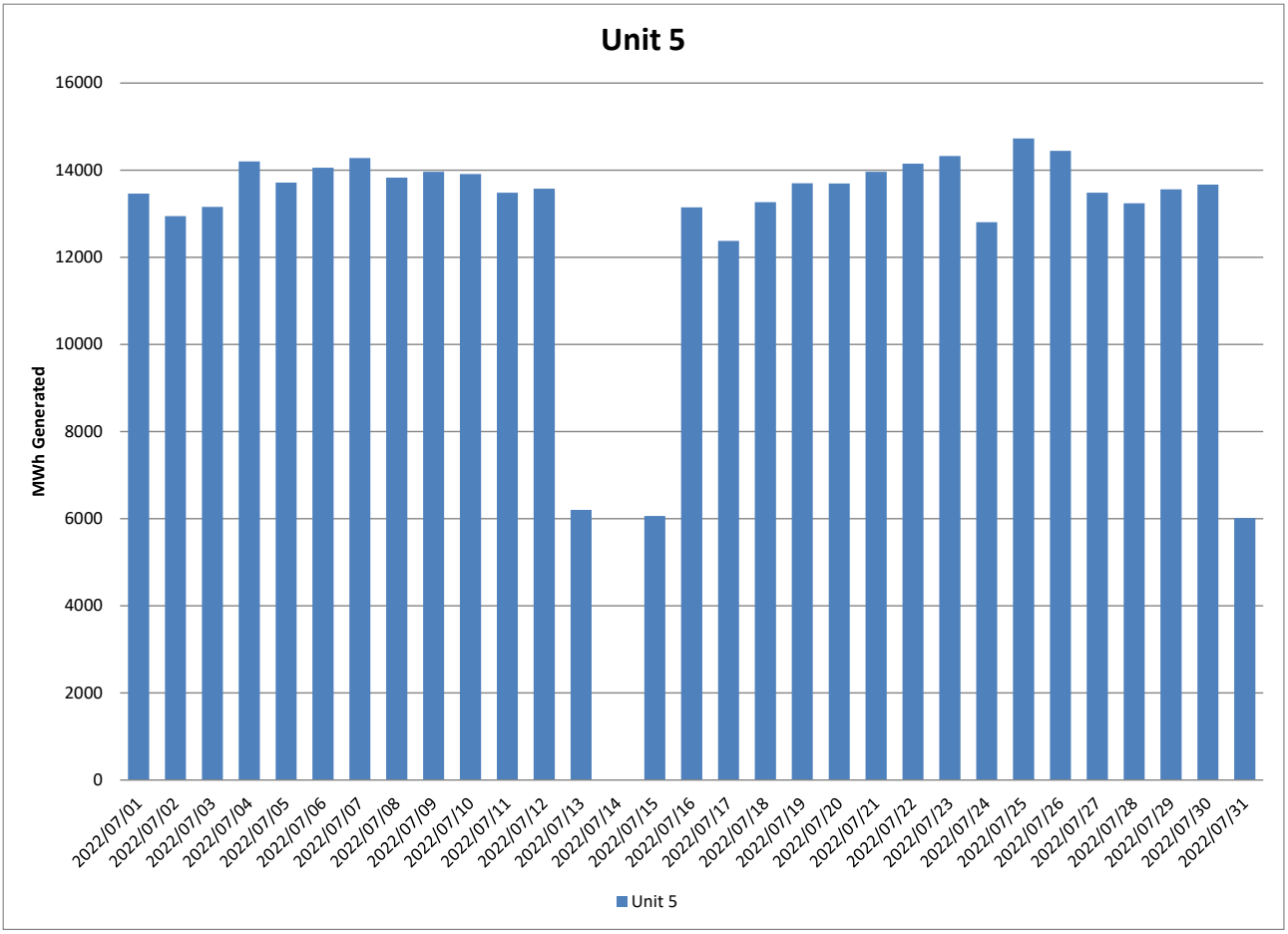

Figure 24: Unit 5 daily generated power in MWh for the month of July 2022

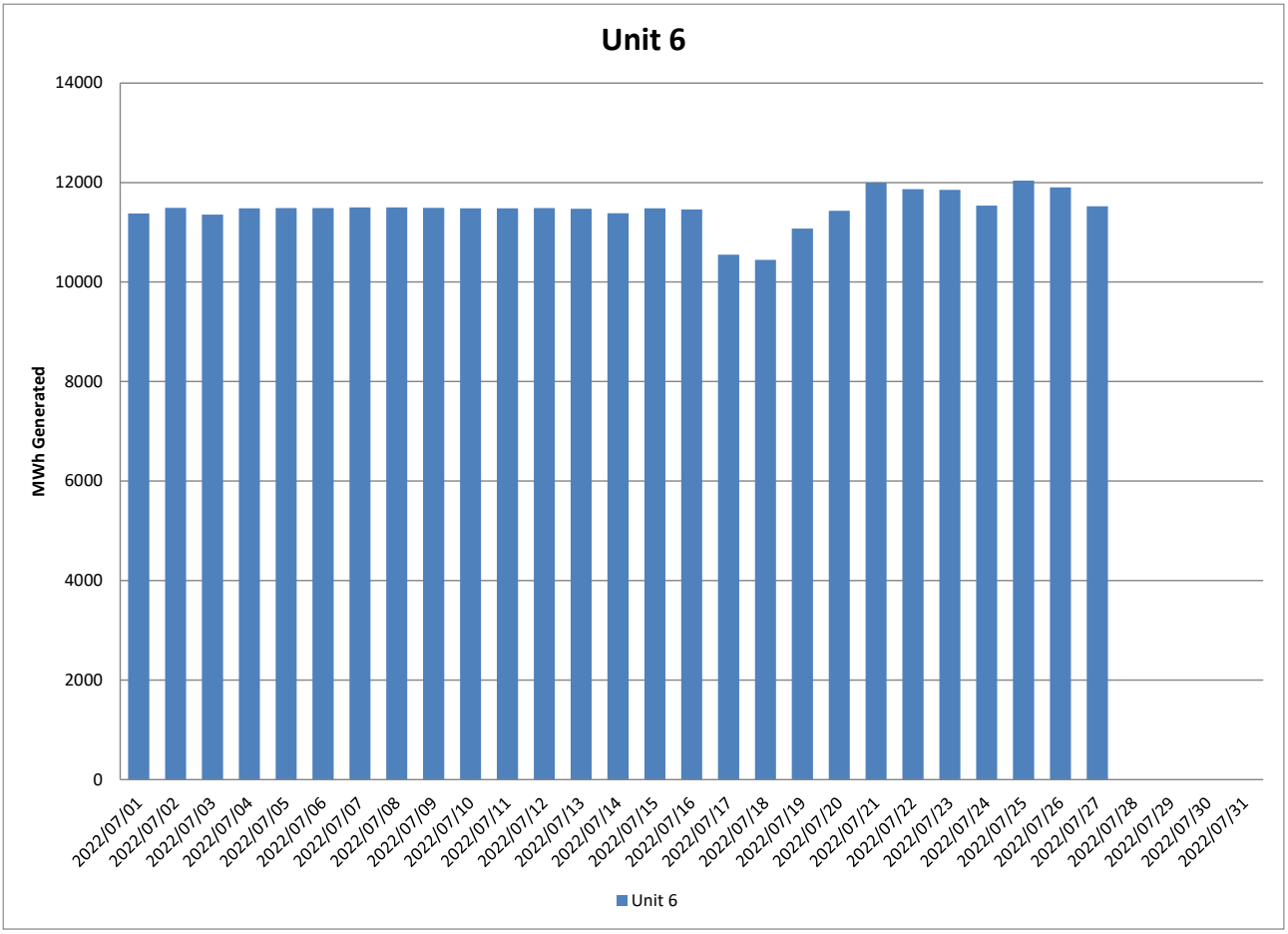

Figure 25: Unit 6 daily generated power in MWh for the month of July 2022

2.6 Pollutant Tonnages

The emitted pollutant tonnages for July 2022 are provided in table 6. CO_2 values for units 3, 4 and 5 were calculated per balance, using O_2 values, due to analyser providing unreliable data. Averaged quality assurance level 2 test values for CO_2 were used for Unit 1 between 14 and 31 July 2022 and Unit 2 between 28 and 31 July 2022. Averaged values were used for O_2 data for Unit 5 from 1 to 7 July 2022 and Unit 6 from 1 to 31 July 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 July 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	59,4	4 357,2	701,9
Unit 2	47,4	9 169,2	1 430,8
Unit 3	80,5	5 910,1	986,1
Unit 4	70,1	5 328,3	1 073,9
Unit 5	41,9	4 044,9	572,8
Unit 6	19,9	4 352,9	643,0
SUM	319,1	33 162,6	5 408,5

2.7 Reference values

Table 7: Reference values for data provided, July 2022

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	6,11	9,83	7,12	6,70	6,47	8,05
Moisture	%	5,07	4,37	5,20	3,67	4,63	2,76
Velocity	m/s	25,4	33,9	29,1	24,7	26,4	26,3
Temperature	^{o}C	140,1	130,4	128,2	134,3	120,3	122,7
Pressure	mBar	934,7	1 200,6	918,5	876,2	913,8	921,1

2.8 Continuous Emission Monitors

2.8.1 Reliability

CO_2 values for units 3, 4 and 5 were calculated per balance, using O_2 values, due to analyser providing unreliable data. Averaged quality assurance level 2 test values for CO_2 were used for Unit 1 between 14 and 31 July 2022 and Unit 2 between 28 and 31 July 2022. Averaged values were used for O_2 data for Unit 5 from 1 to 7 July 2022 and Unit 6 from 1 to 31 July 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 8: Average percentage (%) availability of monitors for the month of July 2022.

Associated Unit/Stack	PM	SO_2	NO
Unit 1	100,0	99,6	98,4
Unit 2	99,7	100,0	100,0
Unit 3	99,7	100,0	100,0
Unit 4	100,0	100,0	100,0
Unit 5	100,0	100,0	100,0
Unit 6	99,8	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	2022/07/23	10H49
Synchronization with Grid	2022/07/23	15H02
Emissions below limit	2022/07/23	17H00
Fires in to synchronization	4,22	HOURS
Synchronization to < Emission limit	1,97	HOURS

Unit	5	
Fires in	2022/07/15	04H50
Synchronization with Grid	2022/07/15	12H06
Emissions below limit	2022/07/15	14H50
Fires in to synchronization	7,27	HOURS
Synchronization to < Emission limit	2,73	HOURS

Unit	5	
Fires in	2022/07/31	11h46
Synchronization with Grid	2022/07/31	15h26
Emissions below limit	2022/07/31	16h18
Fires in to synchronization	3,67	HOURS
Synchronization to < Emission limit	0,87	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	91	174	174	174	159	136
Emergency Hours declared including hours after stand down	103	187	187	187	171	145
Days over the Limit during Emergency Generation	0	0	1	0	0	0

Unit 3 exceeded the 50mg/Nm^3 limit for one day during emergency generation, on 31 July 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 occurred during the period under review. The SO_2 national ambient air quality 10-minute limit was exceeded once. No other exceedances were recorded for the period under review.

The average data recovery for the period was 87,4% and the station availability was 99.9%.

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

Detailed results can be found in Attachment 1, “Marapong Monthly Report_July_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.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

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_July 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

2022/09/08

GENERAL MANAGER: MATIMBA POWER STATION