Eskom	Matimba Power Station Emissions report	Matimba Power Station

Title:	**Matimba Power Station January 2023 emissions report**	Document Identifier:	**RP/247/030**
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		Functional Area Applicability:	**Environment**
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		Total Pages:	**38**
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Compiled by	Functional Responsibility	Authorized by
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Environmental Officer	**Environmental Manager**	**General Manager**
Date: 2023-03-09	Date: 14/03/2023	Date: 2023-03-16

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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 January 2023.

During the period under review, Matimba experienced 22 exceedances of the daily particulate matter emission limit (50mg/Nm3) ,3 of these exceedances occurred outside of the 48-hour grace period and were reported as section 30 incidents. No exceedances of the monthly SOx limit (3500mg/Nm3) or the daily NOx emission limit (750mg/Nm3) occurred.

The Sulphur conditioning plant for unit 6 and unit 2 did not achieve the required 100% availability due to the defects and breakdown experienced on the plants. The SO3 plants were repaired and operating as normal.

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	1 088 708
	Fuel Oil	Tons/month	1 200	740,646
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	MW	4000	2612,008

The consumption rates for the month of January 2023 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%	99,86%
Unit 2	Electrostatic Precipitator	100%	99,89%
Unit 3	Electrostatic Precipitator	100%	99,92%
Unit 4	Electrostatic Precipitator	100%	99,90%
Unit 5	Electrostatic Precipitator	100%	99,86%
Unit 6	Electrostatic Precipitator	100%	99,88%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	100%
Unit 2	SO_3 Plant	100%	99%
Unit 3	SO_3 Plant	100%	98%
Unit 4	SO_3 Plant	100%	97%
Unit 5	SO_3 Plant	100%	95%
Unit 6	SO_3 Plant	100%	91%

Flue gas conditioning plant availability was below the required 100% for all six (05) 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%	1,34%
	Ash Content	40%	34,83%

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

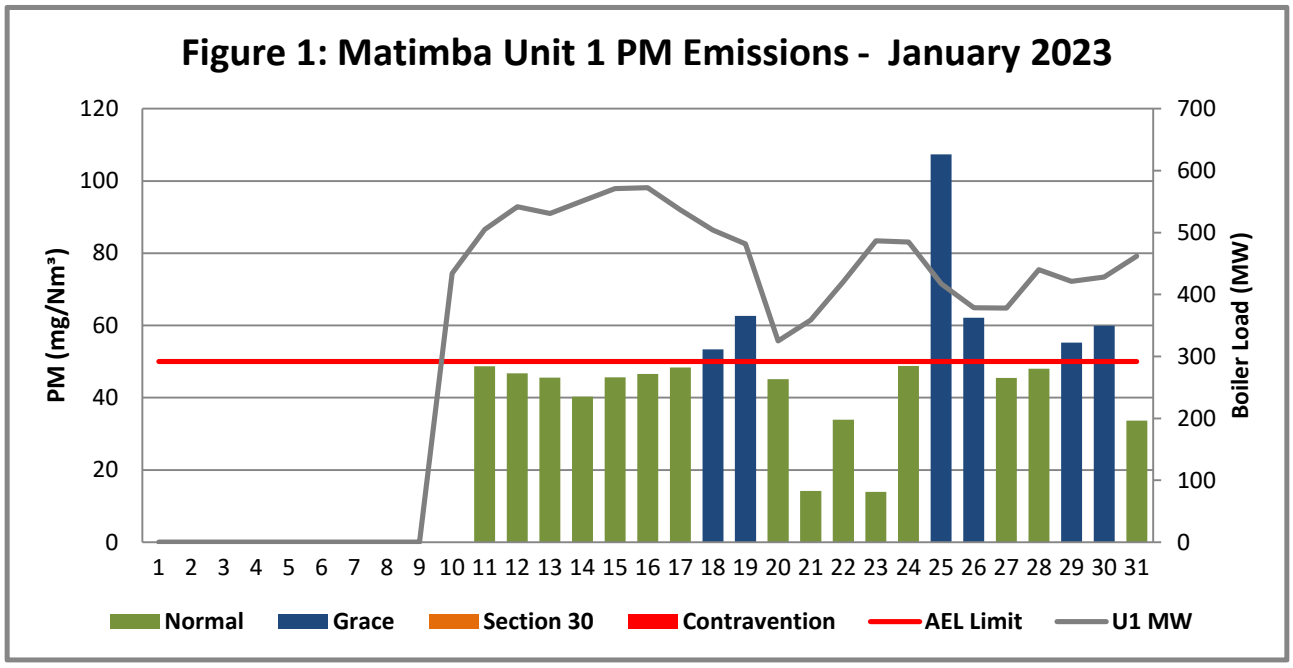

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of January 2023

Interpretation:

Unit 1 exceeded the daily particulate emission limit of 50mg/Nm3 on 18 ,19, 25, 26, 29 and 30 January 2023. 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 plant was repaired, and emissions returned to below the set limit. The exceedance remained within the 48-hour grace period.

Unit 2 Particulate Emissions

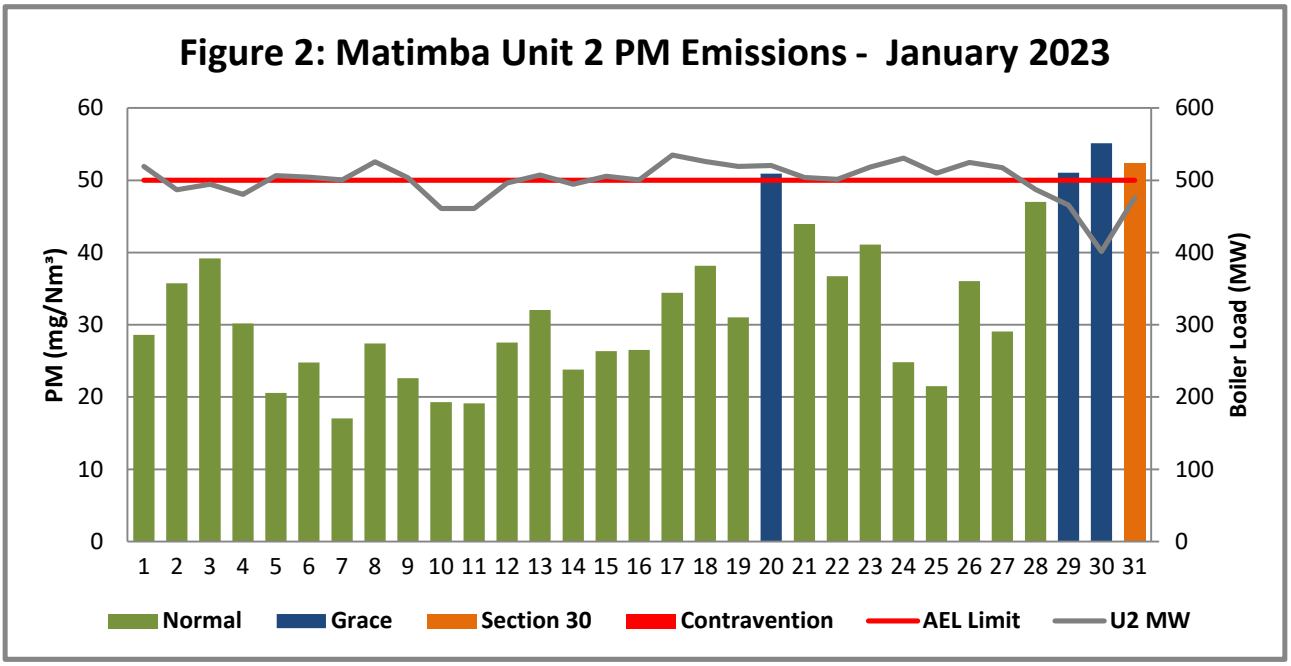

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of January 2023

Interpretation:

Unit 2 exceeded the daily particulate emission limit of 50mg/Nm3 on 20, 29, and 30 January 2023. The exceedance on 20 January 2023 was 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 exceedances on the 29,30 and 31 January 2023 were due to the unavailability of the SO_3 plant due to defects and breakdowns. The 48 hours grace period for exceedance was reached on the 31 January 2023 01:00am and the incident was reported to the authorities.

Unit 3 Particulate Emissions

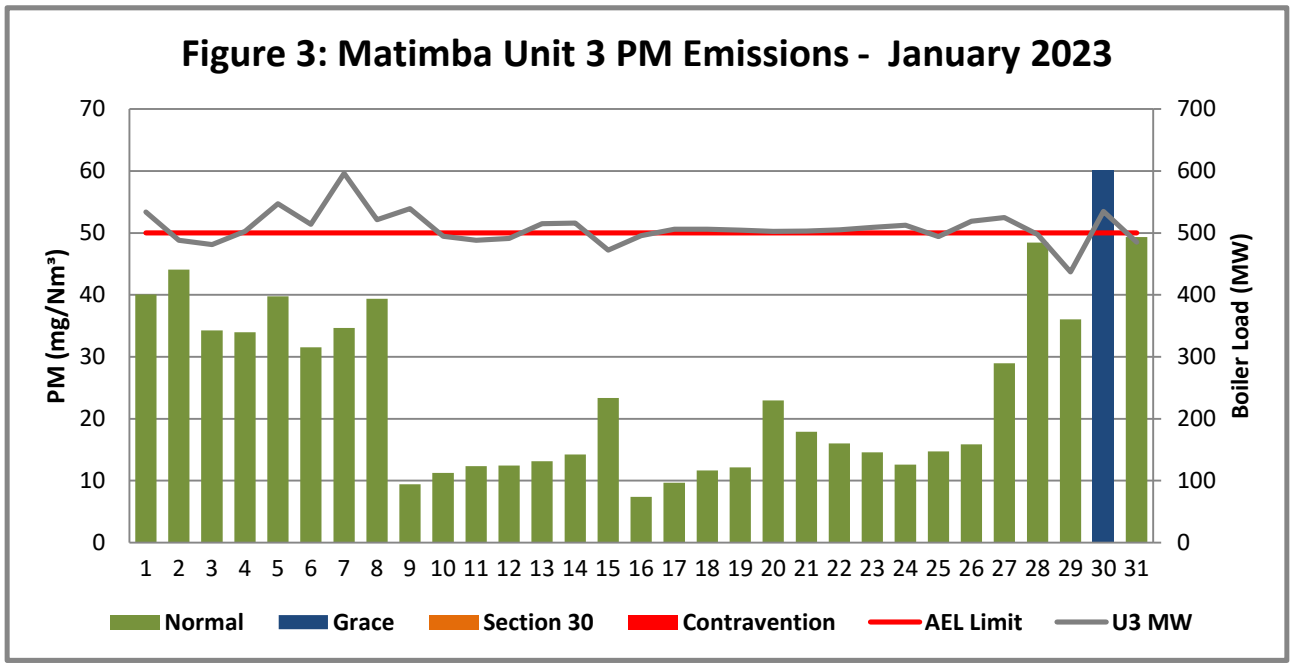

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of January 2023

Interpretation:

Unit 3 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 30 January 2023. The exceedance was 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

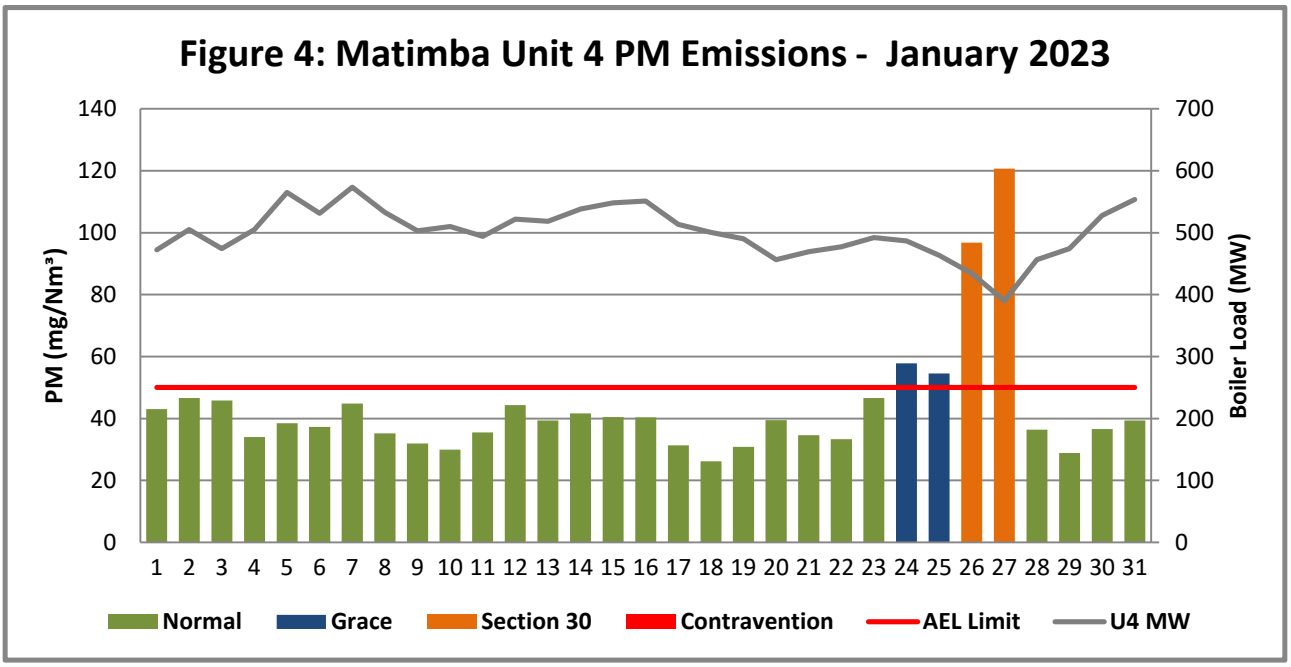

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of January 2023

Interpretation:

Unit 4 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 24,25 ,26 and 27 January 2023. The exceedances on 24 ,25, 26 & 27 January 2023 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 48 hours grace period for exceedance was reached on the 26 January 2023 01:00am and the incident was reported to the authorities.

Unit 5 Particulate Emissions

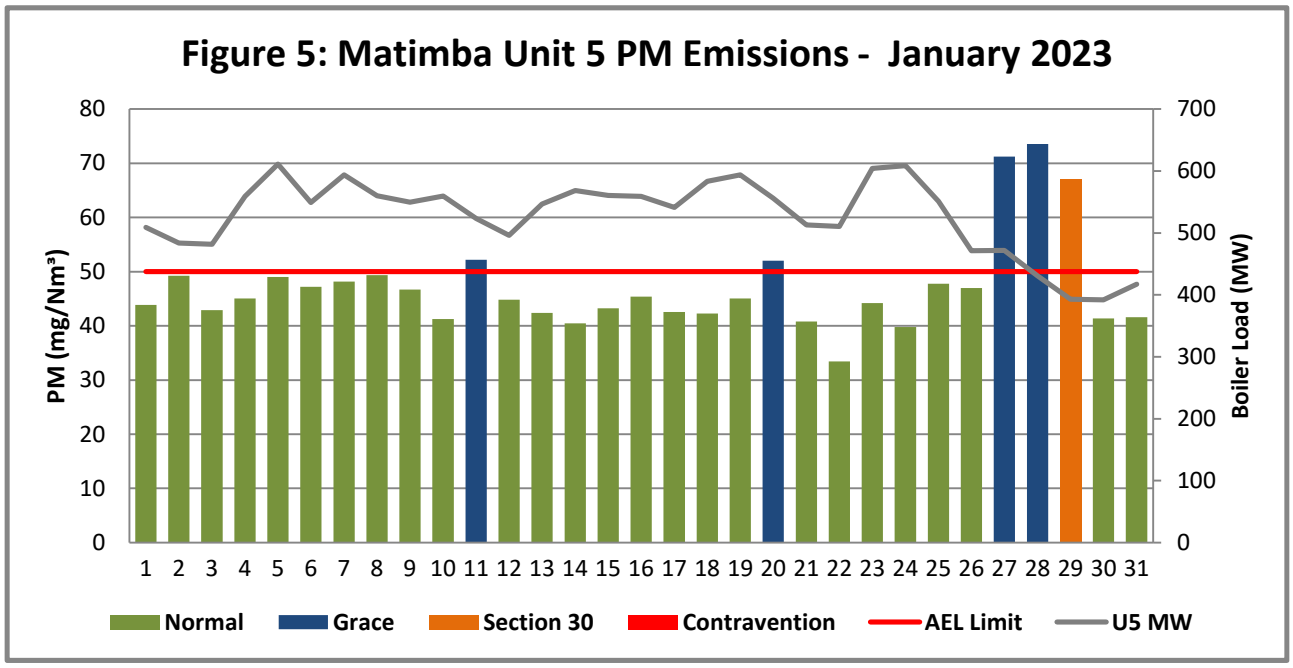

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of January 2023

Interpretation:

Unit 5 Particulate matter exceeded the daily limit of 50 mg/Nm3 on 11, 20 ,27,28, and 29 January 2023. The exceedances on 11, 20 ,27,28 and 29 January 2023 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 48 hours grace period for exceedance was reached on the 29 January 2023 01:00am and the incident was reported to the authorities.

Unit 6 Particulate Emissions

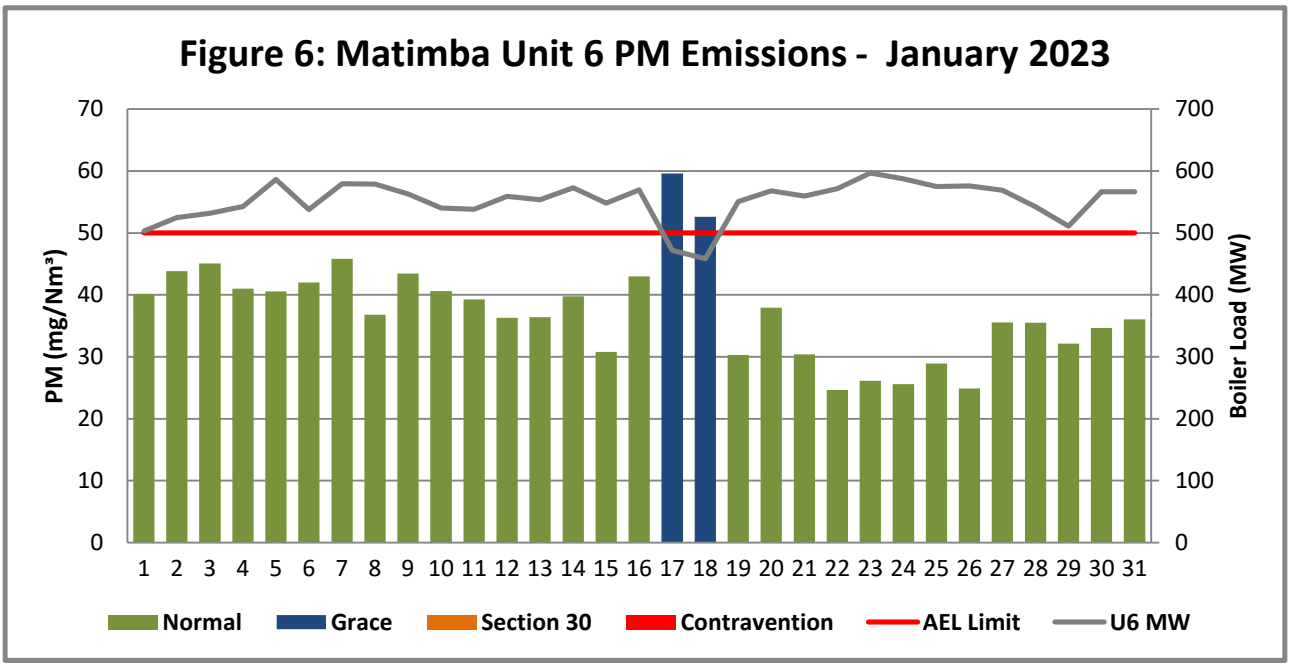

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of January 2023

Interpretation:

Unit 6 Particulate matter exceeded the daily limit of 50 mg/Nm3 on 17 and 18 January 2023. The exceedances were due to the unavailability of the SO3 plant due to defects and breakdowns. The defective plants were repaired and returned back in-service. The exceedances remained within the 48-hour grace period.

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

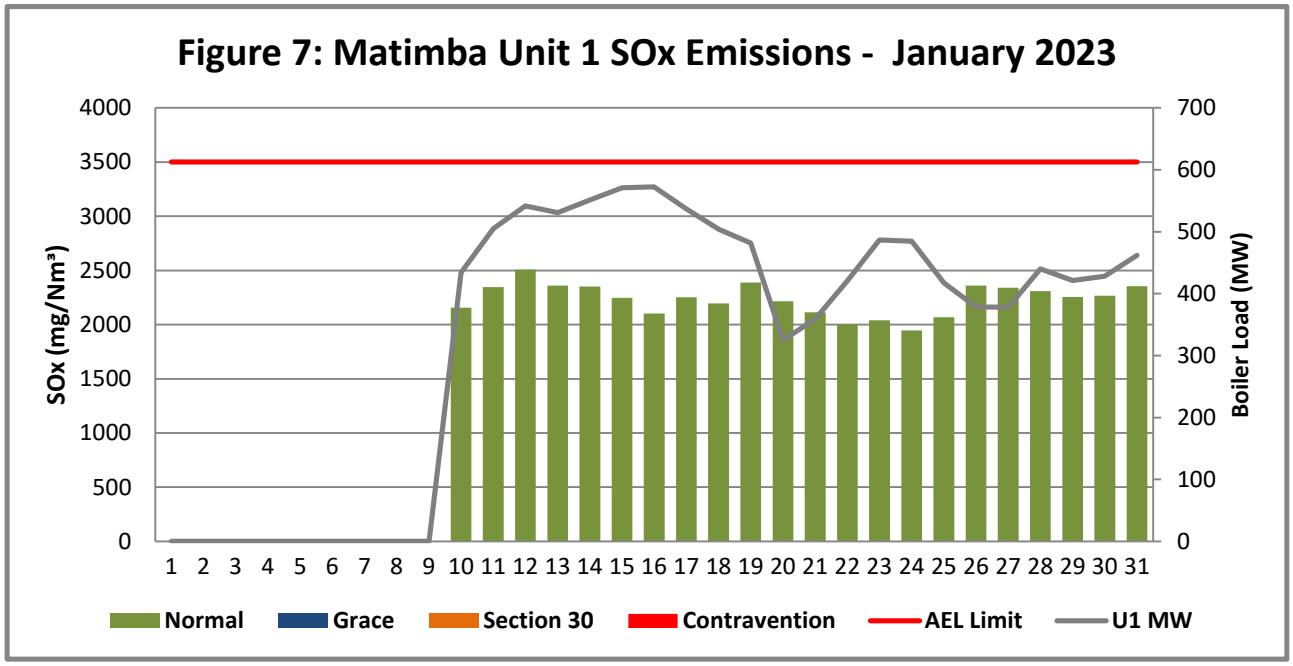

Figure 7: SO2 daily average emissions against emission limit for unit 1 for the month of January 2023

Interpretation:

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

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Unit 2 SO_2 Emissions

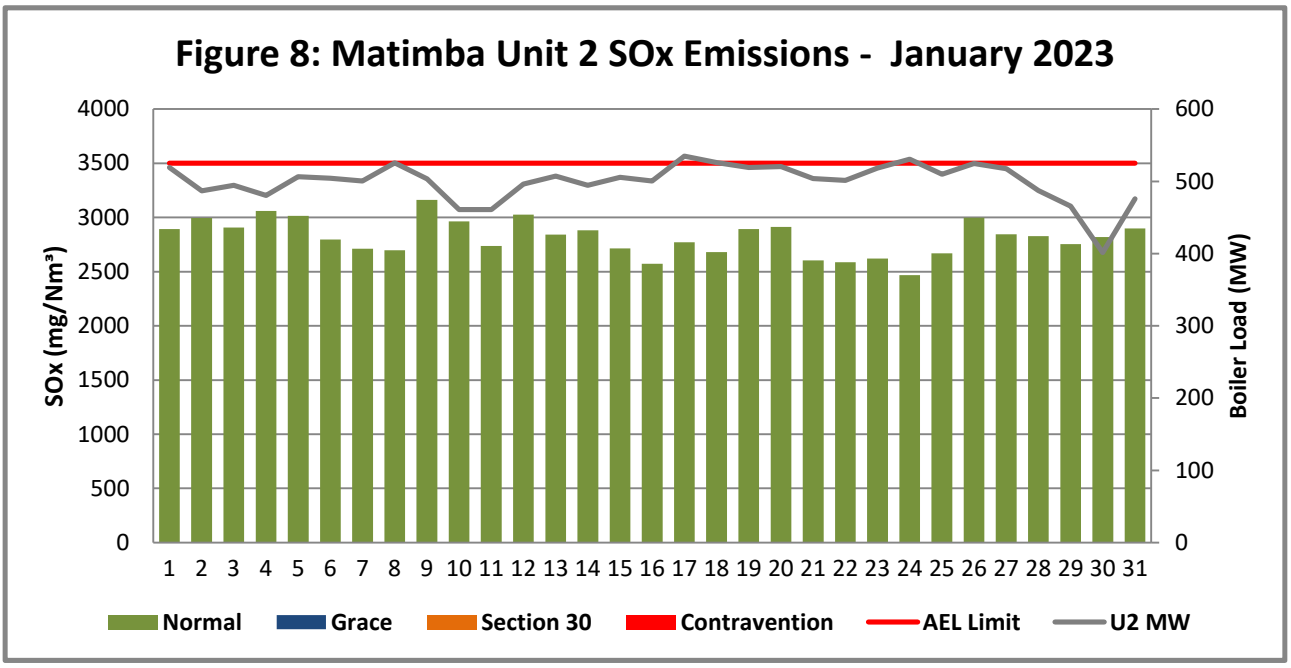

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of January 2023

Interpretation:

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

Unit 3 SO_2 Emissions

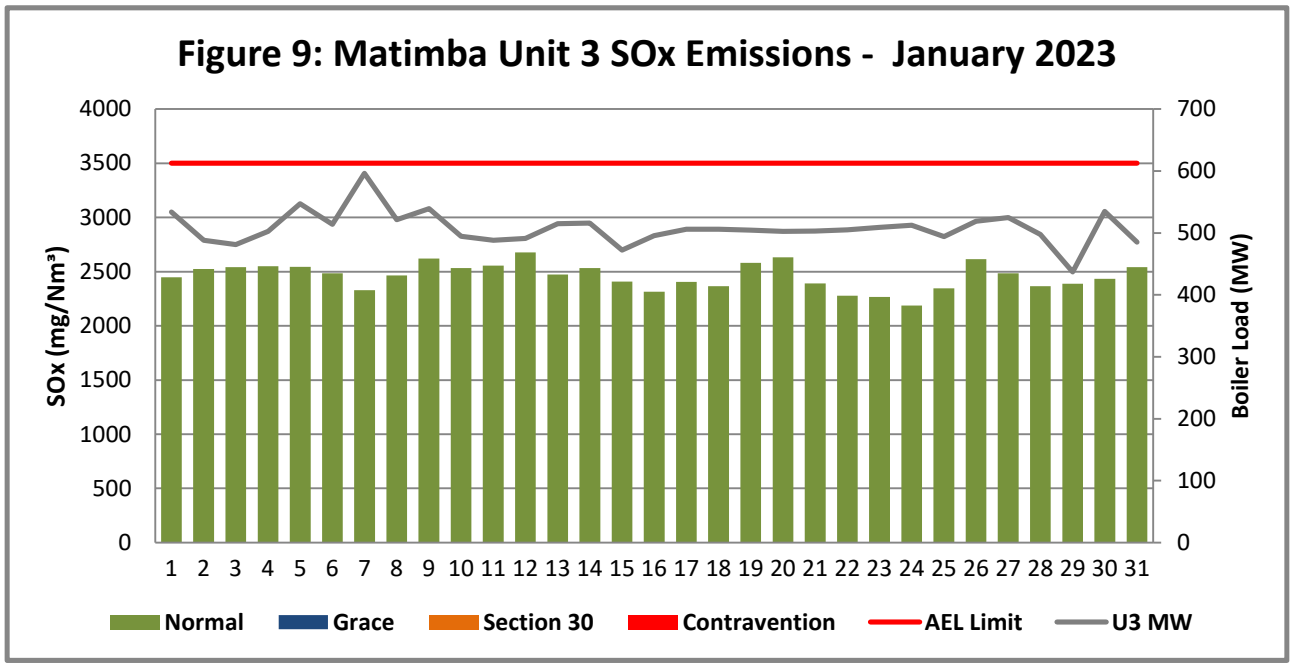

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of January 2023

Interpretation:

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

Unit 4 SO_2 Emissions

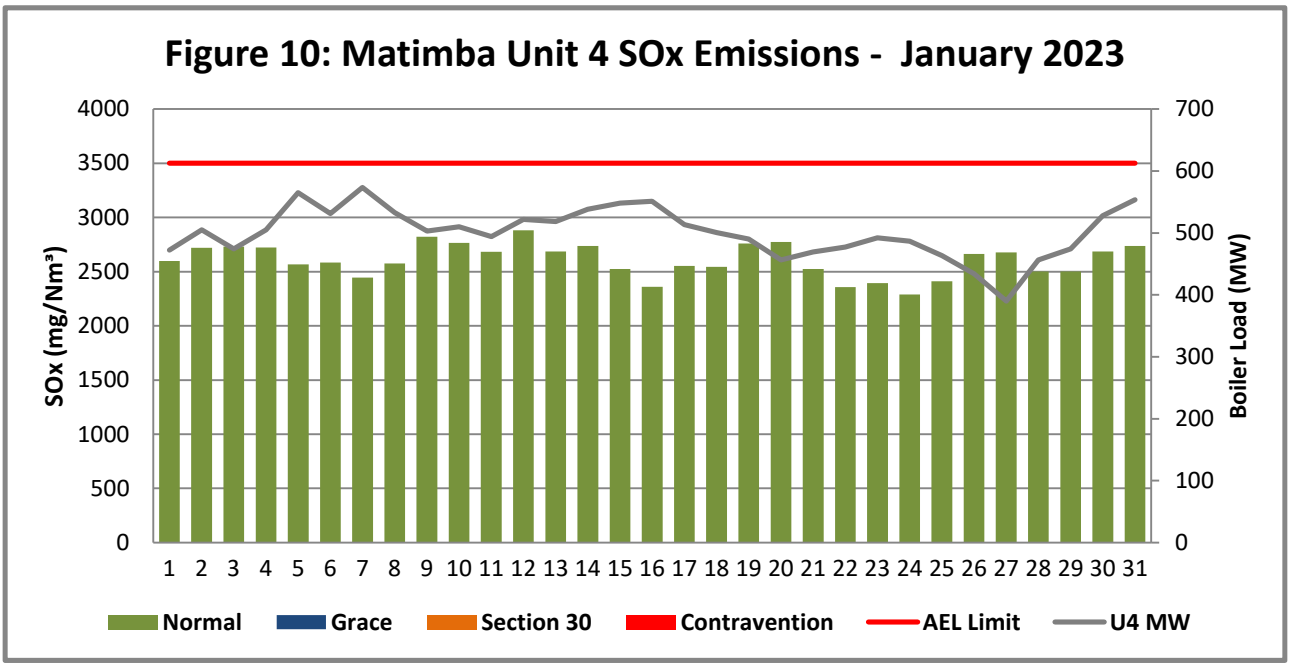

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of January 2023

Interpretation:

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

Unit 5 SO_2 Emissions

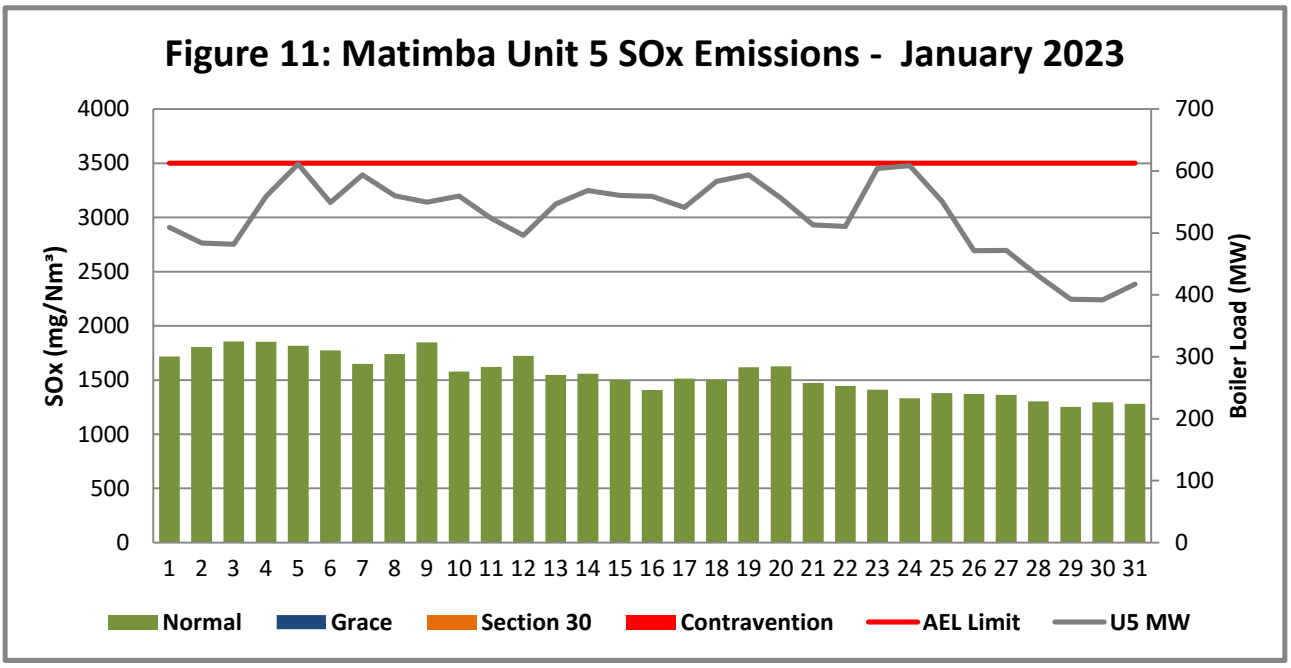

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of January 2023

Interpretation:

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

Unit 6 SO_2 Emissions

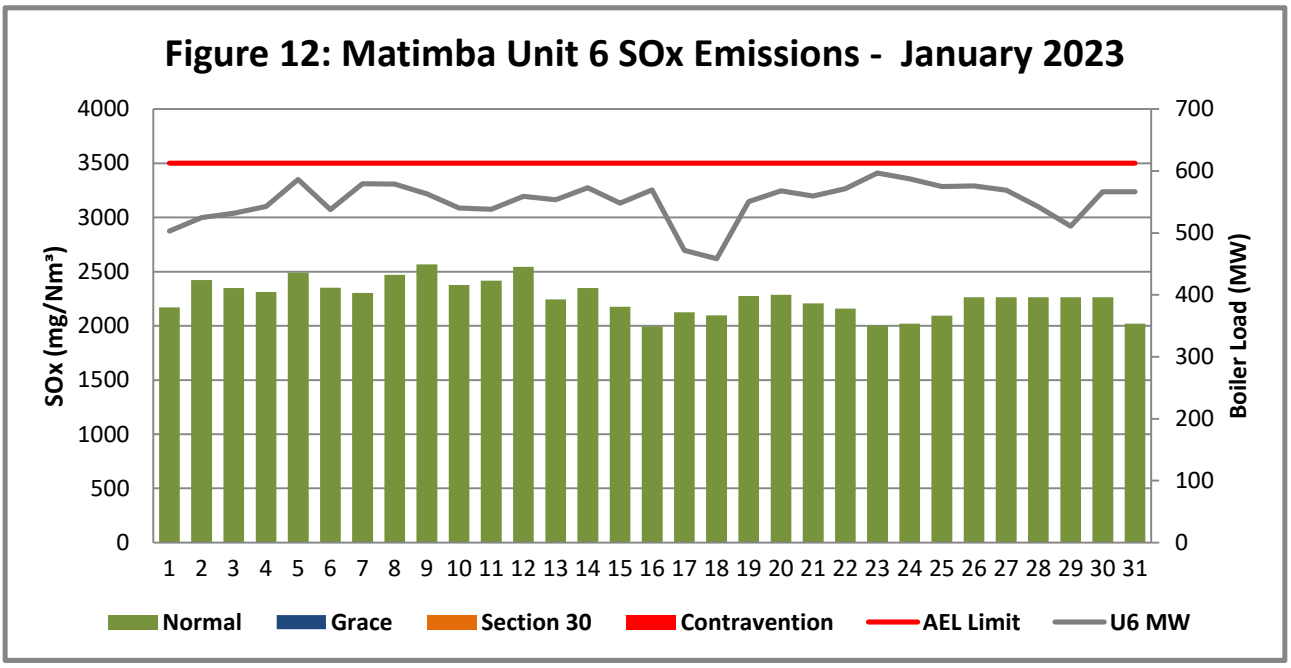

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of January 2023

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

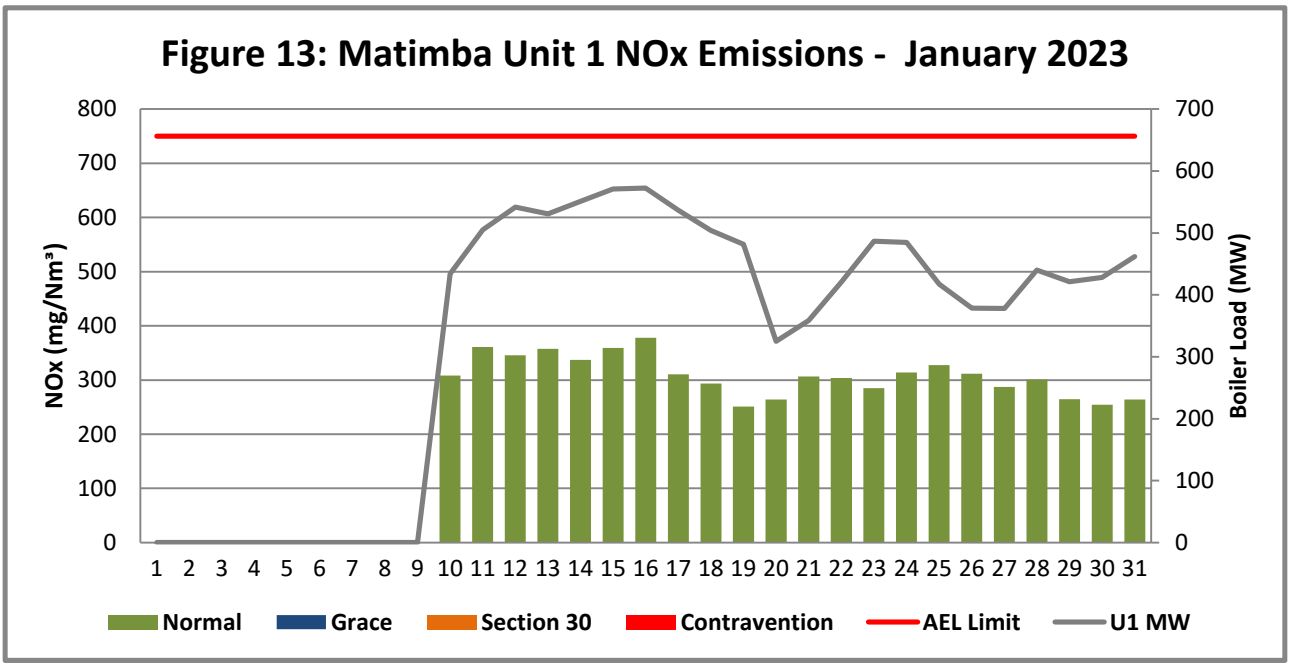

Figure 13: Figure 14: NOx daily average emissions against emission limit for unit 1 for the month of January 2023

Interpretation:

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

Unit 2 NO_x Emissions

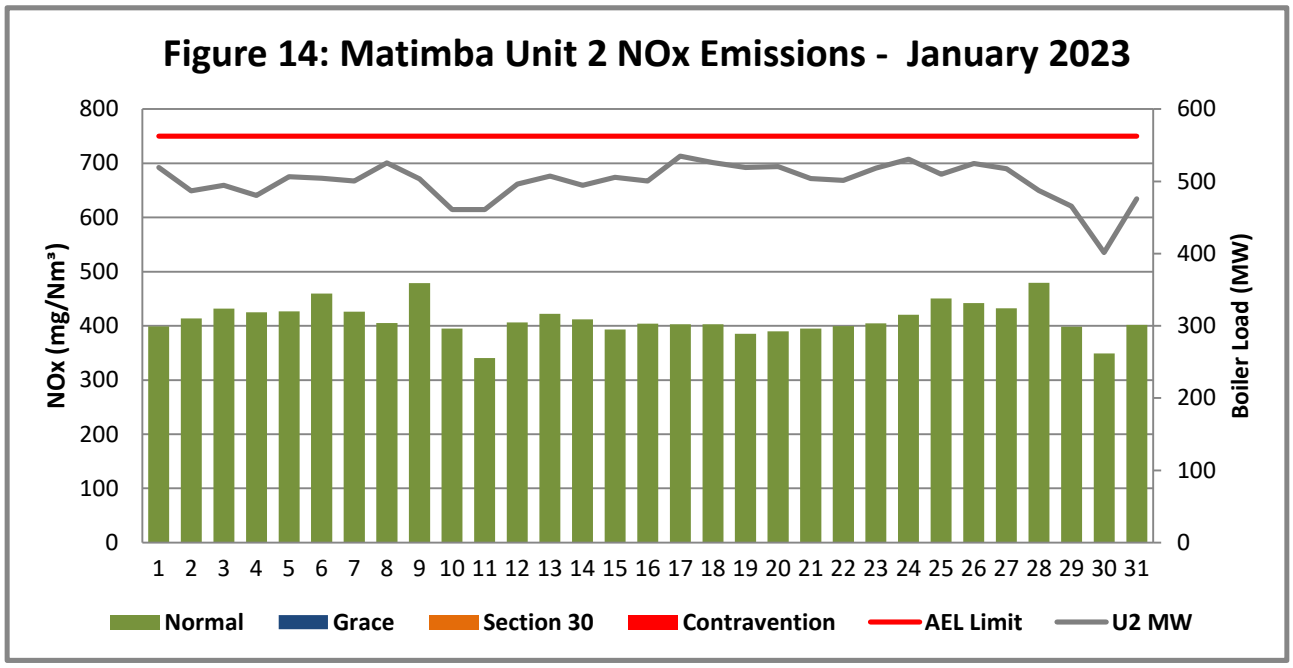

Figure 15: NOx daily average emissions against emission limit for unit 2 for the month of January 2023

Interpretation:

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

Unit 3 NO_x Emissions

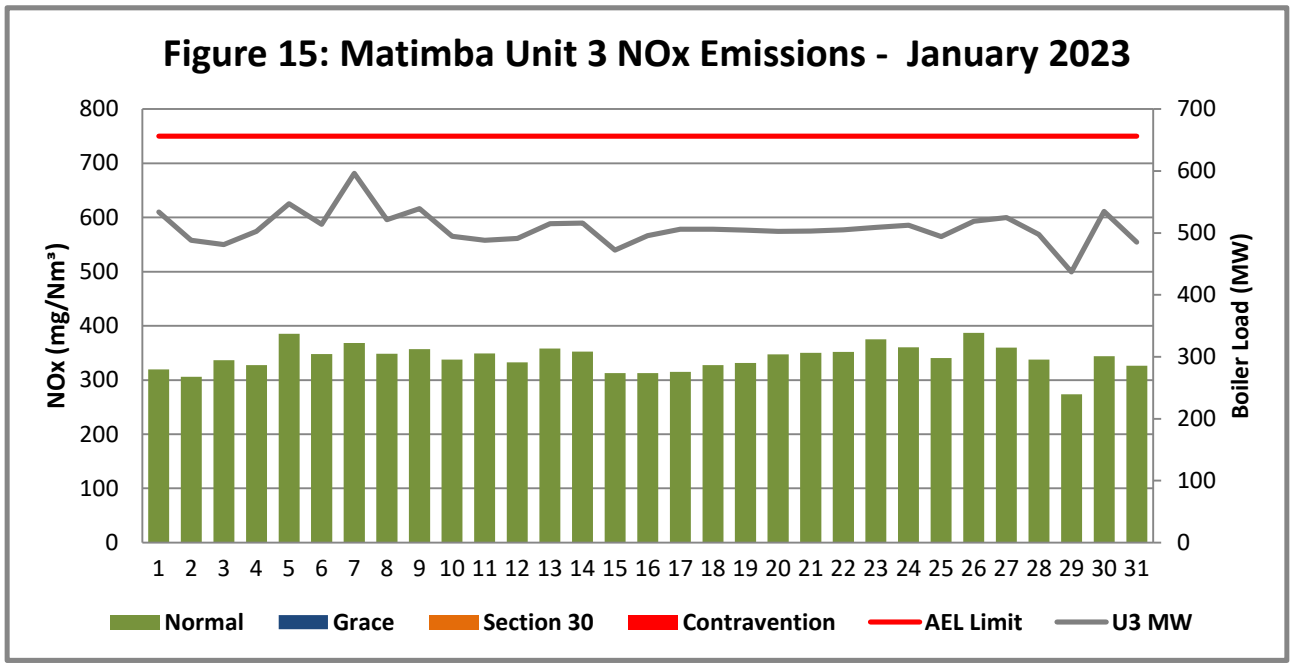

Figure 16: NOx daily average emissions against emission limit for unit 3 for the month of January 2023

Interpretation:

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

Unit 4 NO_x Emissions

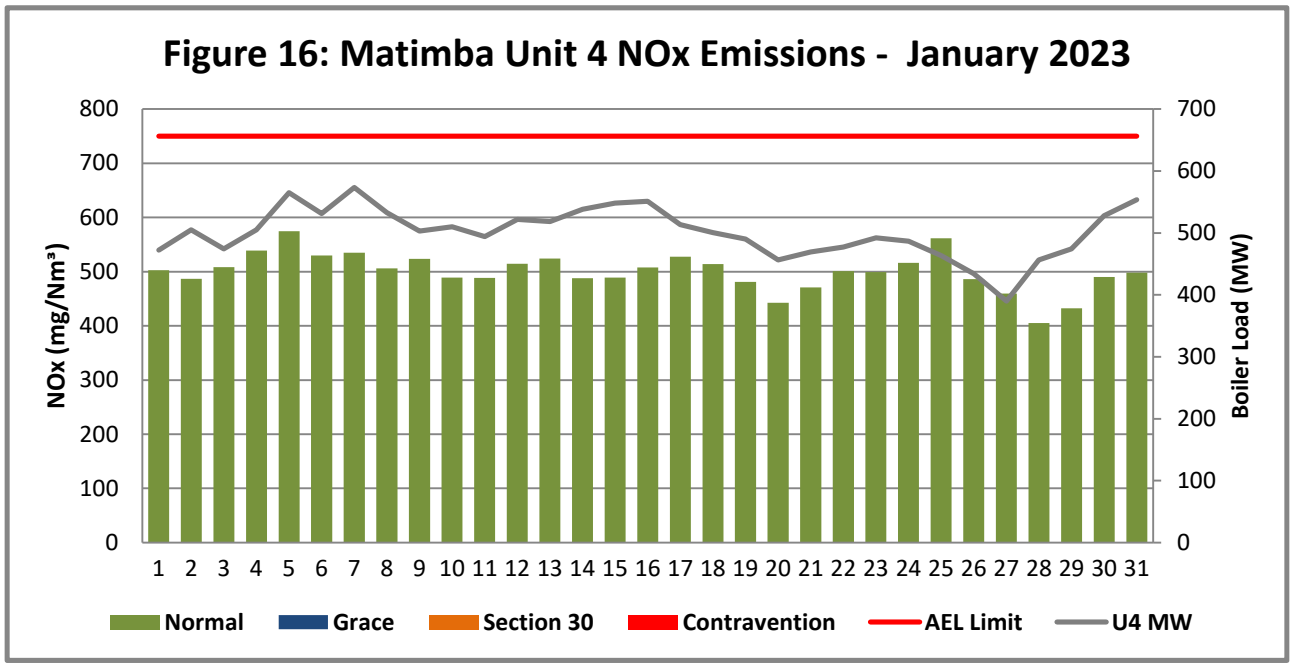

Figure 17: NOx daily average emissions against emission limit for unit 4 for the month of January 2023

Interpretation:

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

Unit 5 NO_x Emissions

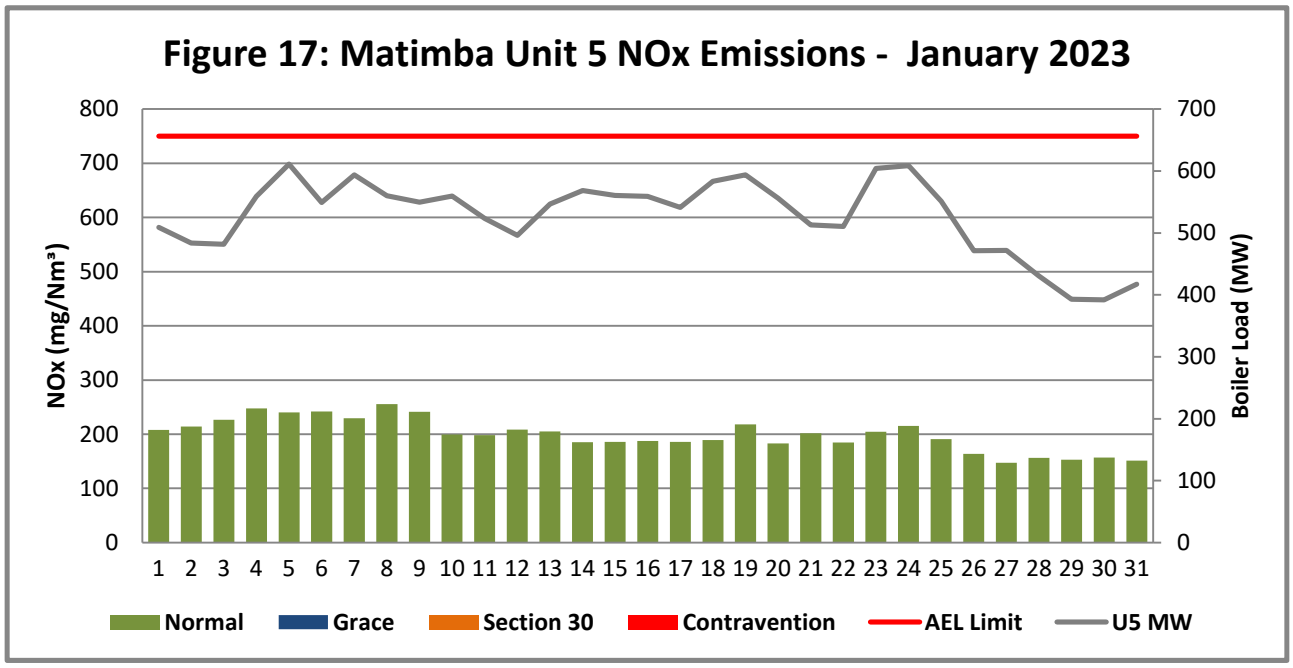

Figure 18: NOx daily average emissions against emission limit for unit 5 for the month of January 2023

Interpretation:

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

Unit 6 NO_x Emissions

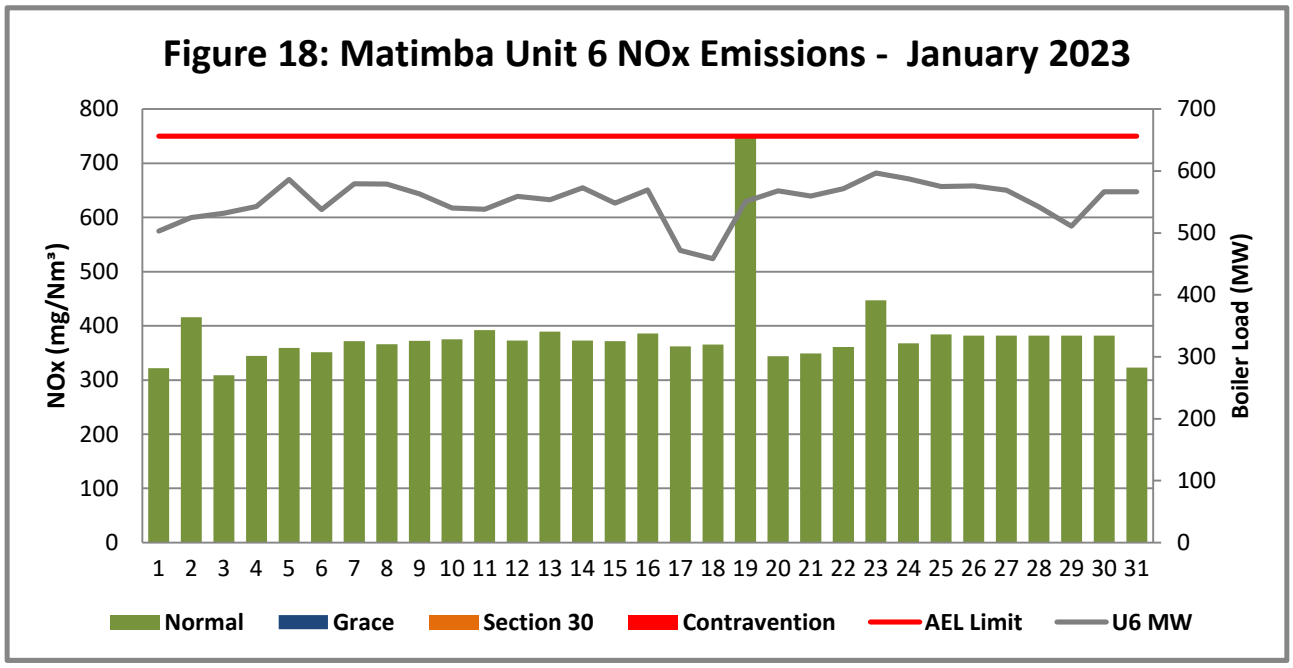

Figure 19: NOx daily average emissions against emission limit for unit 6 for the month of January 2023

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:	Tuesday, 21 February 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:	**January**	

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:	***740,646***	
Molecular weight of the fuel oil:	166,00	Lb/lb-mole

METEROLOGICAL DATA FOR THE MONTH	**Data**	**Unit**
Daily average ambient temperature	25,11	°C
Daily maximum ambient temperature	31,57	°C
Daily minimum ambient temperature	17,48	°C
Daily ambient temperature range	14,10	°C
Daily total insolation factor	5,87	kWh/m²/day
Tank paint colour	***Grey/medium***	NA
Tank paint solar absorbtance	0,68	NA

FINAL OUTPUT:	**Result**	**Unit**
Breathing losses:	0,60	kg/month
Working losses:	0,02	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	**0,62**	**kg/month**

*Calculations performed on this spreadsheet are taken from the USEPA AP-42- Section 7.1 Organic Liquid Storage Tanks - January 1996. This spreadsheet is derived from materials provided by Jimmy Peress, PE, Tritech Consulting Engineers, 85-93 Chevy Chase Street, Jamaica, NY 11432 USA, Tel - 718-454-3920, Fax - 718-454-6330, e-mail - PeressJ@nyc.rr.com.

2.4.4 Greenhouse gas (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 January 2023

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2023/01/01	0	11062	11646	10219	11032	10855
2023/01/02	0	10328	10607	10951	10469	11338
2023/01/03	0	10484	10434	10306	10385	11493
2023/01/04	0	10184	10895	10940	12038	11722
2023/01/05	0	10729	11938	12263	13245	12691
2023/01/06	0	10708	11141	11523	11870	11616
2023/01/07	0	10620	13026	12496	12899	12570
2023/01/08	0	11182	7765	11634	12168	12555
2023/01/09	0	10703	11764	10844	11896	12190
2023/01/10	7660	9764	10750	11046	12066	11663
2023/01/11	11011	9754	10595	10680	11338	11617
2023/01/12	11830	10511	10660	11324	10718	12097
2023/01/13	11606	10779	11187	11185	11786	11974
2023/01/14	12008	10466	11219	11696	12304	12440
2023/01/15	12491	10720	7422	11889	12121	11827
2023/01/16	12519	10597	10744	11972	12101	12356
2023/01/17	11769	11373	10992	11148	11713	10160
2023/01/18	11013	11157	11001	10869	12607	9891
2023/01/19	10502	11000	10957	10642	12841	11866
2023/01/20	4421	11058	10930	9875	12043	12303
2023/01/21	7664	10664	10927	10104	11054	12092
2023/01/22	9097	10622	10981	10288	11048	12377
2023/01/23	10619	11005	11055	10592	13047	12925
2023/01/24	10612	11262	11141	10483	13150	12720
2023/01/25	9057	10836	10731	9964	11934	12435
2023/01/26	8200	11124	11268	9375	10162	12448
2023/01/27	8175	10991	11420	8398	10209	12299
2023/01/28	9557	10306	10833	9821	9314	11722
2023/01/29	9158	9862	9454	10242	8447	11005
2023/01/30	9307	8480	11631	11431	8449	12296
2023/01/31	10060	10068	10558	11986	9027	12271

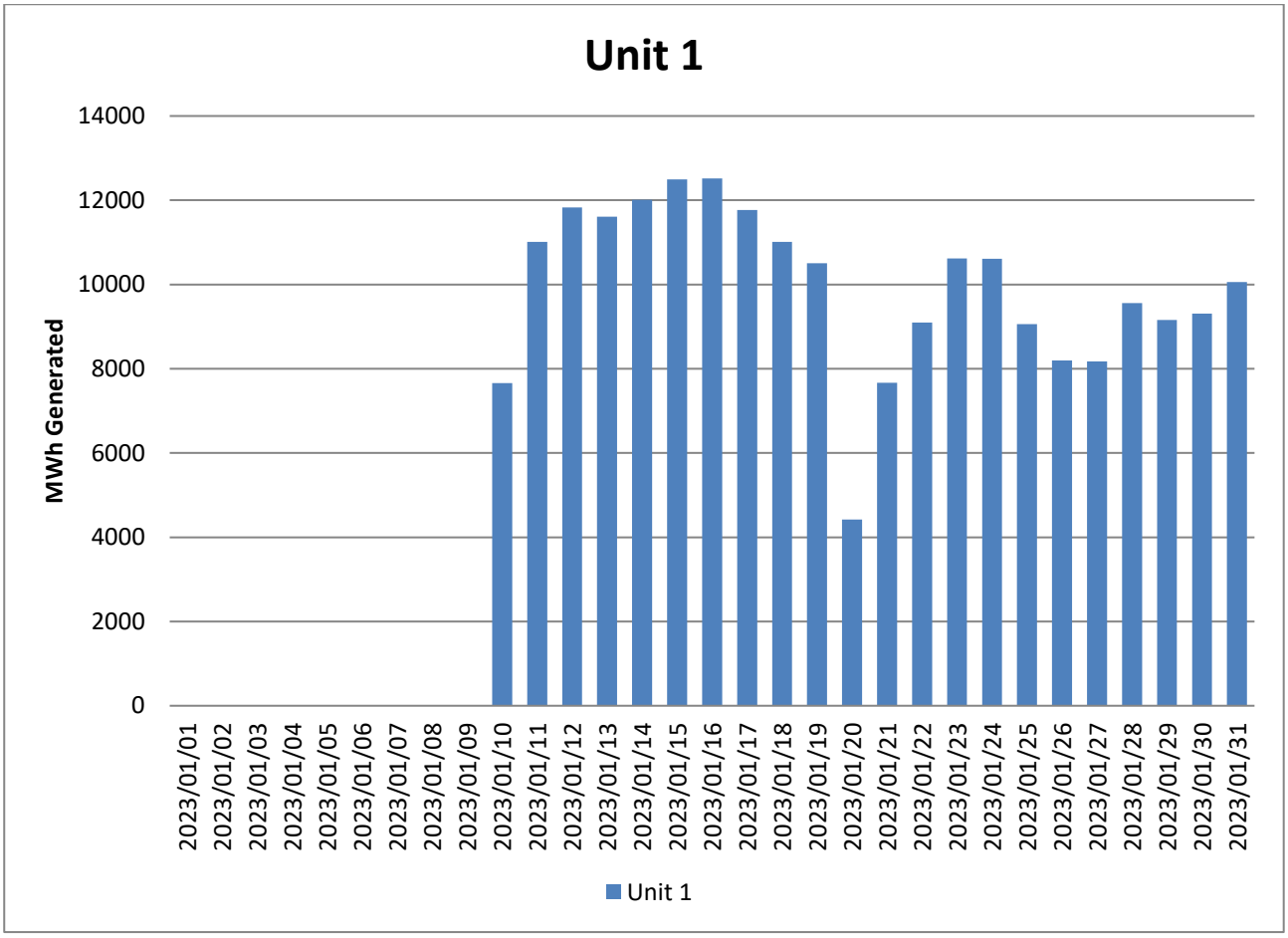

Figure 20: Unit 1 daily generated power in MWh for the month of January 2023

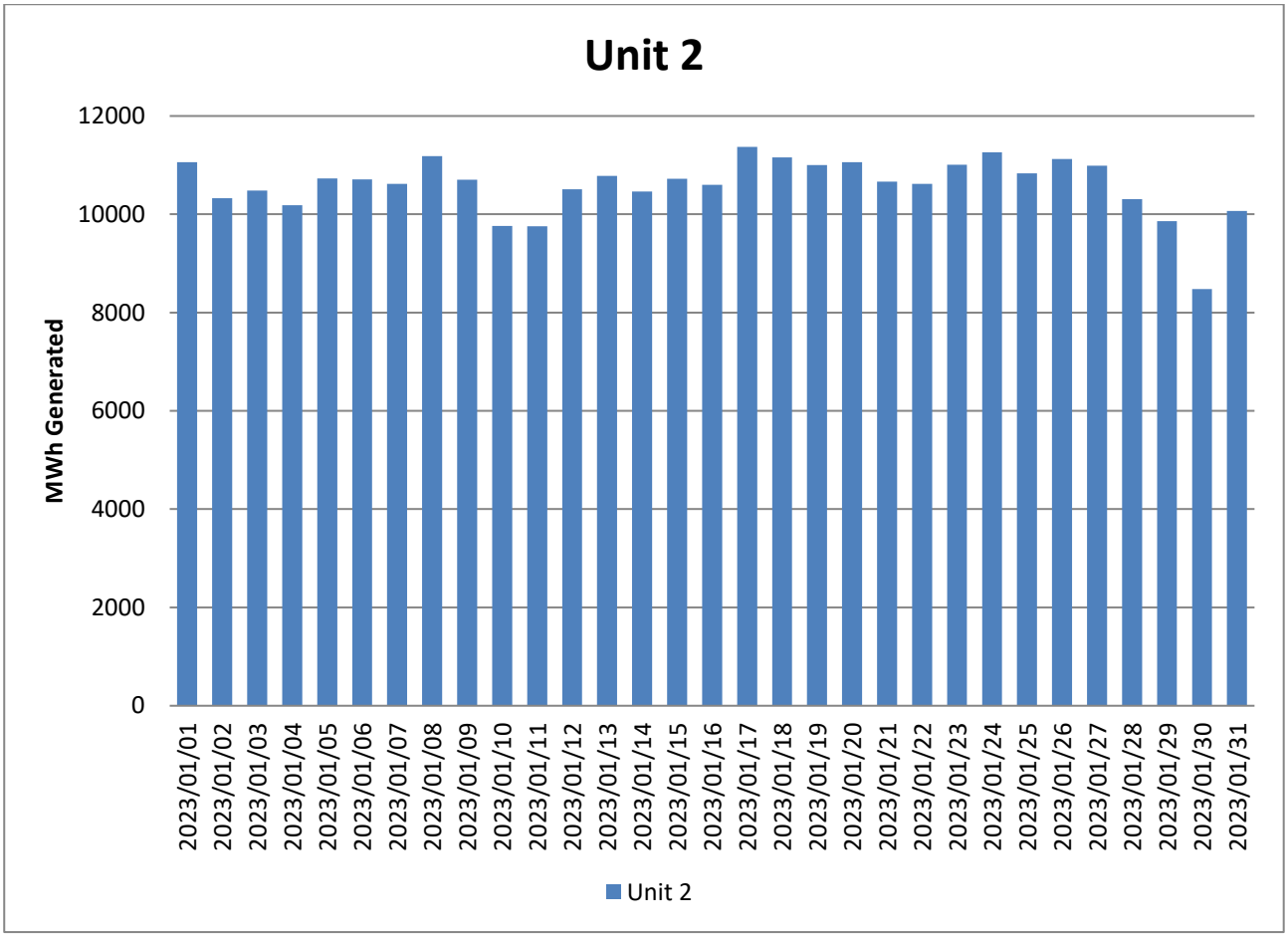

Figure 21: Unit 2 daily generated power in MWh for the month of January 2023

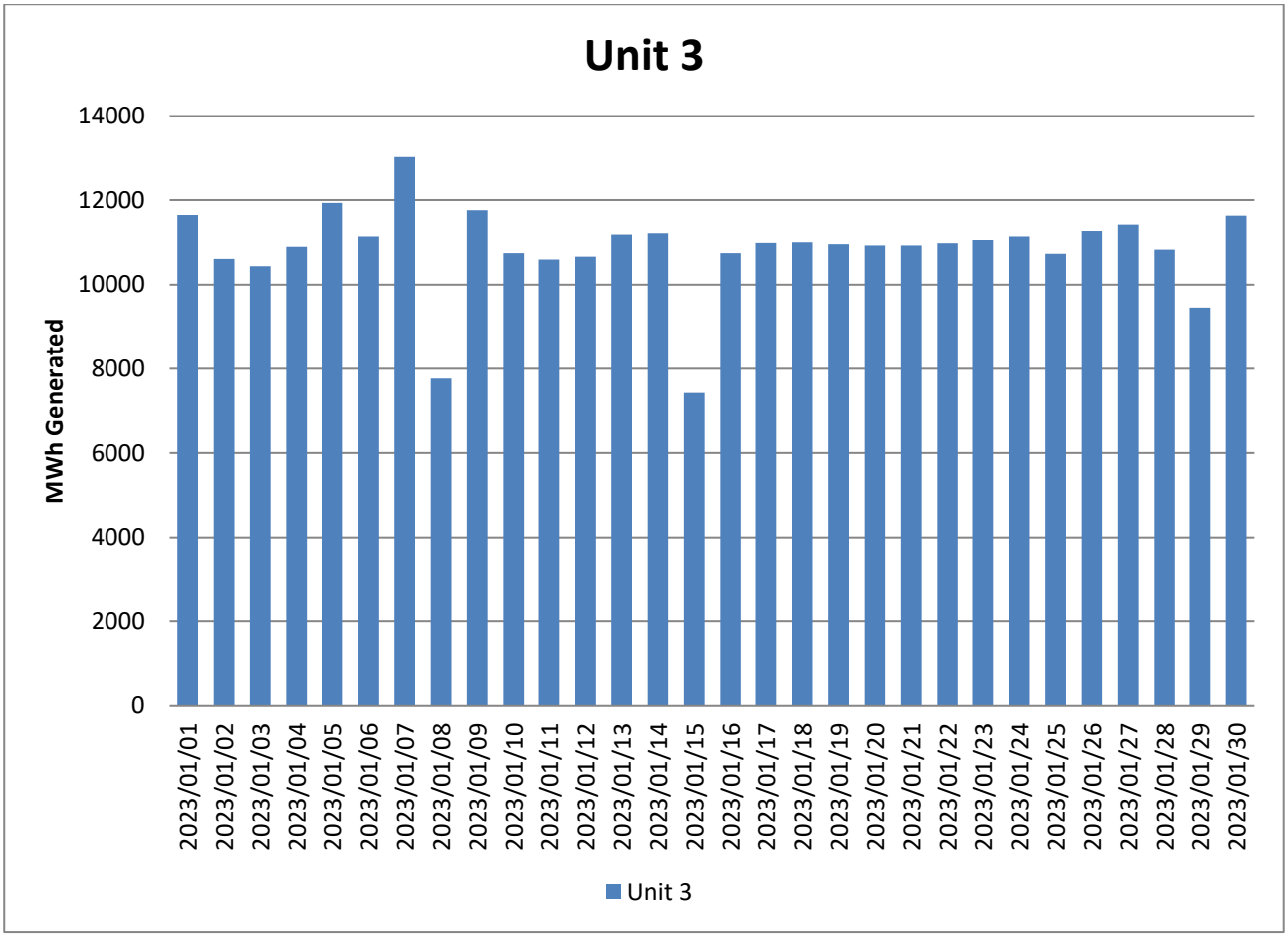

Figure 22: Unit 3 daily generated power in MWh for the month of January 2023

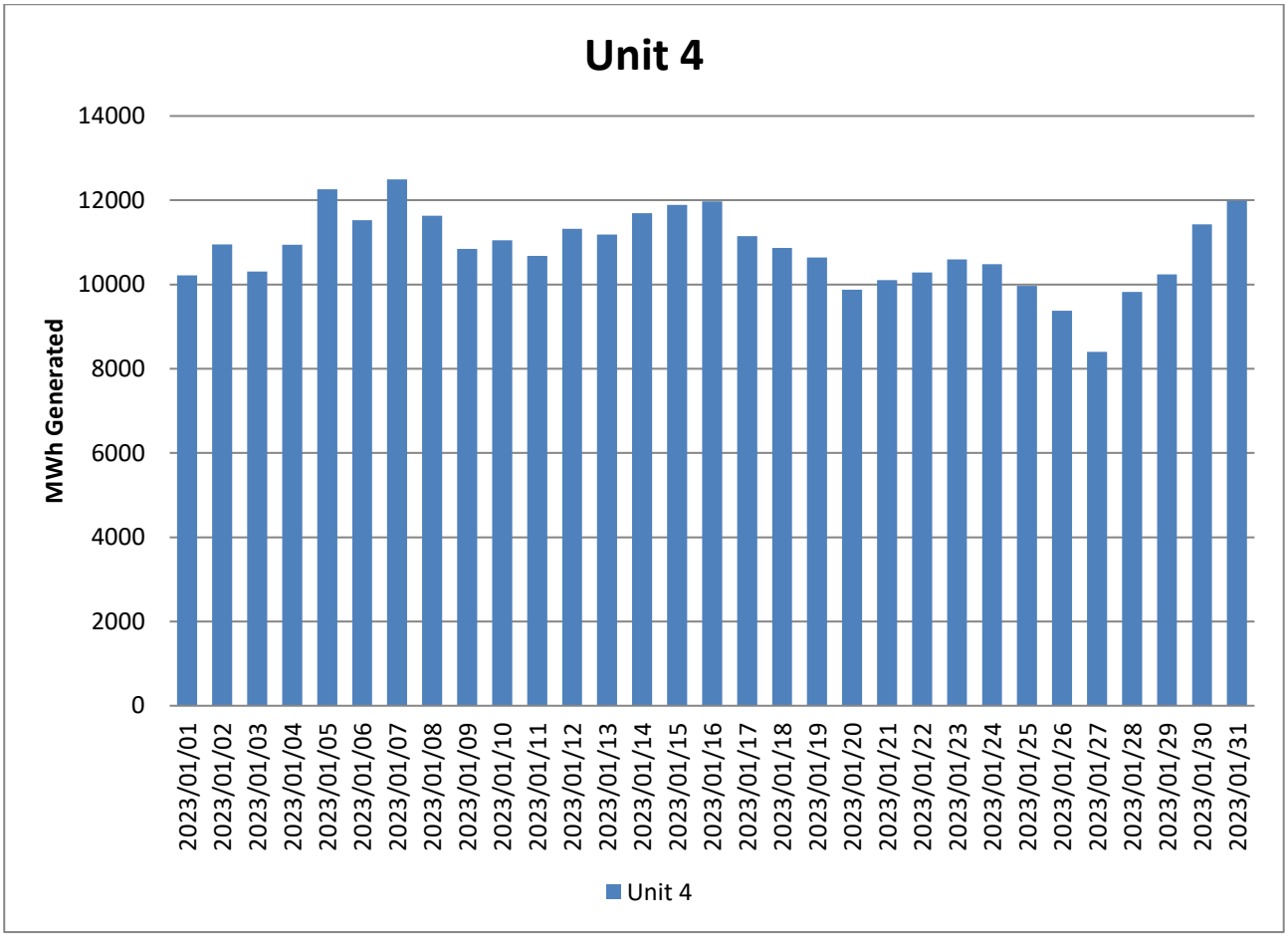

Figure 23: Unit 4 daily generated power in MWh for the month of January 2023

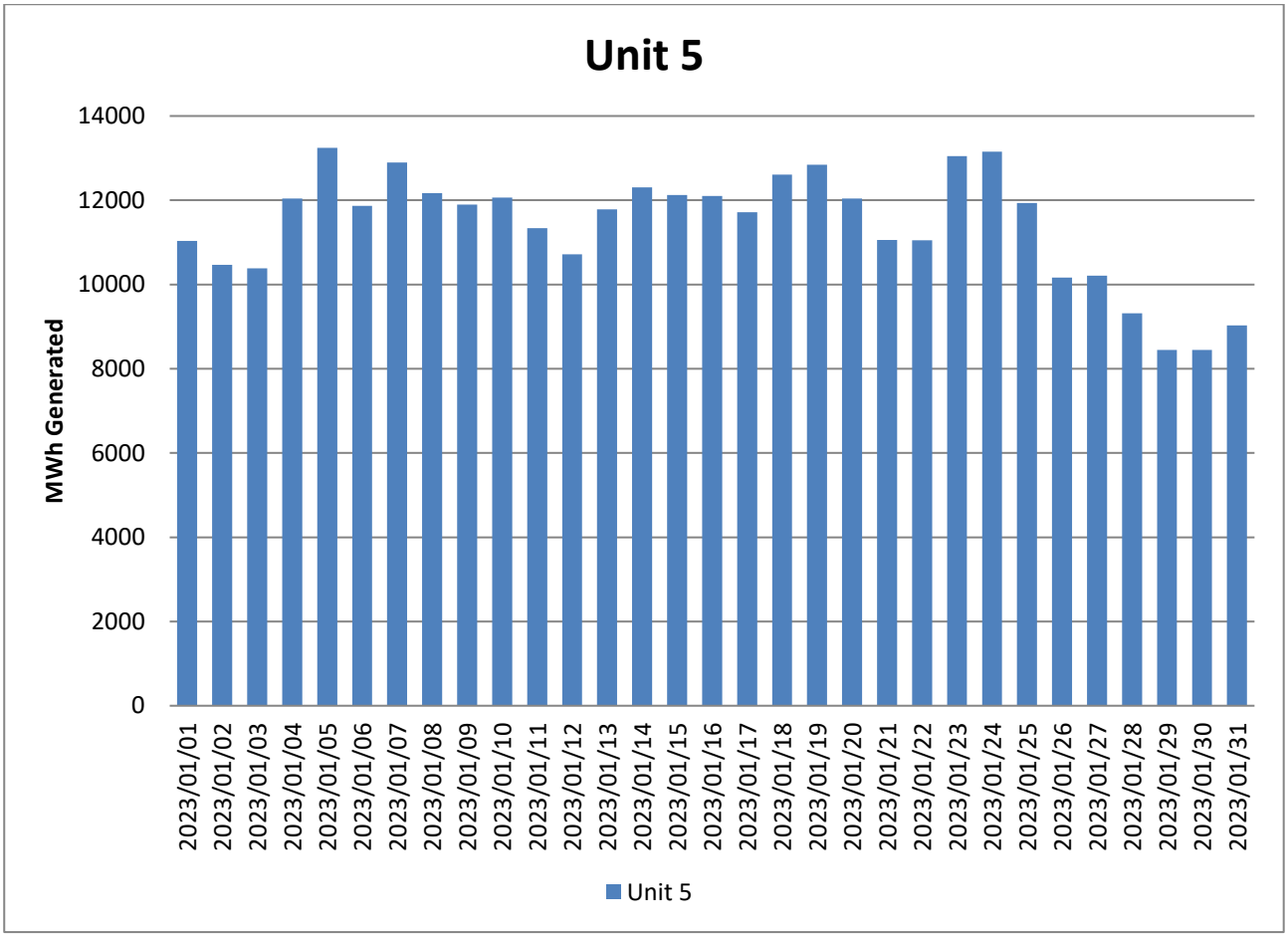

Figure 24: Unit 5 daily generated power in MWh for the month of January 2023

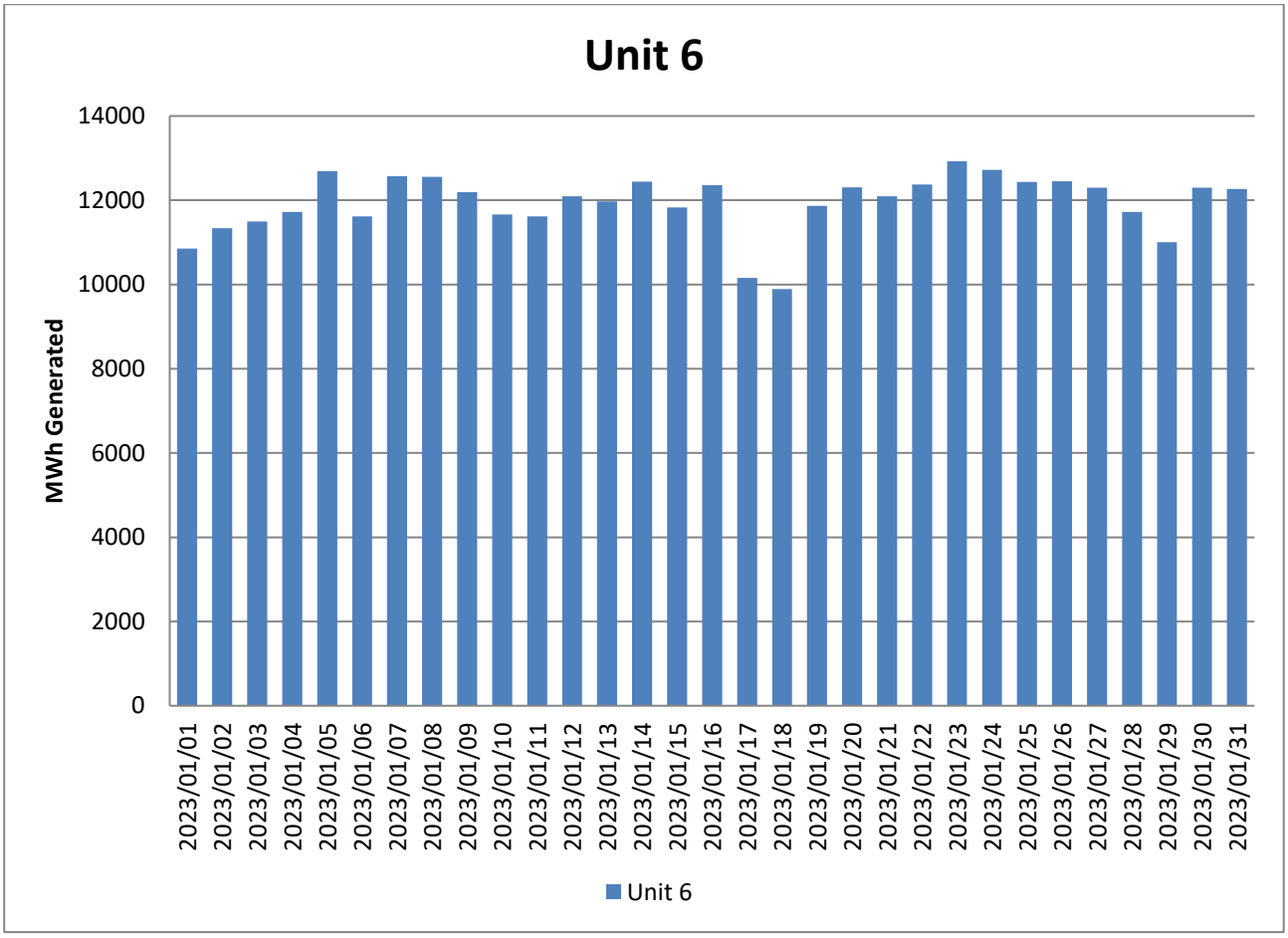

Figure 25: Unit 6 daily generated power in MWh for the month of January 2023

2.6 Pollutant Tonnages

The emitted pollutant tonnages for January 2023 are provided in table 6. CO2 values for units 1, 2, 3 ,4, 5 and 6 were calculated per balance, from O2 values, due to analyser providing unreliable data. Averaged quality assurance level 2 test values for O2 were used for Unit 1 to 6 due to the analysers being 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 January 2023

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO_2 (tons)
Unit 1	58,2	3 447,4	481,3	263 951
Unit 2	64,5	7 500,5	1 096,7	730 016
Unit 3	45,5	5 837,9	811,2	413 483
Unit 4	60,7	5 080,1	977,1	388 317
Unit 5	87,7	3 925,6	505,8	448 583
Unit 6	75,2	5 549,0	935,7	552 457
SUM	391,8	31 340,5	4 807,8	2 796 808

2.7 Reference values

Table 7: Reference values for data provided, January 2023

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	8,72	7,63	7,77	8,03	9,03	8,05
Moisture	%	4,83	3,97	5,83	3,30	4,35	2,75
Velocity	m/s	23,4	34,7	25,1	23,2	27,2	28,5
Temperature	^{o}C	147,4	124,3	129,0	131,8	121,8	124,1
Pressure	mBar	933,5	935,3	914,8	914,0	933,3	912,2

2.8 Continuous Emission Monitors

2.8.1 Reliability

Continuous emission monitors were available for more than 80% of the reporting period. The emitted pollutant tonnages for January 2023 are provided in table 6. CO2 values for units 1, 2, 3 ,4, 5 and 6 were calculated per balance, from O2 values, due to analyser providing unreliable data. Averaged quality assurance level 2 test values for O2 were used for Unit 1 to 6 due to the analysers being 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 January 2023.

Associated Unit/Stack	PM	SO_2	NO
Unit 1	99,2	100,0	99,8
Unit 2	100,0	99,7	97,2
Unit 3	100,0	100,0	100,0
Unit 4	100,0	99,9	99,9
Unit 5	100,0	99,9	93,3
Unit 6	100,0	78,8	78,8

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

- 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	2023/01/09	17h19
Synchronization with Grid	2023/01/10	04h08
Emissions below limit	2023/01/11	11h00
Fires in to synchronization	10,41	HOURS
Synchronization to < Emission limit	31	HOURS

Unit	1	
Fires in	2023/01/20	12h01
Synchronization with Grid	2023/01/20	14h35
Emissions below limit	2023/01/20	17h10
Fires in to synchronization	2,27	HOURS
Synchronization to < Emission limit	2,35	HOURS

Unit	3	
Fires in	2023/01/08	14h10
Synchronization with Grid	2023/01/08	16h10
Emissions below limit	2023/01/08	17h11
Fires in to synchronization	2	HOURS
Synchronization to < Emission limit	1,1	HOURS

Unit	3	
Fires in	2023/01/15	09h20
Synchronization with Grid	2023/01/15	13h03
Emissions below limit	2023/01/15	14h00
Fires in to synchronization	3	HOURS
Synchronization to < Emission limit	0,57	HOURS

2.10 Emergency generation

Table 11: Emergency generation

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

During the period under review all Units were on emergency generation in force from 01 January 2023 until 31 January 2023.

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

Ambient air quality monitoring report was not available at the time of publishing this report.

2.14 Electrostatic precipitator and Sulphur plant status

Unit 1

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

Unit 2

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

Unit 3

- All precipitator fields in service. Unit shut down for outage
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 4

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

Unit 5

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

Unit 6

- 2 fields out of service, will be inspected next opportunity.
- Hole in burner casing and sulphur leak causing low availability. 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

None

4. Report Conclusion

The rest of the information demonstrating compliance with the emission license conditions is supplied in the annual emission report sent to your office.

Hoping the above will meet your satisfaction.

I hereby declare that the information in this report is correct.

Yours sincerely

Wikus van Rensburg

pp
GENERAL MANAGER: MATIMBA POWER STATION