Eskom	Matimba Power Station Emissions report	Matimba Power Station

Title: **Matimba Power Station March 2021 emissions report**

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Compiled by	Functional Responsibility	Authorized by
WC Mocke	**MC Mamabolo**	**CO Mabotja**
Environmental Officer	**Environmental Manager**	**General Manager**
Date: 2021/10/27	Date: 29/10/2021	Date: 2021/10/29

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1. Report Summary

Matimba Power Station was issued with an Atmospheric Emission License (12/4/12L-W4/A4) in March 2020. Condition 7.7.1 of the License requires the license holder to submit monthly reports to the Department. This report contains the required information as specified in condition 7.7.1 for March 2021.

Due to recommendations received from an internal emission data review the Matimba Power Station March 2021 emissions report was reviewed.

Changes were made to correlation curves which were incorrectly captured and averaged Quality Assurance level 2 test data was used where raw data was unreliable.

These changes influenced the pollutant tonnages and the monitor reliability reported in the revision 1 of the report. The influenced data has been updated and is provided in the specific sections in the report

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

The Gaseous emission (SO_x and NO_x) monitors for unit 4 and unit 5 did not achieve the required 90% reliability. The monitors were repaired on the 31st of March 2021 and has been 100% available since then.

Issues mentioned above are discussed further under the respective 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	1 325 970
	Fuel Oil	Tons/month	1 200	550,488
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	2 048,435

The coal and fuel oil consumptions rates for the month of March 2021 were within the permitted maximum limit.

2.2 Abatement technology

Table 2: Abatement Equipment Control Technology Utilised

Associated Unit	Technology Type	Minimum utilisation (%)	Actual Utilisation (%)
Unit 1	Electrostatic Precipitator	100%	99,95%
Unit 2	Electrostatic Precipitator	100%	99,95%
Unit 3	Electrostatic Precipitator	100%	99,94%
Unit 4	Electrostatic Precipitator	100%	99,90%
Unit 5	Electrostatic Precipitator	100%	99,94%
Unit 6	Electrostatic Precipitator	100%	Unit Off load
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	100%
Unit 2	SO_3 Plant	100%	100%
Unit 3	SO_3 Plant	100%	100%
Unit 4	SO_3 Plant	100%	90,3%
Unit 5	SO_3 Plant	100%	100%
Unit 6	SO_3 Plant	100%	Unit Off load

2.3 Energy source characteristics

Table 3: Energy Source Material Characteristics.

	Characteristic	Stipulated Range (Unit)	Monthly Average Content
Coal burned	Sulphur Content	0.8-1.6%	1,283
	Ash Content	30-40%	33,316

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

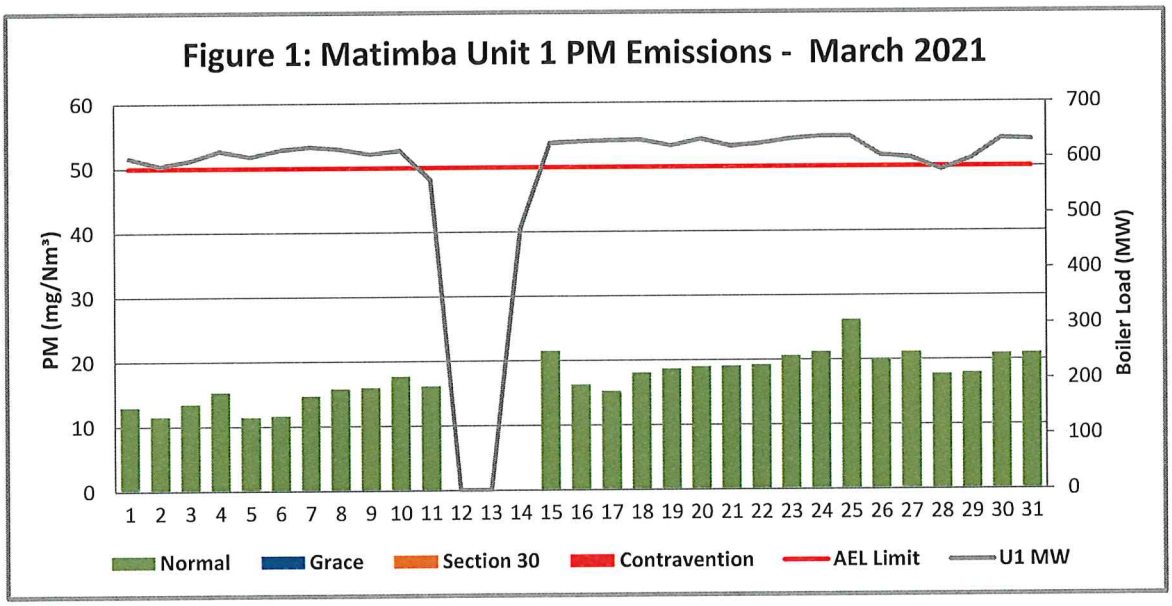

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of March 2021

Interpretation:

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

Unit 2 Particulate Emissions

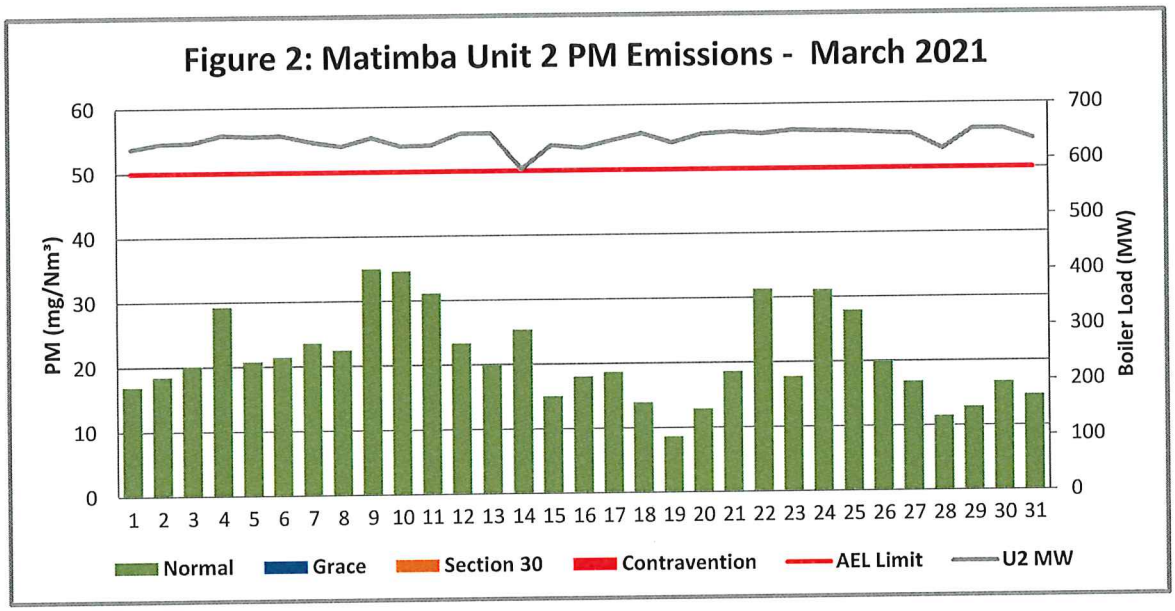

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of March 2021

Interpretation:

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

Unit 3 Particulate Emissions

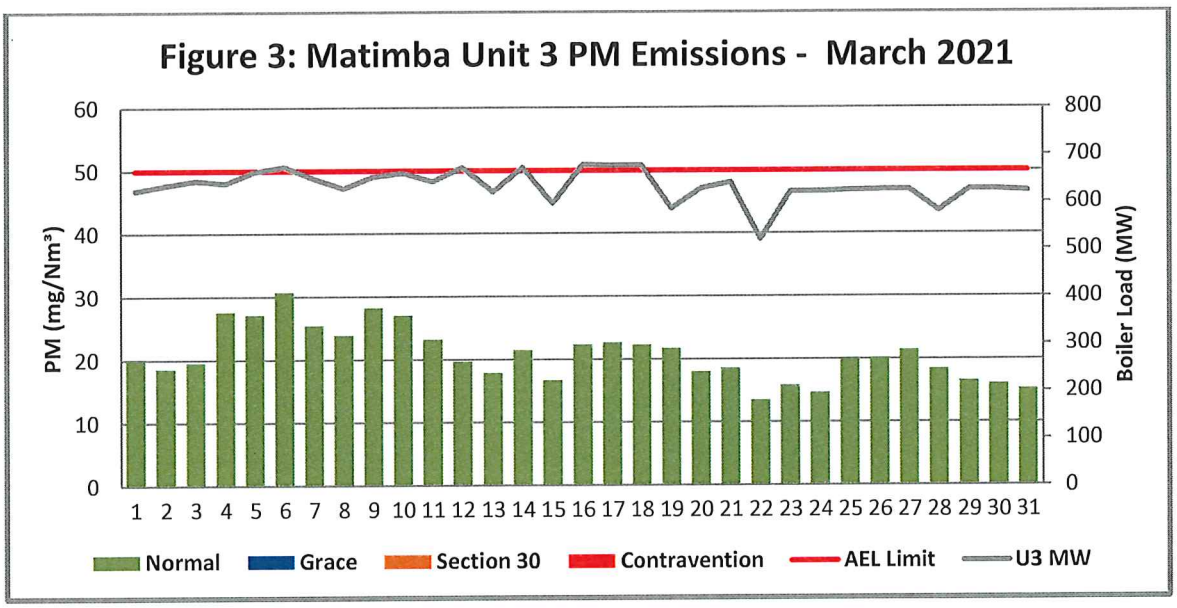

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of March 2021

Interpretation:

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

Unit 4 Particulate Emissions

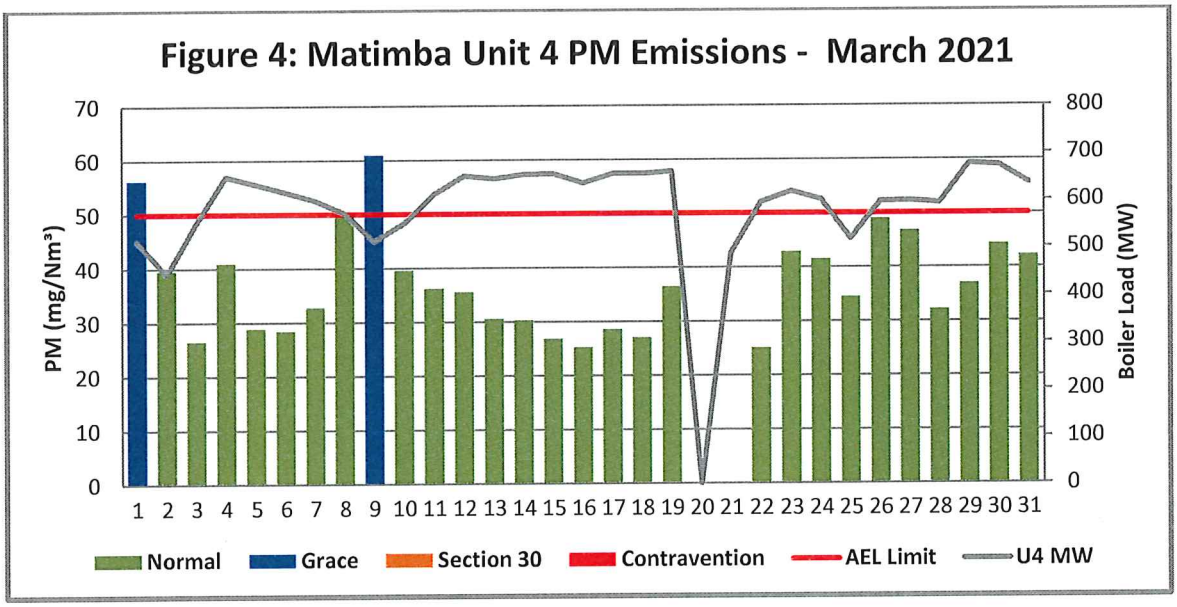

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of March 2021

Interpretation:

Unit 4 exceeded the particulate emission limit of 50 mg/Nm^3 on the 1st and 9th of March 2021. The exceedances was due to defects on the sulphur plant. The plant was repaired and emissions returned to normal. The exceedances did not exceed the 48-hour grace period.

Unit 5 Particulate Emissions

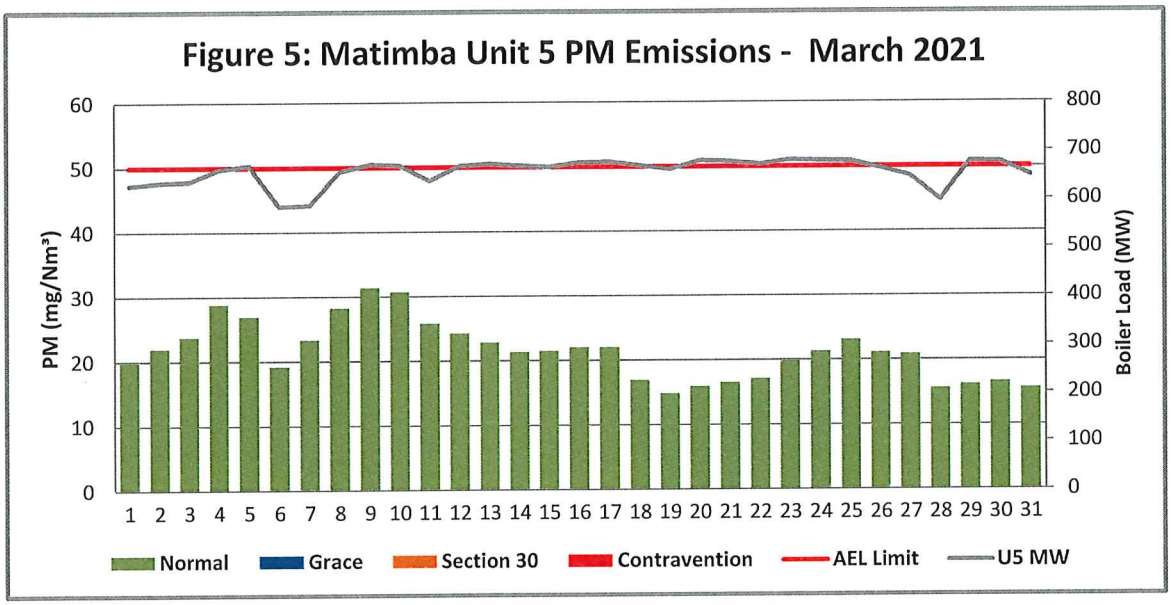

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of March 2021

Interpretation:

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

Unit 6 Particulate Emissions

Interpretation:

Unit on outage

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

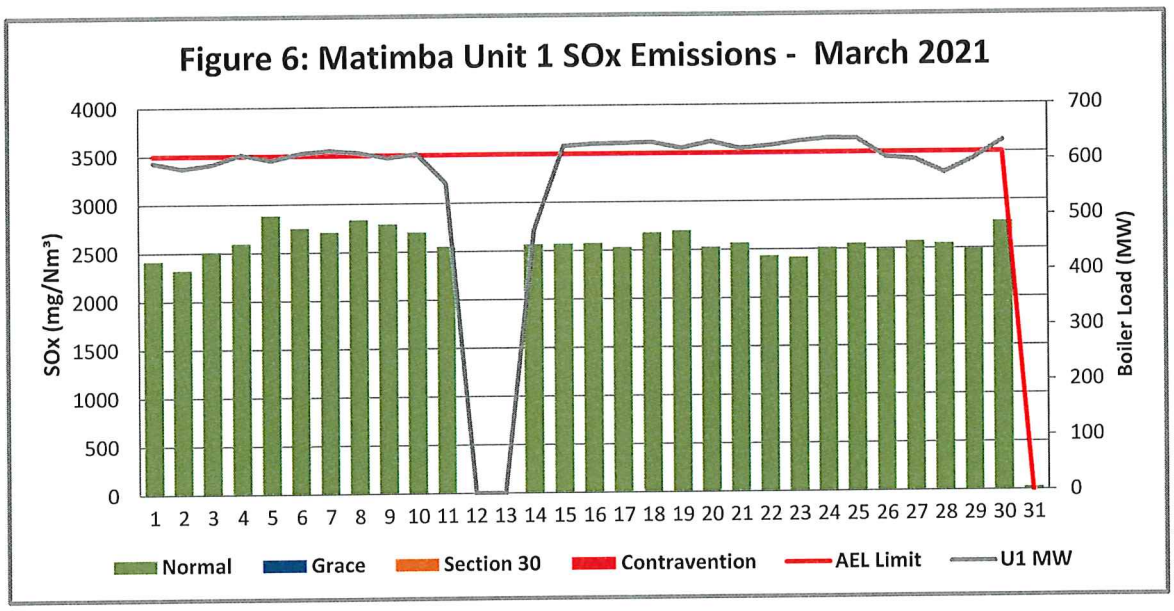

Figure 6: SO_2 daily average emissions against emission limit for unit 1 for the month of March 2021

Interpretation:

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

Unit 2 SO_2 Emissions

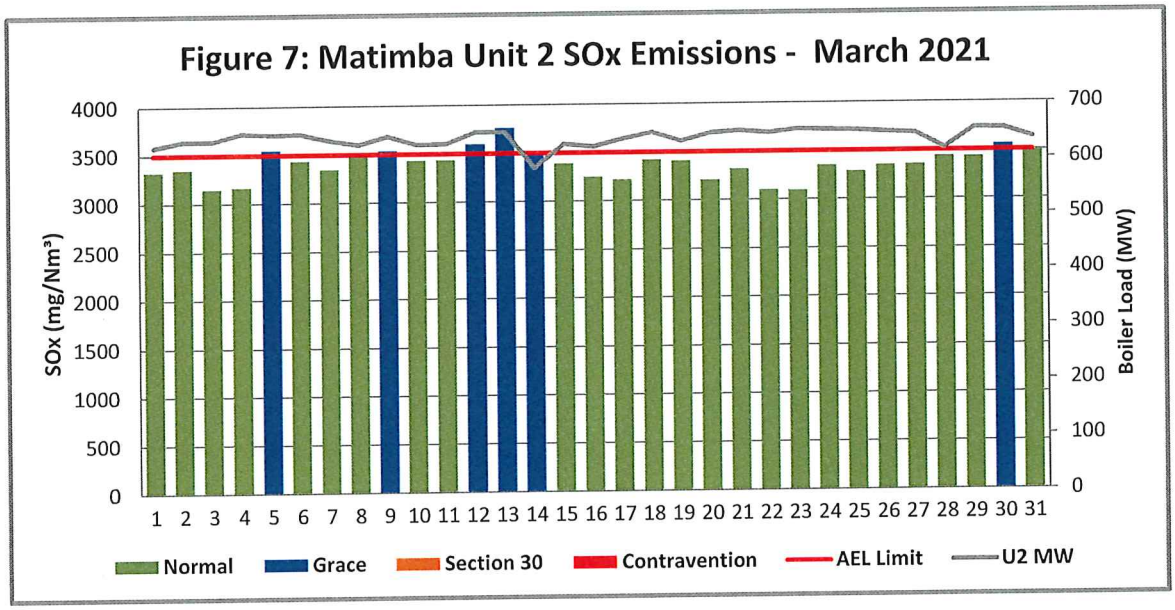

Figure 7: SO2 daily average emissions against emission limit for unit 2 for the month of March 2021

Interpretation:

Unit 2 experienced increased SO_x emissions on 5, 9, 12-14 and 30 March 2021. The emissions remained below the monthly limit of 3500mg/Nm³ with an average of 3359mg/Nm³.

Unit 3 SO_2 Emissions

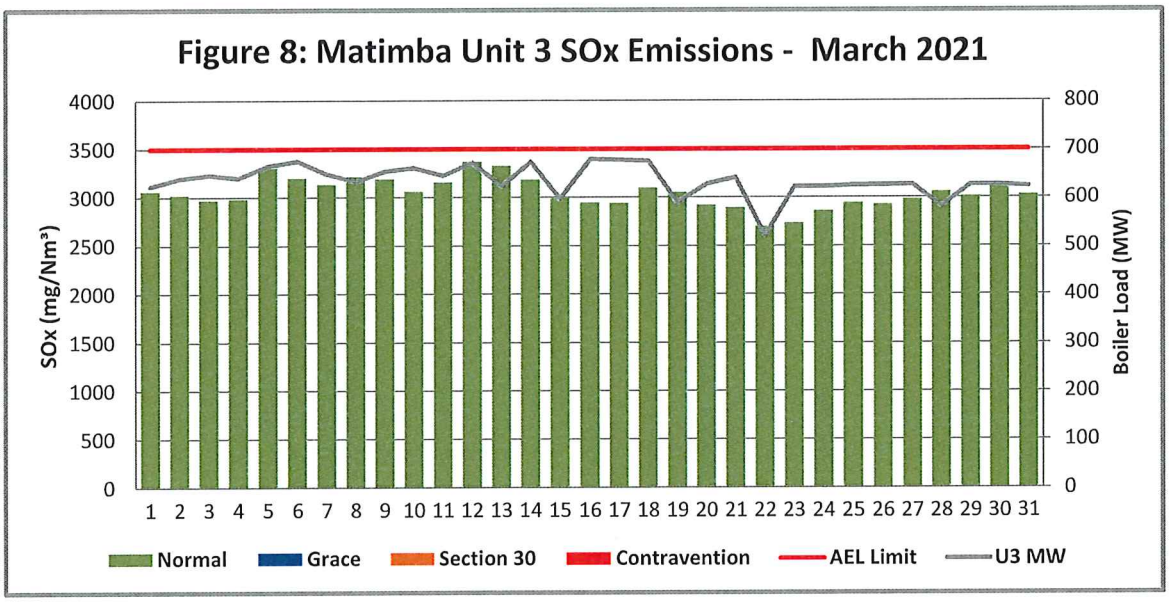

Figure 8: SO2 daily average emissions against emission limit for unit 3 for the month of March 2021

Interpretation:

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

Unit 4 SO_2 Emissions

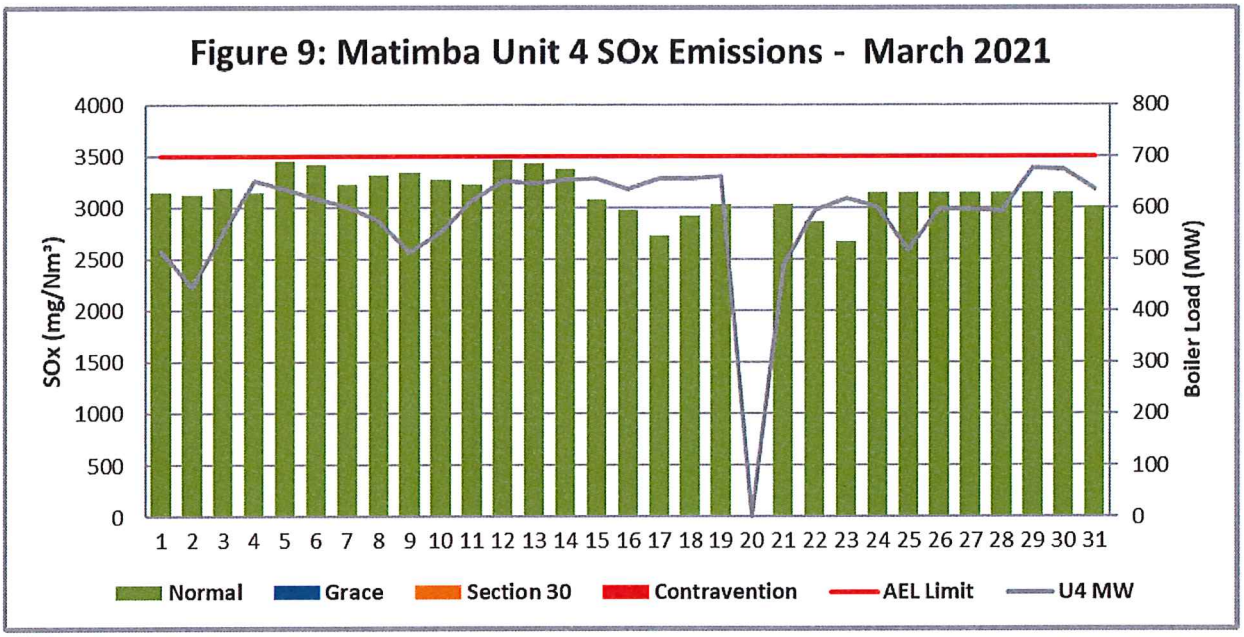

Figure 9: SO2 daily average emissions against emission limit for unit 4 for the month of March 2021

Interpretation:

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

Data from the 23rd of March 2021 until the 31st of March 2021 was removed and averaged data for the month was used due to a defect on the monitor after calibration on the 23rd of March 2021. The monitor was repaired on the 31st and emission readings returned to normal.

Unit 5 SO_2 Emissions

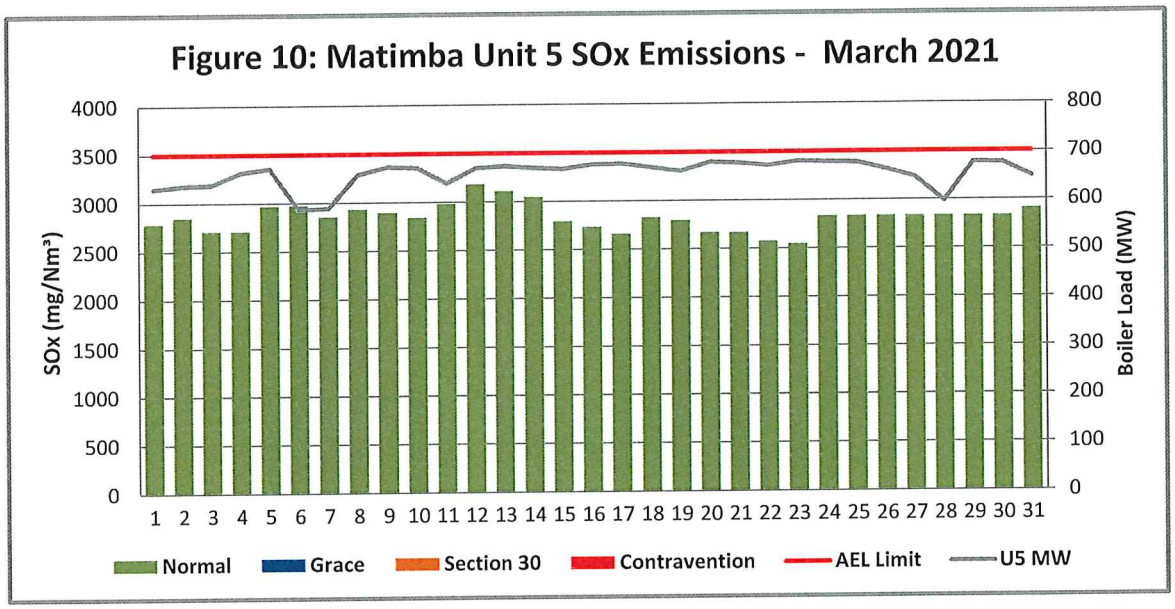

Figure 10: SO2 daily average emissions against emission limit for unit 5 for the month of March 2021

Interpretation:

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

Data from the 23rd of March 2021 until the 31st of March 2021 was removed and averaged data for the month was used due to a defect on the monitor after calibration on the 23rd of March 2021. The monitor was repaired on the 31st and emission readings returned to normal.

Unit 6 SO_2 Emissions

Interpretation:

Unit on outage

Unit 1 NO_x Emissions

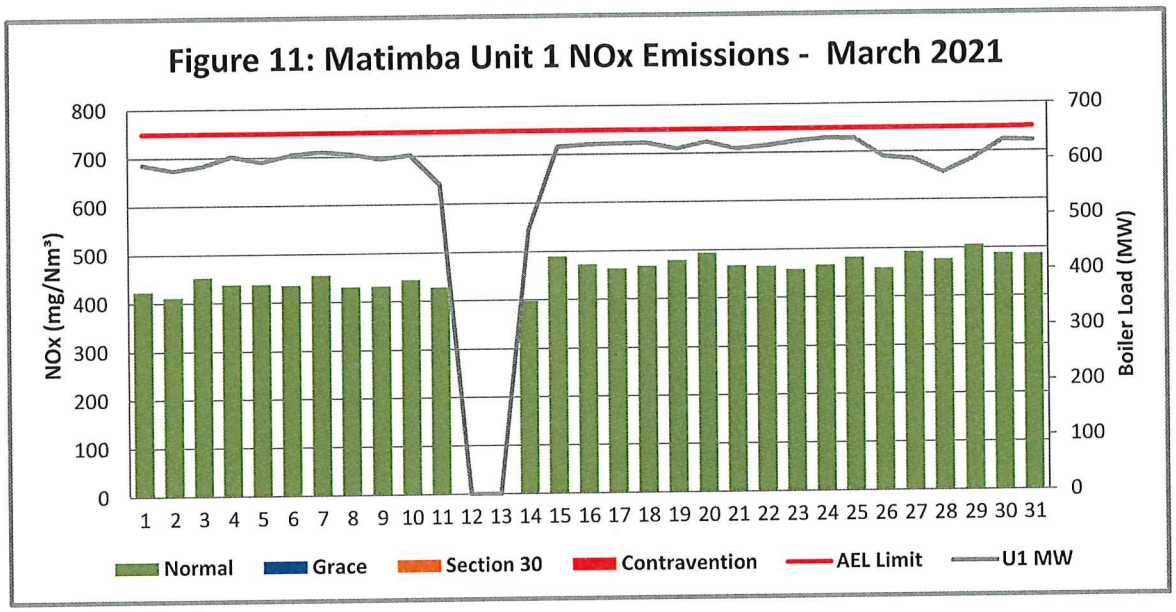

Figure 11: NOx daily average emissions against emission limit for unit 1 for the month of March 2021

Interpretation:

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

Unit 2 NO_x Emissions

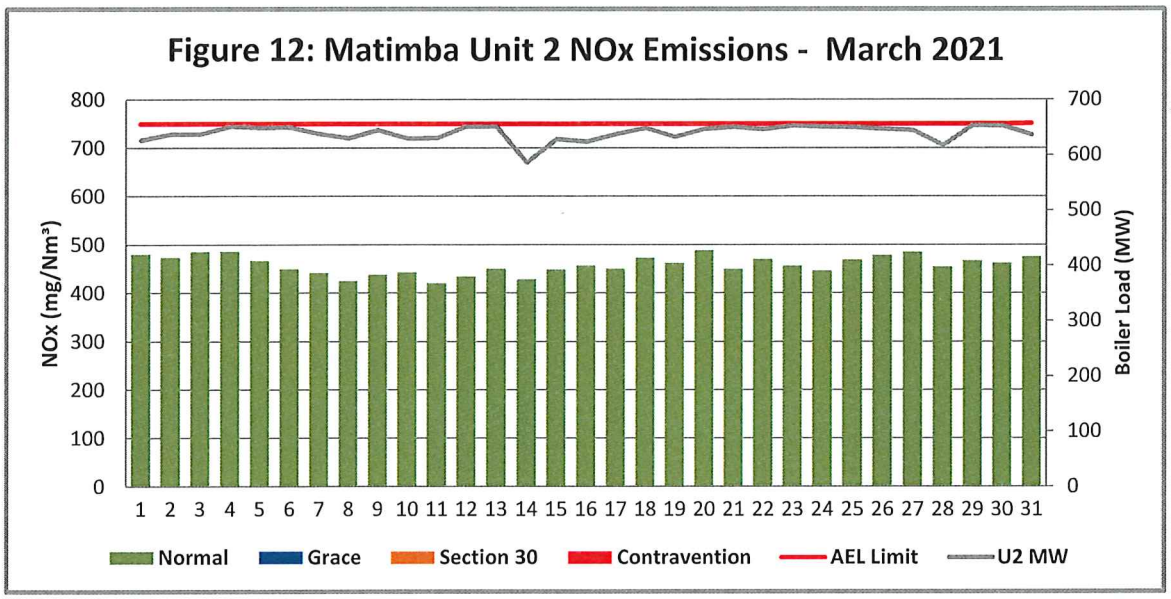

Figure 12: NOx daily average emissions against emission limit for unit 2 for the month of March 2021

Interpretation:

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

Unit 3 NO_x Emissions

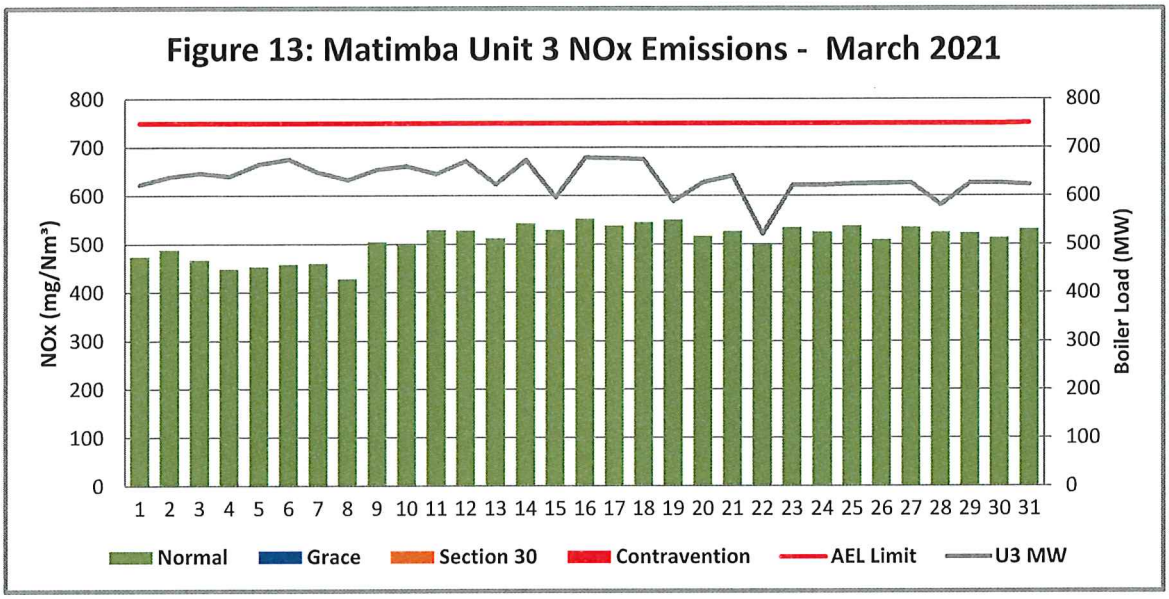

Figure 13: NOx daily average emissions against emission limit for unit 3 for the month of March 2021

Interpretation:

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

Unit 4 NO_x Emissions

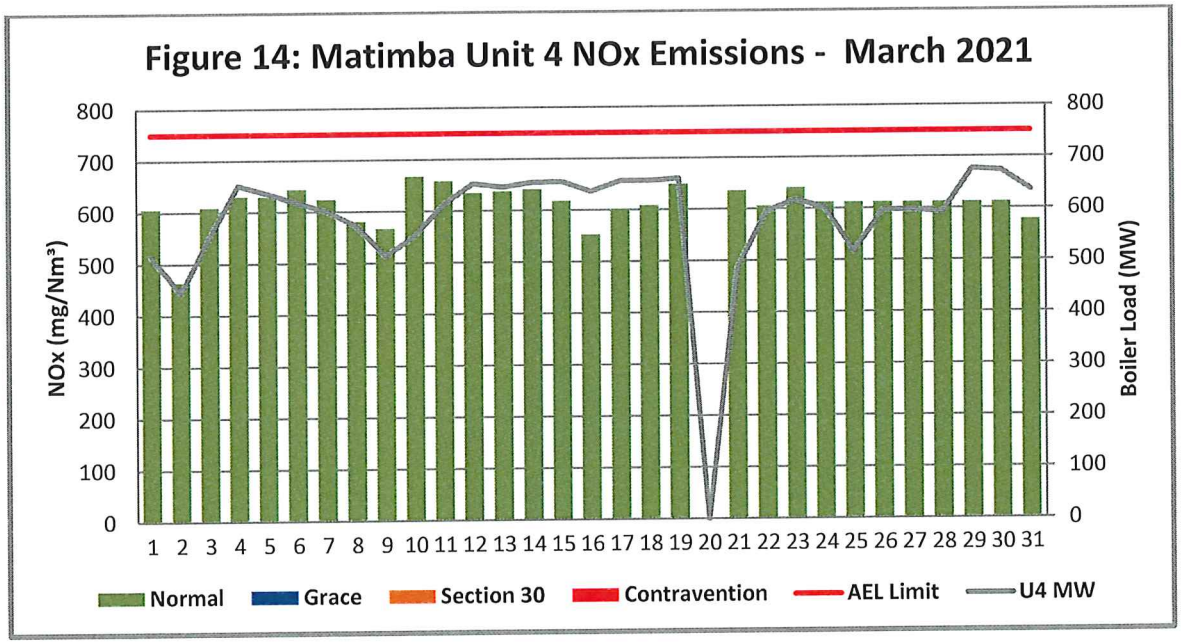

Figure 14: NOx daily average emissions against emission limit for unit 4 for the month of March 2021

Interpretation:

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

Data from the 23rd of March 2021 until the 31st of March 2021 was removed and averaged data for the month was used due to a defect on the monitor after calibration on the 23rd of March 2021. The monitor was repaired on the 31st and emission readings returned to normal.

Unit 5 NO_x Emissions

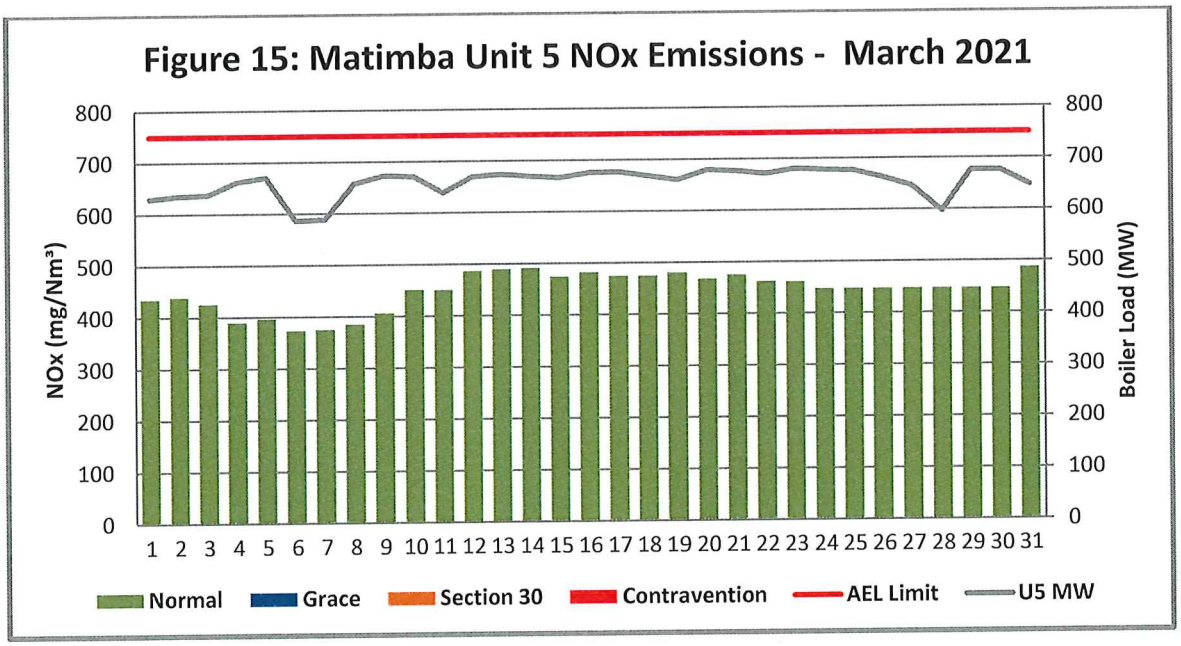

Figure 15: NOx daily average emissions against emission limit for unit 5 for the month of March 2021

Interpretation:

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

Data from the 23rd of March 2021 until the 31st of March 2021 was removed and averaged data for the month was used due to a defect on the monitor after calibration on the 23rd of March 2021. The monitor was repaired on the 31st and emission readings returned to normal.

Unit 6 NO_x Emissions

Interpretation:

Unit on outage

2.4.3 Total Volatile Organic Compounds

Table 4: Total volatile compound estimates

Eskom

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

Date:	Thursday, 08 April 2021
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:	*550,488*	tons/month
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):	**0,56**	**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, No.R. 994) 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 2021

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2021/03/01	14438,6	14837,9	14910,7	12273	14972,8	0
2021/03/02	14114,2	15055,9	15190,5	10572	15111,5	0
2021/03/03	14333,1	15085,3	15434	13159	15166,8	0
2021/03/04	14748,8	15413,2	15279,6	15536	15759,1	0
2021/03/05	14507,7	15362,9	15889,1	15146	15953,3	0
2021/03/06	14802,9	15396,5	16124,4	14712	13948,8	0
2021/03/07	14920,8	15112,8	15534	14295	14002,4	0
2021/03/08	14824,5	14922,7	15036,3	13656	15640,6	0
2021/03/09	14597,7	15273,9	15621,7	12231	16007,1	0
2021/03/10	14762,9	14904,3	15798,7	13135	15956,1	0
2021/03/11	6518,07	14926,7	15384,2	14598	15205	0
2021/03/12	0	15420,4	16071,6	15557	15932,3	0
2021/03/13	0	15414,1	14856,3	15396	16026,6	0
2021/03/14	10574,1	10316,3	16077,1	15583	15923,3	0
2021/03/15	15049,8	14878,3	14255,3	15647	15856,4	0
2021/03/16	15132,1	14755,6	16209,8	15196	16077,3	0
2021/03/17	15160,3	15072,6	16171	15638	16099,1	0
2021/03/18	15182,8	15358,9	16175,4	15628	15912,7	0
2021/03/19	14923,3	14956,8	13997,5	6898	15718,4	0
2021/03/20	15213,5	15306,3	14995,7	0	16156	0
2021/03/21	14898,8	15395,1	15316,6	5883	16103,8	0
2021/03/22	15018,4	15288,7	12437,5	14170	15975,7	0
2021/03/23	15203,9	15439,1	14852,9	14733	16186,4	0
2021/03/24	15314,6	15400,9	14850,8	14310	16139,3	0
2021/03/25	15298,1	15377,7	14911,5	12346	16111,2	0
2021/03/26	14493,1	15306,8	14933,9	14199	15778,2	0
2021/03/27	14385,7	15250,6	14959,1	14242	15382,3	0
2021/03/28	13866,7	14611,6	13877,7	14140	14215,8	0
2021/03/29	14348,9	15453,8	14961,1	16096	16096,6	0
2021/03/30	15201,7	15454,1	14961,7	16042	16092,5	0
2021/03/31	15157,1	15038,5	14879,7	15168	15410,4	0

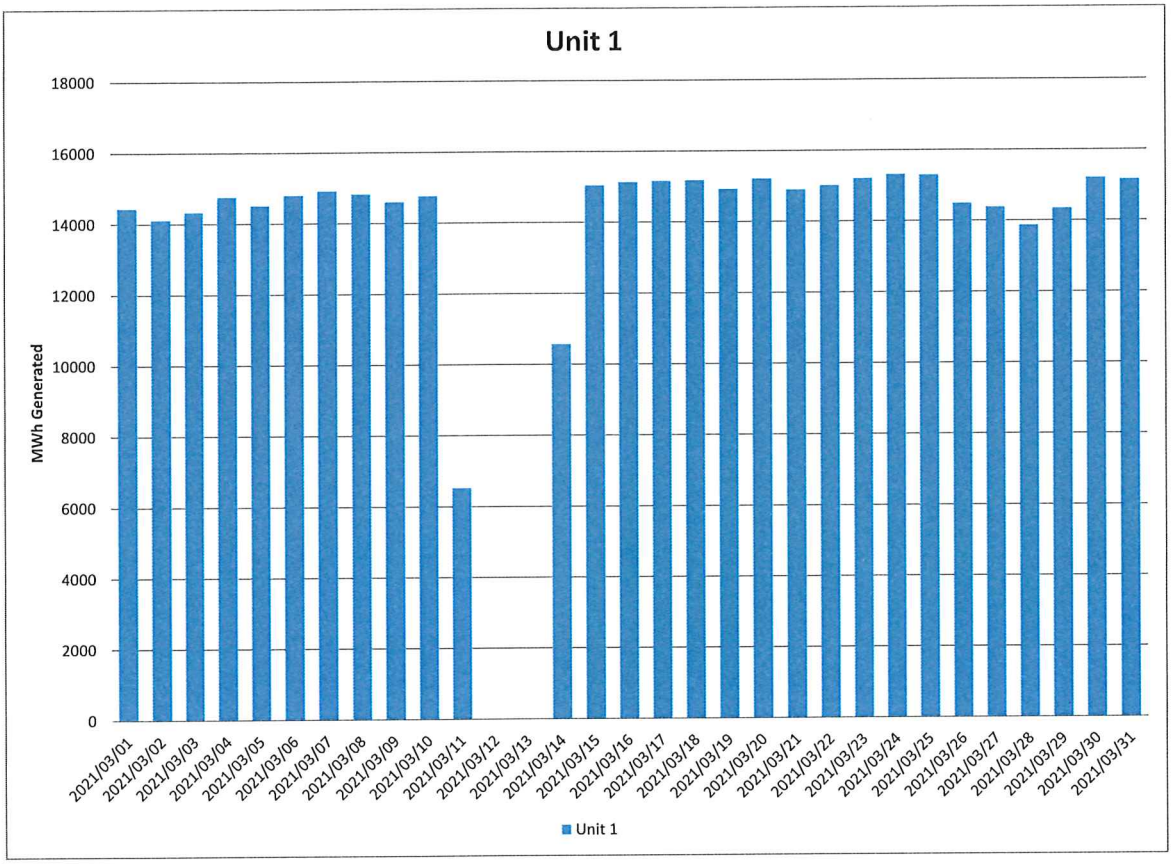

Figure 16: Unit 1 daily generated power in MWh for the month of March 2021

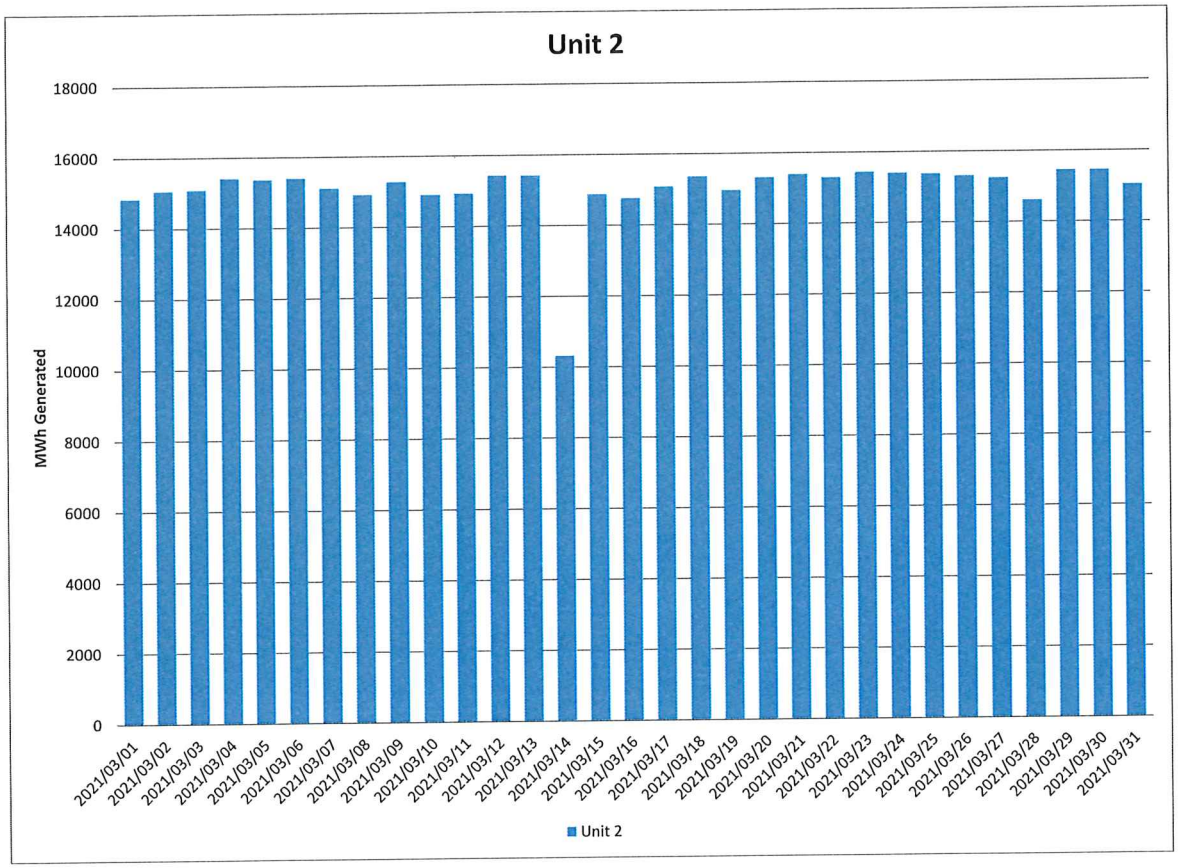

Figure 17: Unit 2 daily generated power in MWh for the month of March 2021

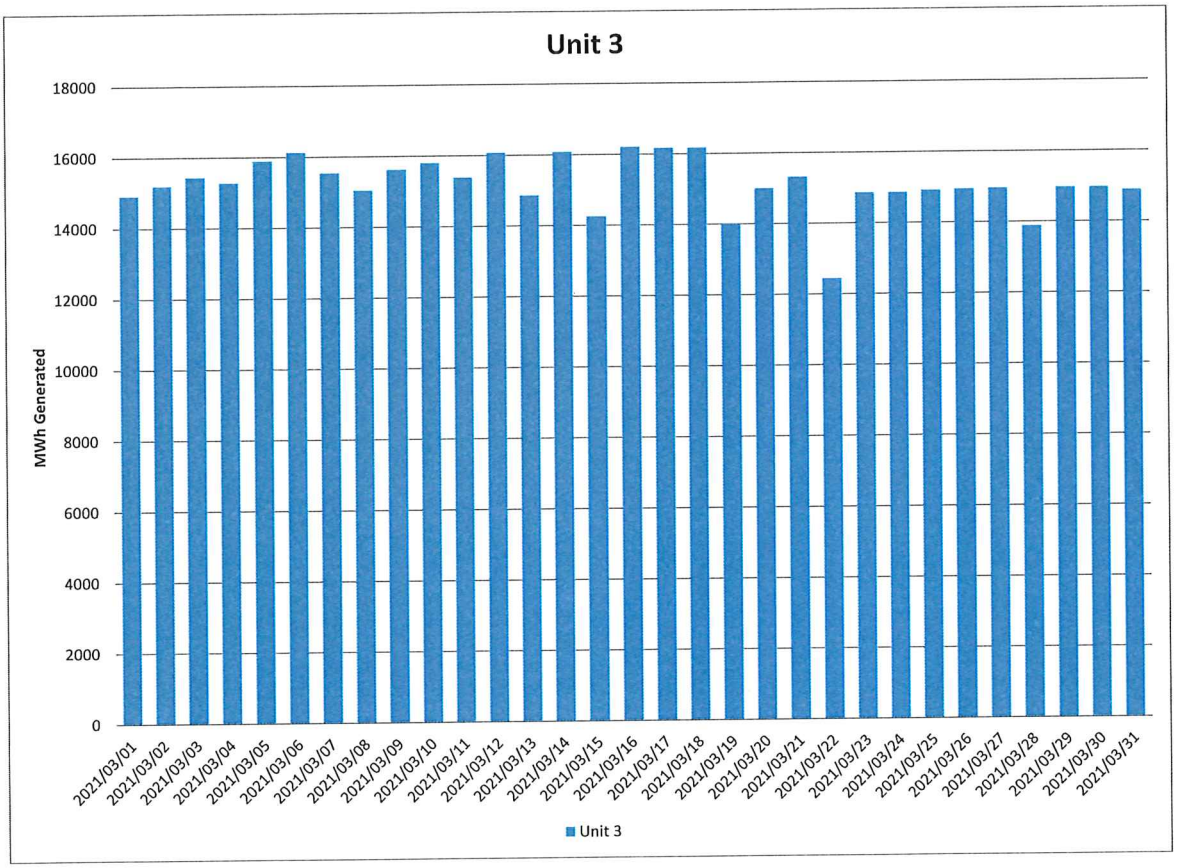

Figure 18: Unit 3 daily generated power in MWh for the month of March 2021

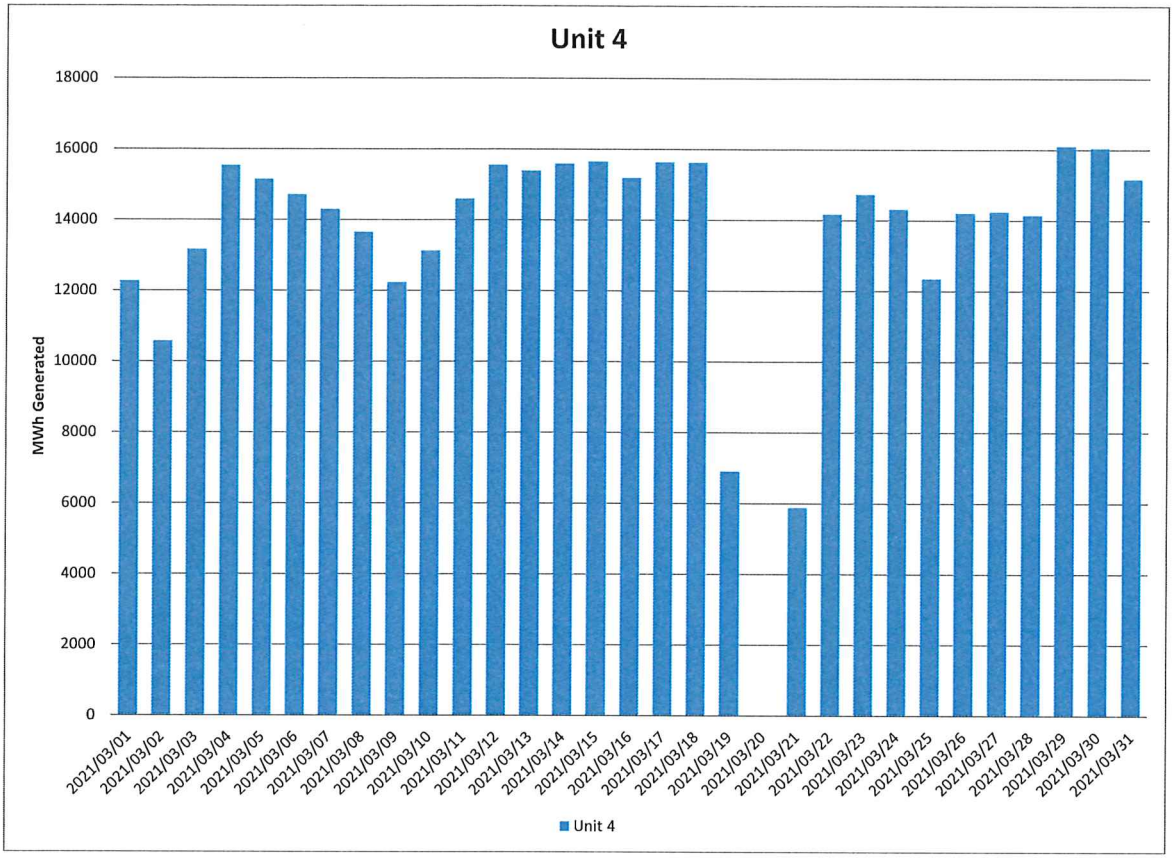

Figure 19: Unit 4 daily generated power in MWh for the month of March 2021

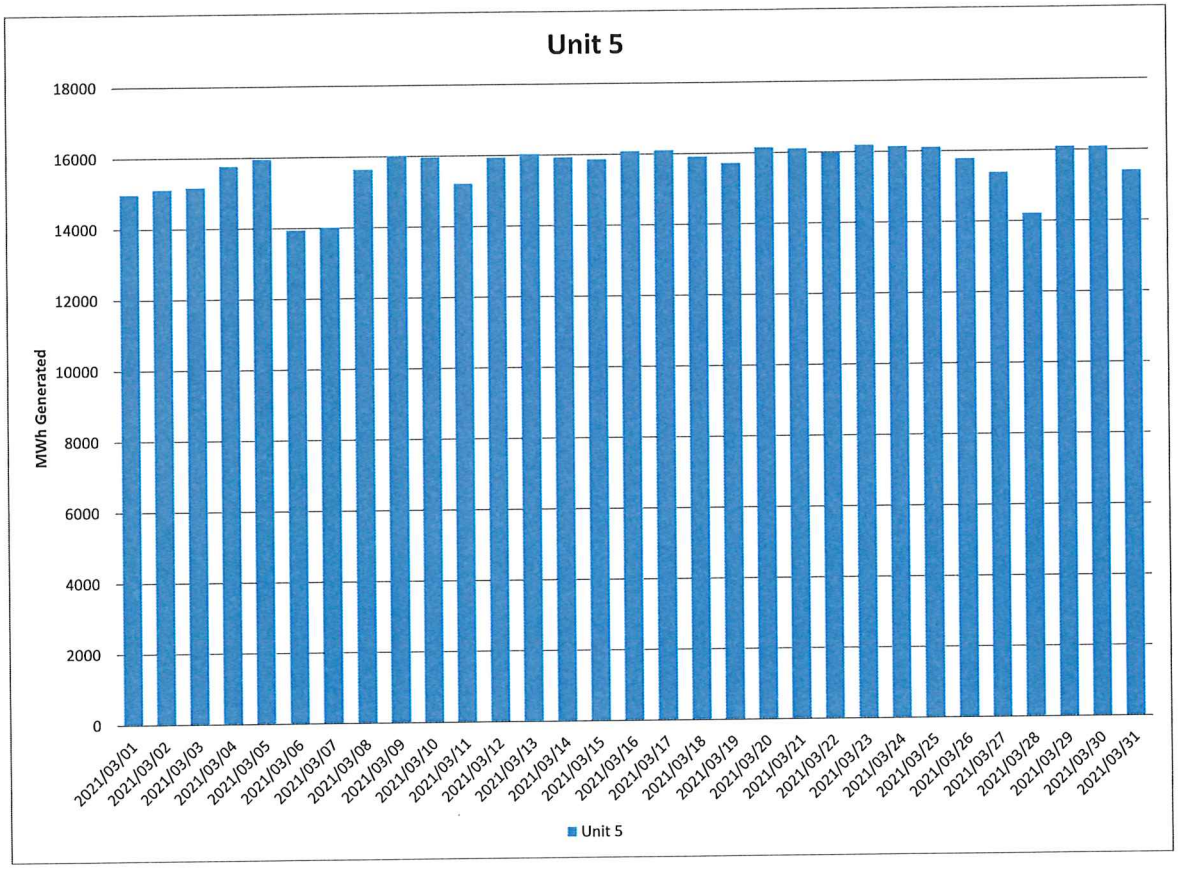

Figure 20: Unit 5 daily generated power in MWh for the month of March 2021

Note: Unit 6 is on outage

2.6 Pollutant Tonnages

Table 6: Pollutant tonnages for the month of March 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO_2 (tons)
Unit 1	38,7	5 488,1	971,5	438 493
Unit 2	44,9	7 447,1	1 011,0	486 454
Unit 3	46,9	7 537,1	1 258,2	441 408
Unit 4	70,5	6 450,9	1 261,0	402 129
Unit 5	50,0	6 308,7	998,4	417 410
Unit 6	0,0	0,0	0,0	0
SUM	251,0	33 232,0	5 500,1	2 185 894

The emitted pollutant tonnages for March 2021 are provided in table 6. Unit 6 was on outage for the whole of March 2021.

2.7 Reference values

Table 7: Reference values for data provided

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	8,66	7,74	7,34	6,96	7,61	
Moisture	%	5,07	5,42	4,72	3,66	5,73	
Velocity	m/s	30,9	28,3	29,7	25,8	27,2	
Temperature	°C	143,3	131,7	129,9	134,7	128,7	
Pressure	mBar	934,5	900,2	917,9	921,4	933,4	

Table 7 shows the reference values for the emission data provided for the month of March 2021. Unit 6 was on outage for the whole of March 2021.

2.8 Continuous Emission Monitors

2.8.1 Reliability

Table 8: Average percentage (%) availability of monitors for the month of March 2021.

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100,0	100,0	99,8	100,0
Unit 2	100,0	100,0	100,0	0,0
Unit 3	100,0	100,0	100,0	0,0
Unit 4	100,0	70,4	72,4	99,0
Unit 5	100,0	74,2	74,2	100,0
Unit 6	Outage	Outage	Outage	Outage

SO_X and NO_x emission monitors for unit 4 and unit 5 did not achieve 90% reliability as required by the license. Calibrations were done on the gaseous monitors on the 23rd of March 2021 and an incorrect setting caused the monitors to give faulty readings. The monitors were repaired on the 31st of March 2021.

CO_2 monitors for units 2 and 3 achieved 100% availability however CO_2 data was replaced with Average values from the QAL 2 report due to the raw data being unreliable.

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

- Unit 6 has been on outage for the whole month of March 2021

2.8.3 Sampling dates and times

Continuous

2.9 Start-up information

Table 9: Start-up information

Unit	1	
Fires in	13 March 2021	18h57
Synchronization with Grid	14 March 2021	01h38
Emissions below limit	14 March 2021	09h20
Fires in to synchronization	6,68	HOURS
Synchronization to < Emission limit	7,7	HOURS

Unit	2	
Fires in	14 March 2021	09h49
Synchronization with Grid	14 March 2021	12h08
Emissions below limit	14 March 2021	13h02
Fires in to synchronization	2,32	HOURS
Synchronization to < Emission limit	54	MINUTES

Unit	4	
Fires in	21 March 2021	05h31
Synchronization with Grid	21 March 2021	11h50
Emissions below limit	21 March 2021	15h00
Fires in to synchronization	6,32	HOURS
Synchronization to < Emission limit	3,17	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	510,13	566,01	572,2	522,83	572,2	Unit off
Emergency Hours declared including hours after stand down	516,13	572,02	578,2	528,83	578,2	Unit off
Days over the Limit during Emergency Generation	0	0	0	2	0	Unit off

Unit 4 particulate emissions exceeded the 50mg/Nm^3 emission limit on the 1st and 9th of March 2021. The exceedances did not exceed the 48-hour grace period. Detailed emission information for unit 4 particulate emissions can be found on figure 4.

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
None					

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

Four exceedances of the SO_2 10-minute limit, two exceedances of the SO_2 hourly limit , two exceedances of the $PM_{2.5}$ daily limit and one exceedance of the PM_{10} daily limit was noted. No other parameters exceeded the set limits during the monitoring period.

Ambient CO, PM_{10} and NO_2 concentrations at Marapong monitoring site show influence of emissions from low-level sources in the area while ambient SO_2, and $PM_{2.5}$ concentrations show influence of emissions from low level sources, tall stack emitters and other industrial activities.

The average data recovery for the period was 87,6% and the station availability was 90,2%.

Detailed results can be found in Attachment 1, "Marapong monthly Report_March 2021".

2.14 Electrostatic precipitator and Sulphur plant status

Unit 1

- All precipitator fields in service.
- 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

- 2 out of 32 precipitator fields is out of service. Repairs will be done during the next opportunity outage.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 4

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

Unit 5

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

Unit 6

- Unit 6 has been on outage for the whole month of March 2021

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

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

GENERAL MANAGER: MATIMBA POWER STATION