Eskom	Matimba Power Station Emissions report	Matimba Power Station

Title:	**Matimba Power Station January 2021 emissions report**	Document Identifier:	**RP/247/003**
		Plant Location:	**Emission management**
		Area of Applicability:	**Matimba Power Station**
		Functional Area Applicability:	**Environment**
		Revision:	**3**
		Total Pages:	**38**
		Report Date:	**October 2021**
		Disclosure Classification:	**Controlled**

Compiled by	**Functional Responsibility**	**Authorized by**
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Environmental Officer	**Environmental Manager**	**General Manager**
Date: 2021/10/27	Date: 29 October 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 January 2021.

Due to recommendations received from an internal emission data review the Matimba Power Station January 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 2 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 seven exceedances of the daily particulate matter emission limit (50mg/Nm^3), all exceedances were within the 48hour grace period. No exceedances of the daily NO_x emission limit (750mg/Nm^3), and of the monthly SO_x limit (3500mg/Nm^3) occurred.

Gaseous emission monitoring availability was below the required 90% for unit 1, unit 2, unit 4 and unit 6.

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	1 050 144
	Fuel Oil	Tons/month	1 200	1117,61
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	2 010,816

The coal and fuel oil consumptions rates for the month of January 2021 were within the permitted maximum limit. The consumption rate for fuel oil increased compared to previous months, this was due to multiple unit start-ups (three in total) during the reporting period.

2.2 Abatement technology

Table 2: Abatement Equipment Control Technology Utilised

Associated Unit	Technology Type	Minimum utilisation (%)	Actual Utilisation (%)
Unit 1	Electrostatic Precipitator	100%	99,93%
Unit 2	Electrostatic Precipitator	100%	99,94%
Unit 3	Electrostatic Precipitator	100%	99,89%
Unit 4	Electrostatic Precipitator	100%	99,88%
Unit 5	Electrostatic Precipitator	100%	99,92%
Unit 6	Electrostatic Precipitator	100%	99,86%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	87,1%
Unit 2	SO_3 Plant	100%	93,5%
Unit 3	SO_3 Plant	100%	93,5%
Unit 4	SO_3 Plant	100%	90,3%
Unit 5	SO_3 Plant	100%	100%
Unit 6	SO_3 Plant	100%	96,8%

Matimba experienced challenges with regards to sulphur plant availability. Long lead times for delivery for spares and unplanned breakdowns caused units 1, 2, 3, 4 and 6 to not achieve the required 100% availability of the respective sulphur plants. Planned maintenance activities can also cause availability to not reach 100%.

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%	1.321%
	Ash Content	30-40%	32.590%

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

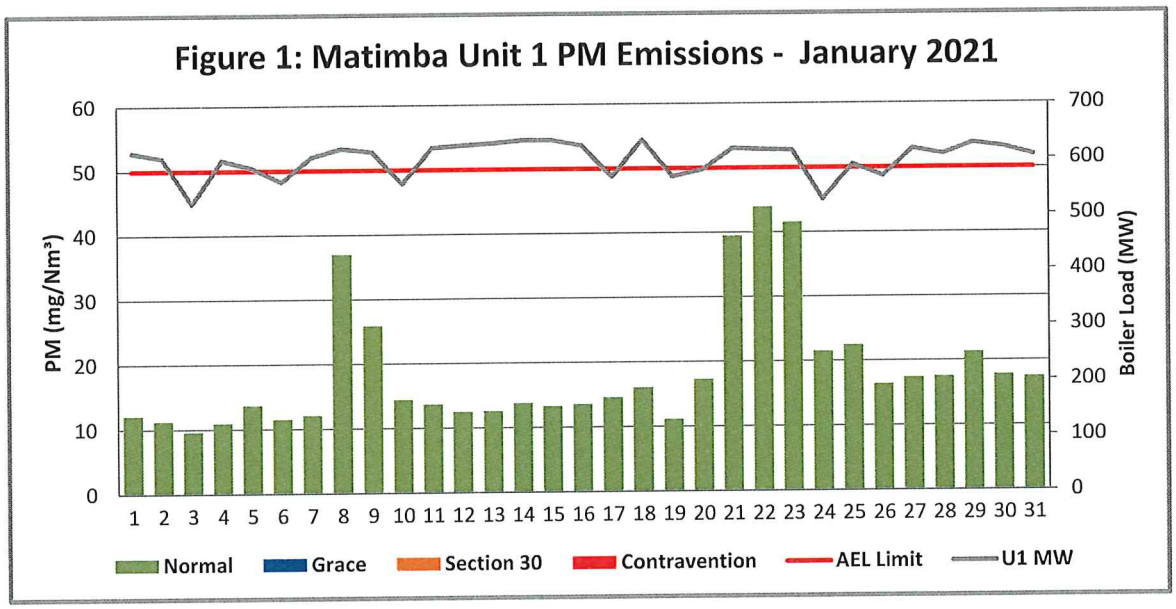

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of January 2021

Interpretation:

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

Unit 2 Particulate Emissions

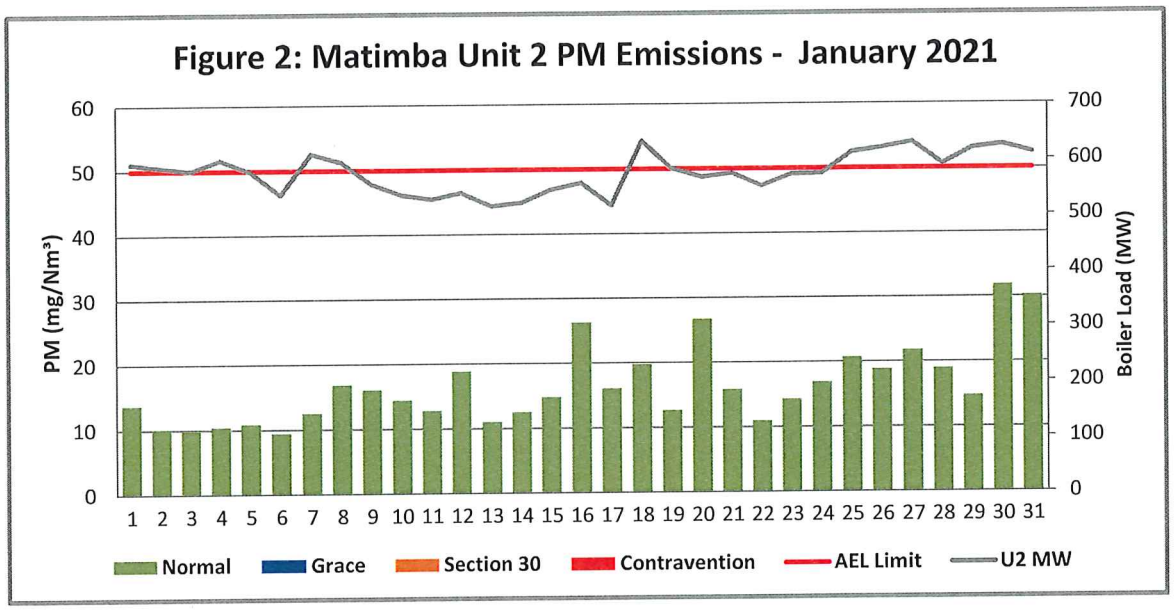

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of January 2021

Interpretation:

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

Unit 3 Particulate Emissions

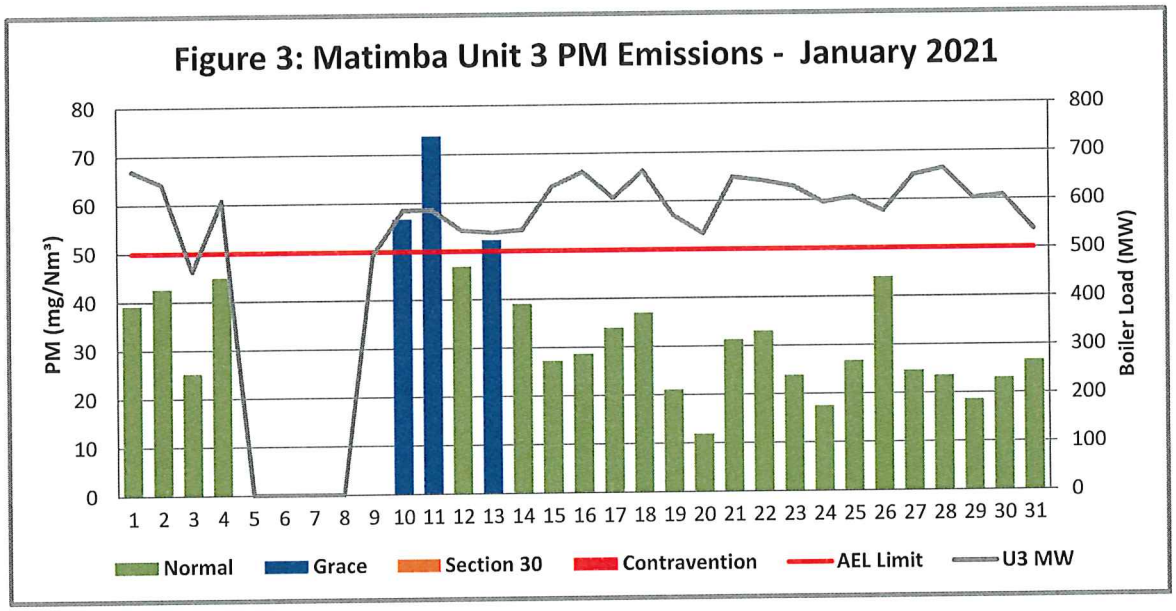

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of January 2021

Interpretation:

Unit 3 exceeded the particulate emission limit of 50 mg/Nm^3 on the 10th and 11th of January 2021. The exceedances were due to defects within the ash handling plant. Defects were addressed and no further exceedances were noted. The 48-hour grace period was not exceeded.

Unit 4 Particulate Emissions

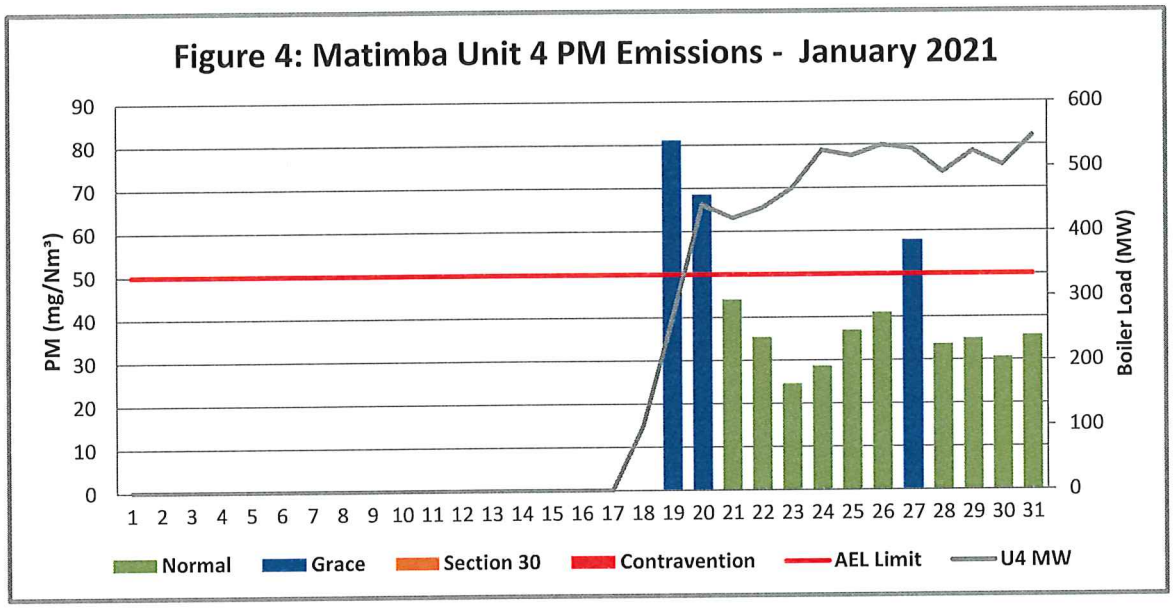

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of January 2021

Interpretation:

Unit 4 exceeded the particulate emission limit of 50 mg/Nm^3 on the 19th and 20th and 27th of January 2021. The exceedances was due to breakdowns 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

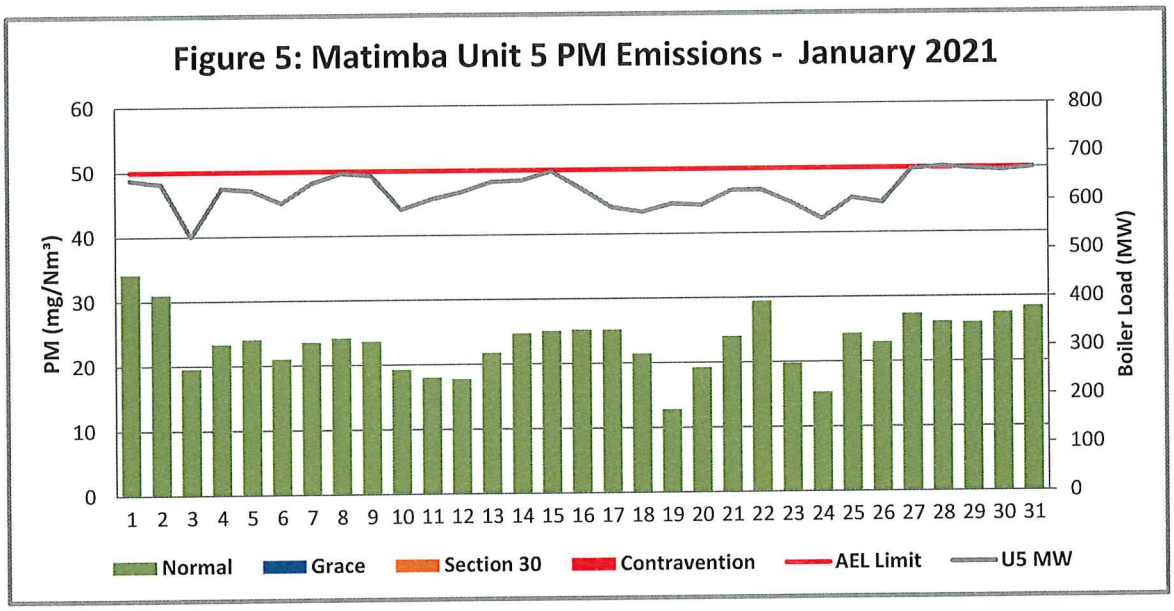

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of January 2021

Interpretation:

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

Unit 6 Particulate Emissions

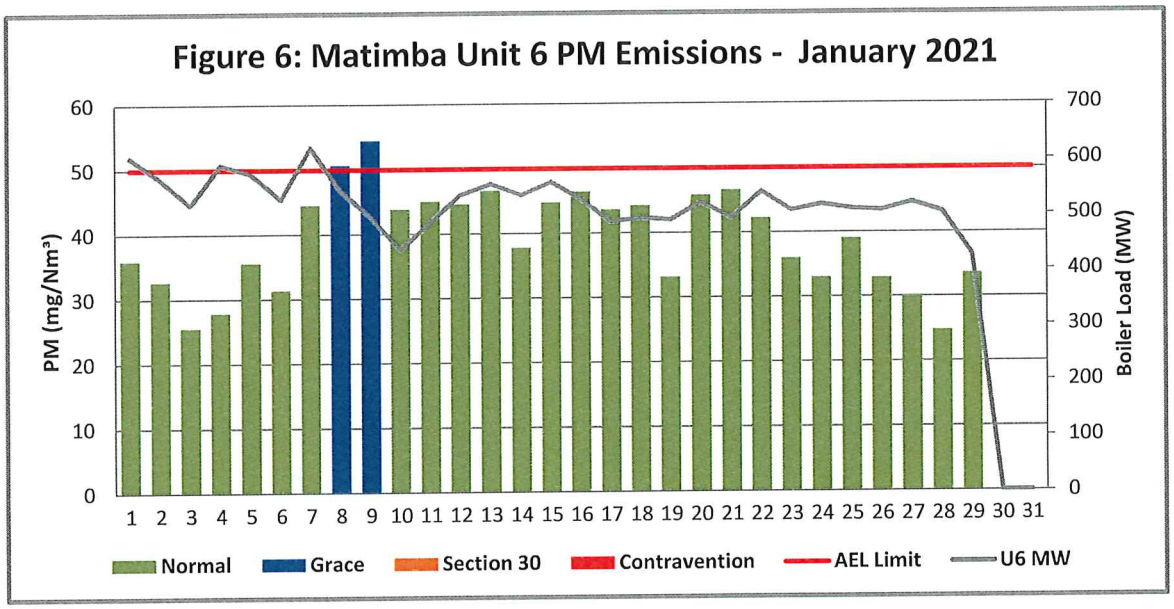

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of January 2021

Interpretation:

Unit 6 exceeded the particulate emission limit of 50 mg/Nm^3 on the 8th and 9th of January 2021 due to defects on the sulphur plant. The exceedances did not exceed the 48-hour grace period. Unit 6 is currently on outage and defects on the sulphur plant are being addressed.

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

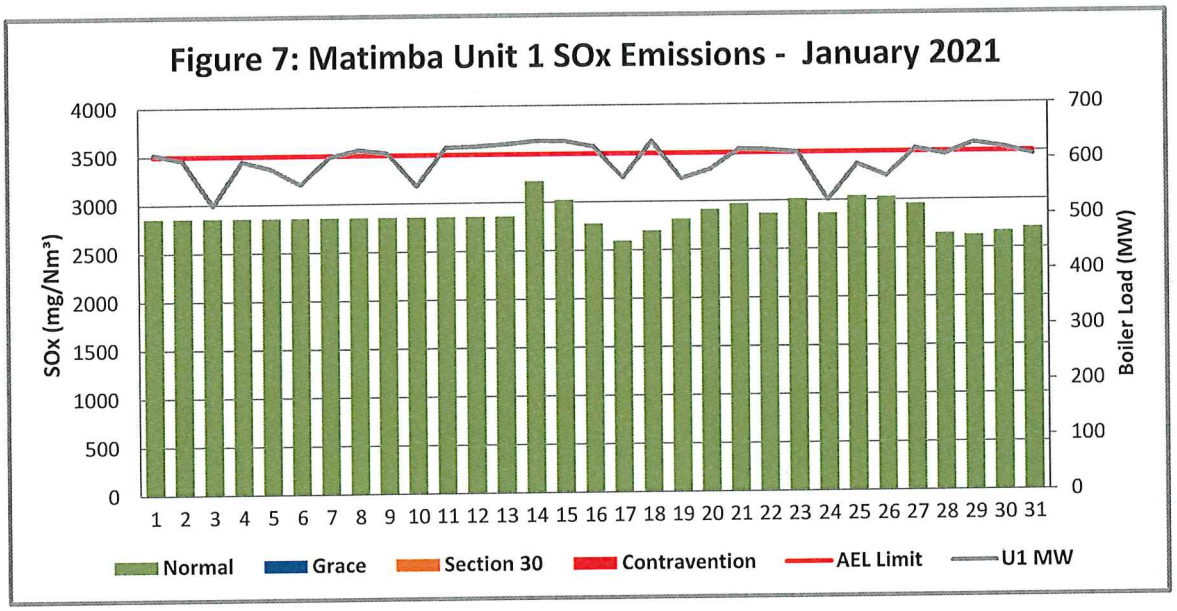

Figure 7: SO_2 daily average emissions against emission limit for unit 1 for the month of January 2021

Interpretation:

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

Average Emission data for the 1st until the 14th of January 2021 was used due to the monitor giving faulty readings for that time period. Monitor was repaired on the 14th.

Unit 2 SO_2 Emissions

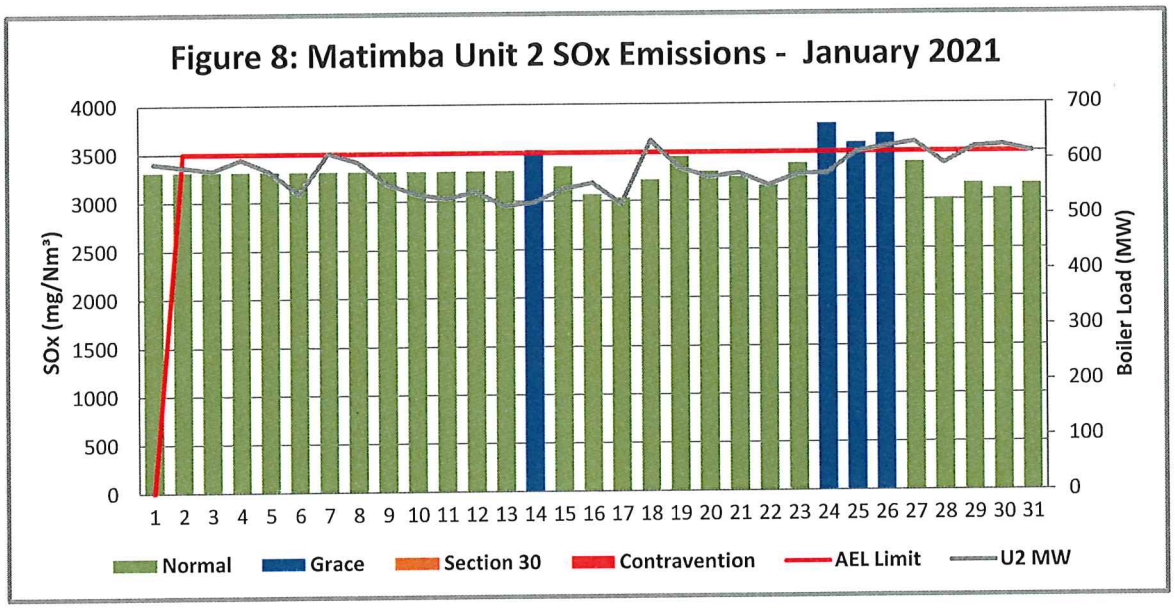

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of January 2021

Interpretation:

Unit 2 experienced increased SO_x emissions on the 14th and of January 2021 and from the 24th to the 26th of January 2021. The monthly average remained below the limit of 3500mg/Nm³ with a monthly average of 3358mg/Nm³

Average Emission data for the 1st until the 13th of January 2021 was used due to the monitor computer being defective. The computer was repaired on the 13th of January 2021.

Unit 3 SO_2 Emissions

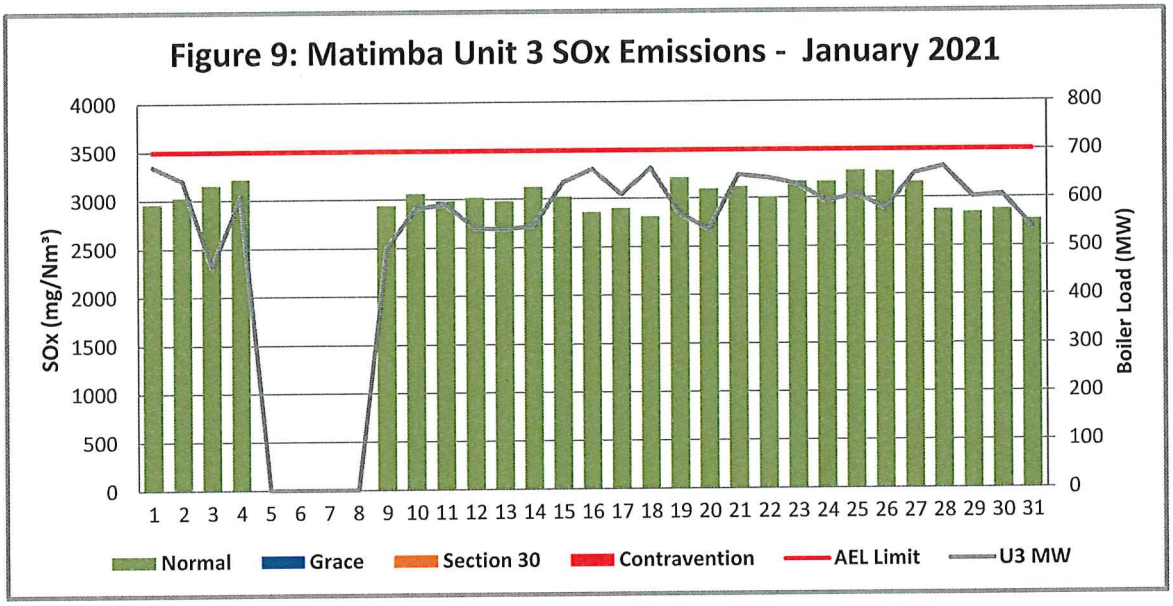

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of January 2021

Interpretation:

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

Average Emission data for the 13th and 14th of January 2021 was used due to faulty monitor readings.

Unit 4 SO_2 Emissions

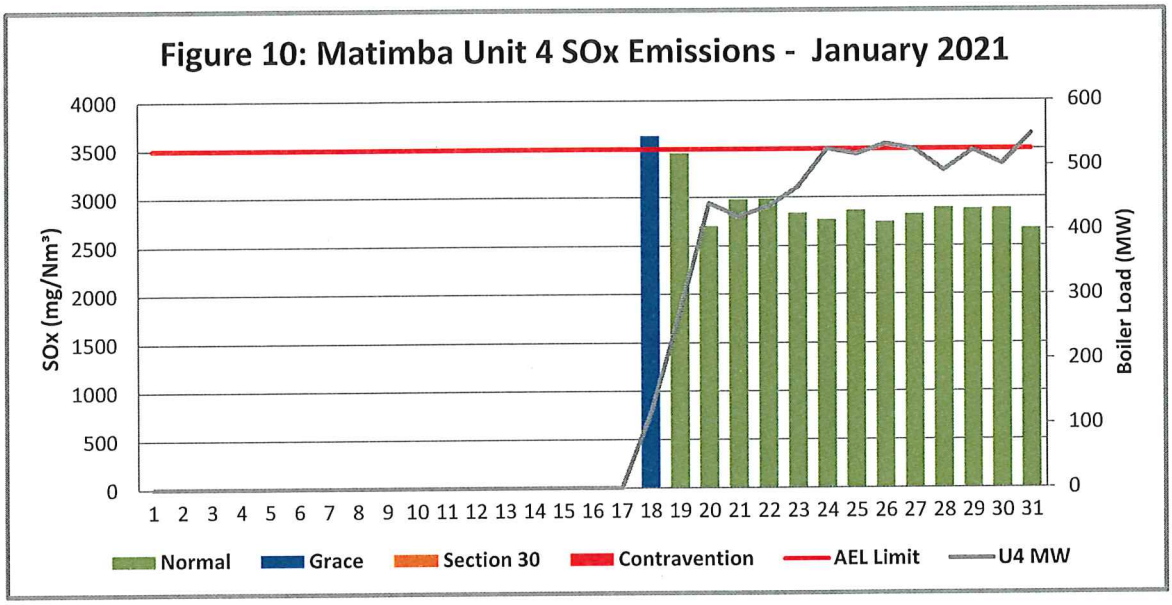

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of January 2021

Interpretation:

Unit 4 experienced increased SO_x emissions on 18 January 2021. The monthly average remained below the limit of 3500mg/Nm^3.

Unit 4 gaseous emission monitor started providing faulty readings on the 20th of January 2021. Averaged QAL 2 values were used for reporting SO_x emission data for January 2021.

Unit 5 SO_2 Emissions

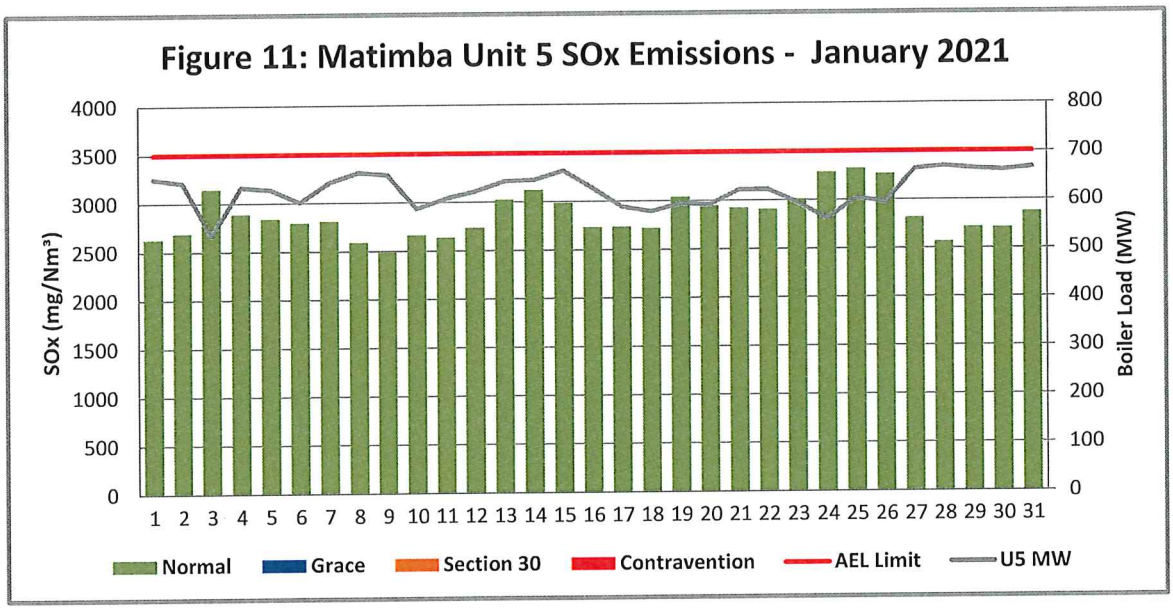

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of January 2021

Interpretation:

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

Unit 6 SO_2 Emissions

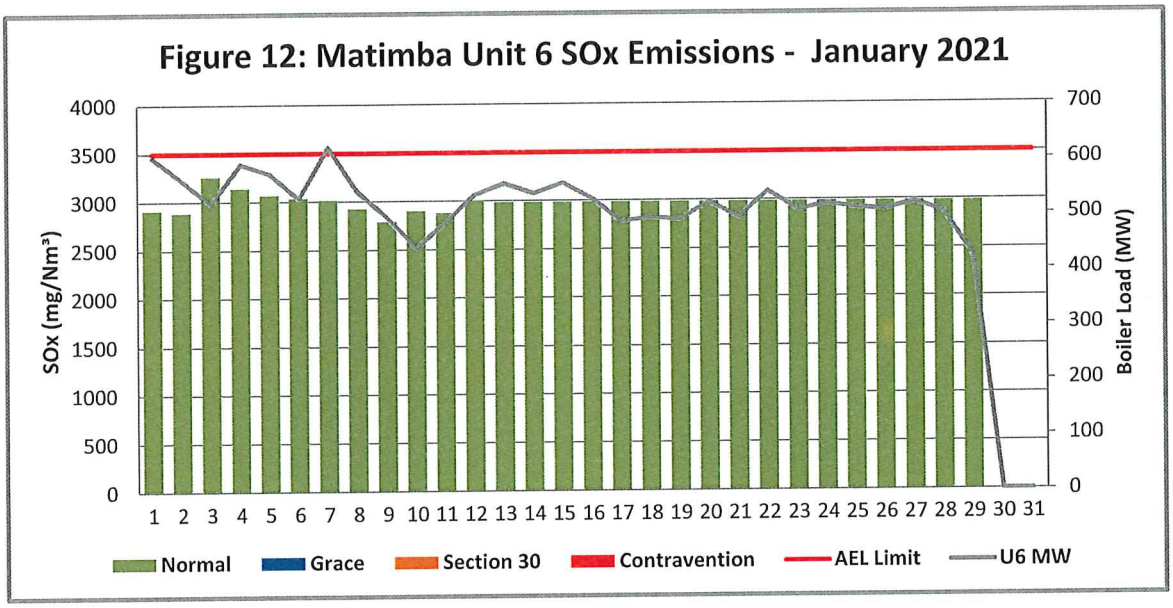

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of January 2021

Interpretation:

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

Average Emission data from the 12th until the 29th of January 2021. Gaseous emission monitor provided faulty readings due to a defective pressure sensor and computer.

Unit 6 was shut down on the 29th of January 2021

Unit 1 NO_x Emissions

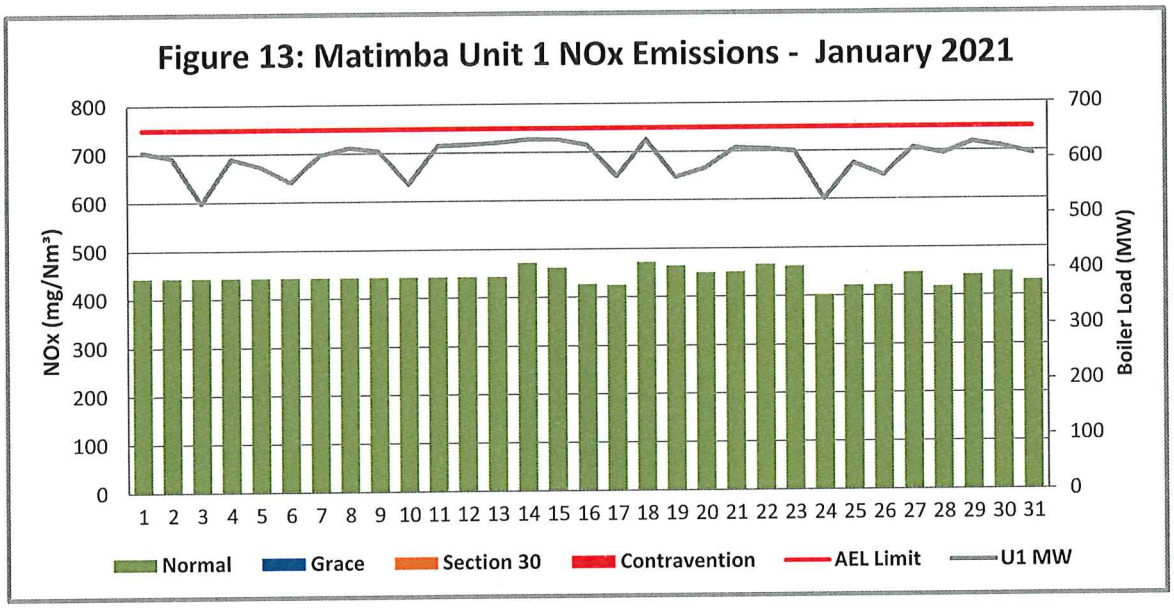

Figure 13: NOx daily average emissions against emission limit for unit 1 for the month of January 2021

Interpretation:

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

Average Emission data for the 1st until the 14th of January 2021 was used due to the monitor giving faulty readings for that time period. Monitor was repaired on the 14th.

Unit 2 NO_x Emissions

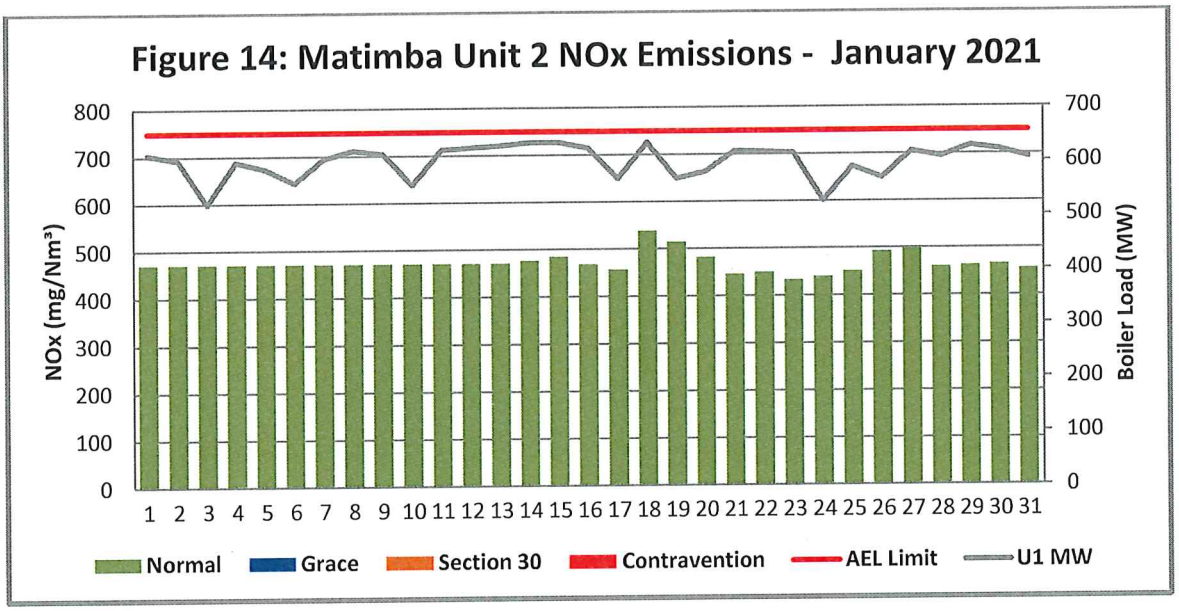

Figure 14: NOx daily average emissions against emission limit for unit 2 for the month of January 2021

Interpretation:

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

Average Emission data for the 1st until the 13th of January 2021 was used due to the computer being defective. The computer was repaired on the 13th of January 2021.

Unit 3 NO_x Emissions

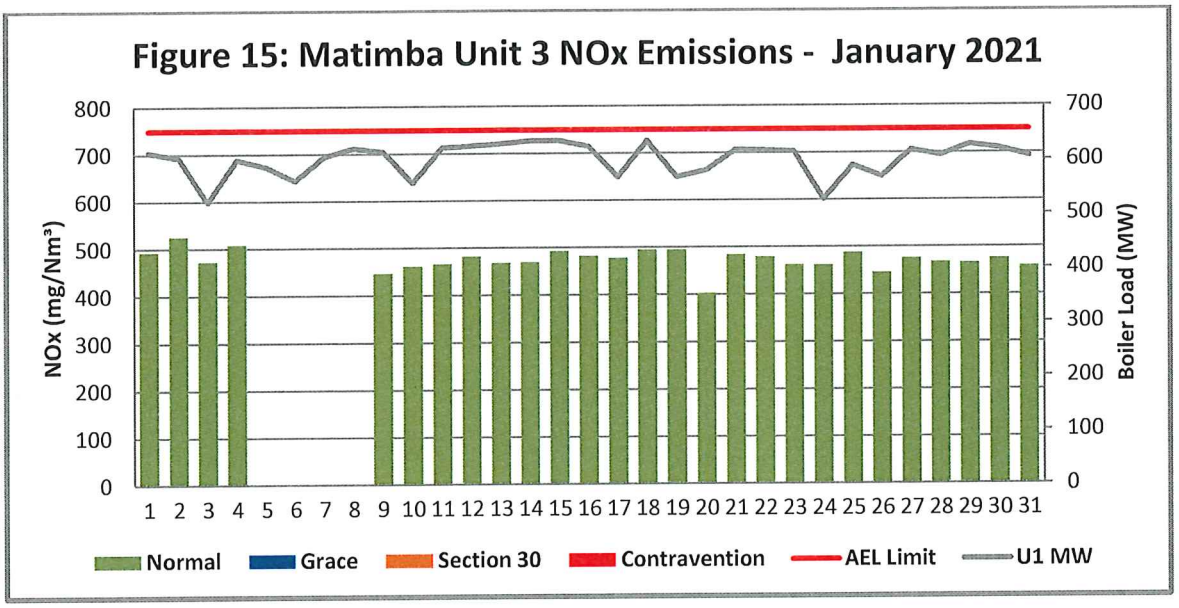

Figure 15: NOx daily average emissions against emission limit for unit 3 for the month of January 2021

Interpretation:

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

Average Emission data for the 13th and 14th of January 2021 was used due to faulty monitor readings.

Unit 4 NO_x Emissions

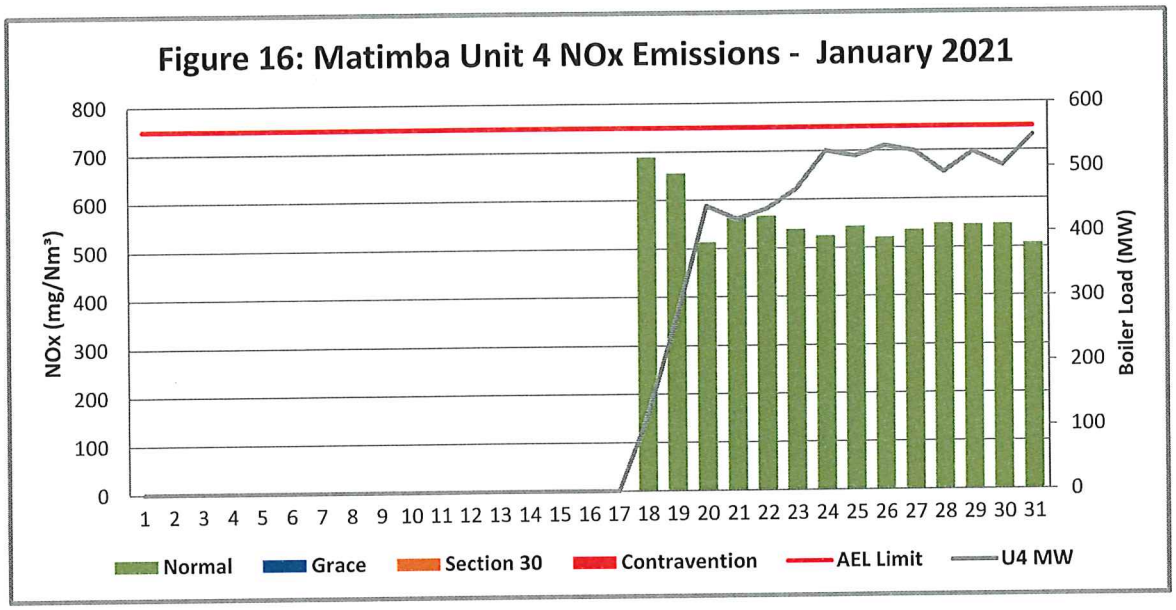

Figure 16: NOx daily average emissions against emission limit for unit 4 for the month of January 2021

Interpretation:

Unit 4 gaseous emission monitor started providing faulty readings on the 20th of January 2021. Averaged QAL 2 values were used for reporting NO_x emission data for January 2021.

Unit 5 NO_x Emissions

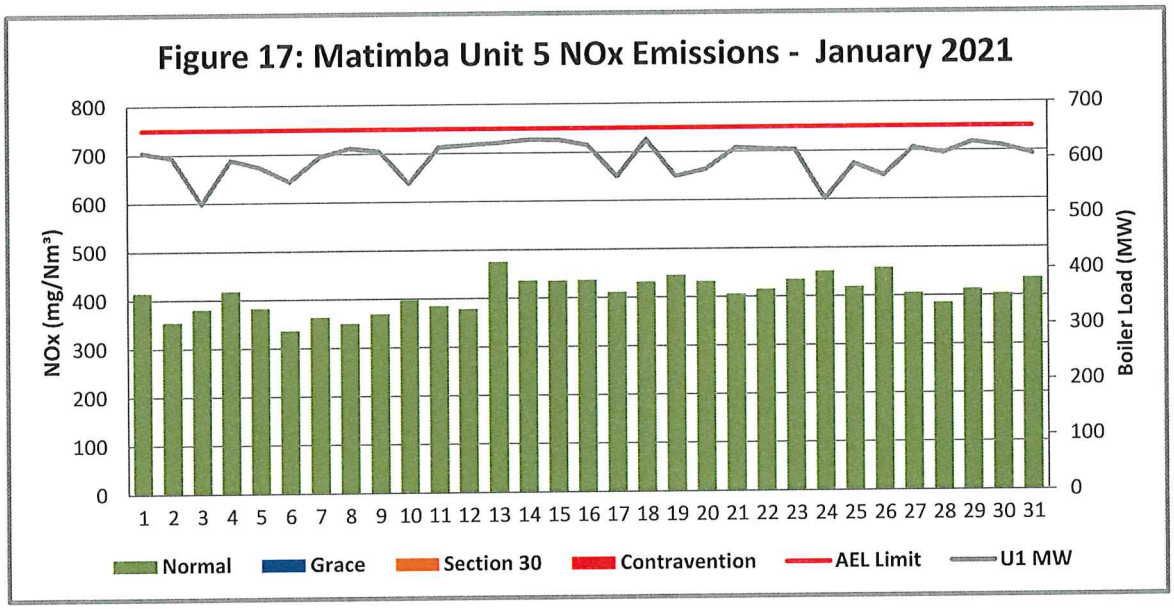

Figure 17: NOx daily average emissions against emission limit for unit 5 for the month of January 2021

Interpretation:

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

Unit 6 NO_x Emissions

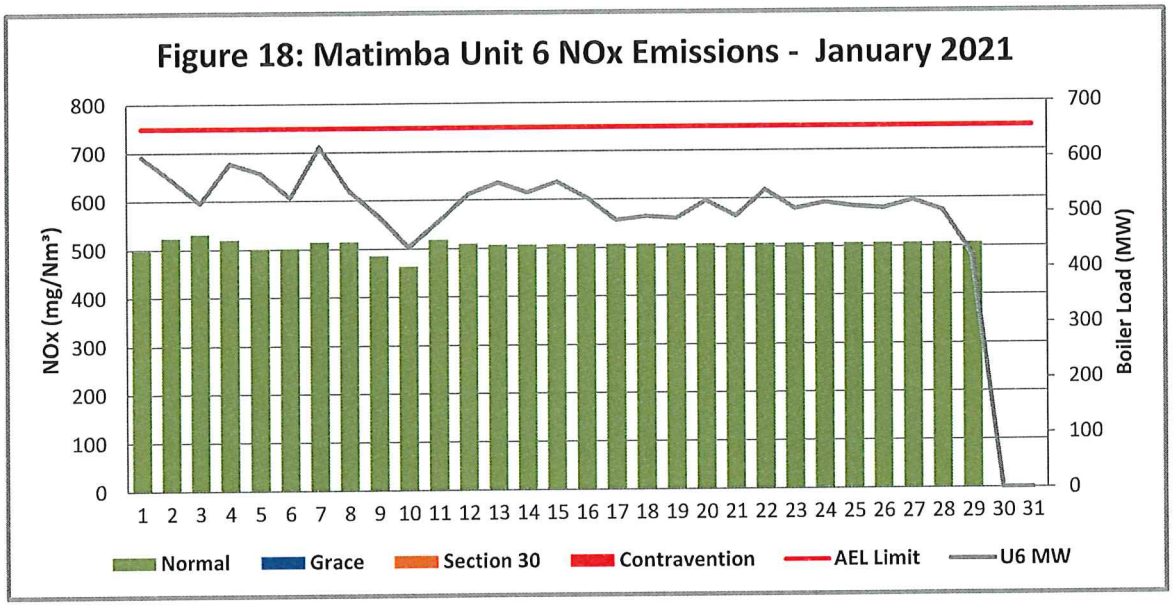

Figure 18: NOx daily average emissions against emission limit for unit 6 for the month of January 2021

Interpretation:

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

Average Emission data from the 12th until the 29th of January 2021. Gaseous emission monitor provided faulty readings due to a defective pressure sensor and computer.

Unit 6 was shut down on the 29th of January 2021

2.4.3 Total Volatile Organic Compounds

Table 4: Total volatile compound estimates

Eskom

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

Date:	Wednesday, 24 February 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:	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:	*1117,610*	tons/month
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:	0,03	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	0,63	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 January 2021

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2021/01/01	14798,5	14107,5	15976,9	0	15449,2	14443
2021/01/02	14560,7	13945,1	15314,6	0	15270,8	13522,3
2021/01/03	12590,3	13795,3	11026,5	0	12699,8	12421,1
2021/01/04	14461,5	14253,9	10934,7	0	15032,4	14145,9
2021/01/05	14149,8	13770	0	0	14920	13730,5
2021/01/06	13535,8	12772,3	0	0	14303	12625,9
2021/01/07	14594	14520,5	0	0	15263	14843,6
2021/01/08	14963	14152	0	0	15754,7	12991,1
2021/01/09	14806,5	13215	3635,2	0	15633,9	11837,4
2021/01/10	13428,9	12763,2	13962,6	0	13956,7	10441,1
2021/01/11	14976,5	12567,5	13998	0	14454,6	11590,6
2021/01/12	15068	12828,8	12951	0	14794,2	12755
2021/01/13	15152,7	12251,5	12843,8	0	15282,2	13232
2021/01/14	15277	12388,9	12968,7	0	15340,4	12748,4
2021/01/15	15274,7	12942,1	15082,6	0	15767,3	13315,3
2021/01/16	15028,3	13228,9	15797,2	0	14918,3	12577
2021/01/17	13669,2	12254,7	14515,7	0	14003,7	11604,1
2021/01/18	15256	15020,5	15828,9	202,3	11991,8	11754,5
2021/01/19	13651,4	13822,9	13632,2	6442	14152,8	11670,9
2021/01/20	13955,7	13444,6	12717,7	10565	14078,7	12428,5
2021/01/21	14874,5	13615,7	15477,6	10064	14790,8	11744,7
2021/01/22	14818,6	13074,9	15298,5	10420	14803	12858,8
2021/01/23	14776,6	13562,7	15012,7	11143	14160	12033,7
2021/01/24	12649,1	13578,4	14202,5	12555	13376,9	12317,5
2021/01/25	14154,5	14485,5	14462,7	12341	14380,3	12123,6
2021/01/26	13645,3	14680,1	13762,1	12731	14148	12049,5
2021/01/27	14832,5	14928,8	15531,9	12592	15775,2	12393,5
2021/01/28	14599,1	13980,9	15871,5	11729	15918,3	11974,4
2021/01/29	15073,5	14645,2	14378	12504	15796,6	1320,13
2021/01/30	14904	14802	14510,2	11995	15730,8	0
2021/01/31	14568,1	14462,5	12832,3	13081	15854,2	0

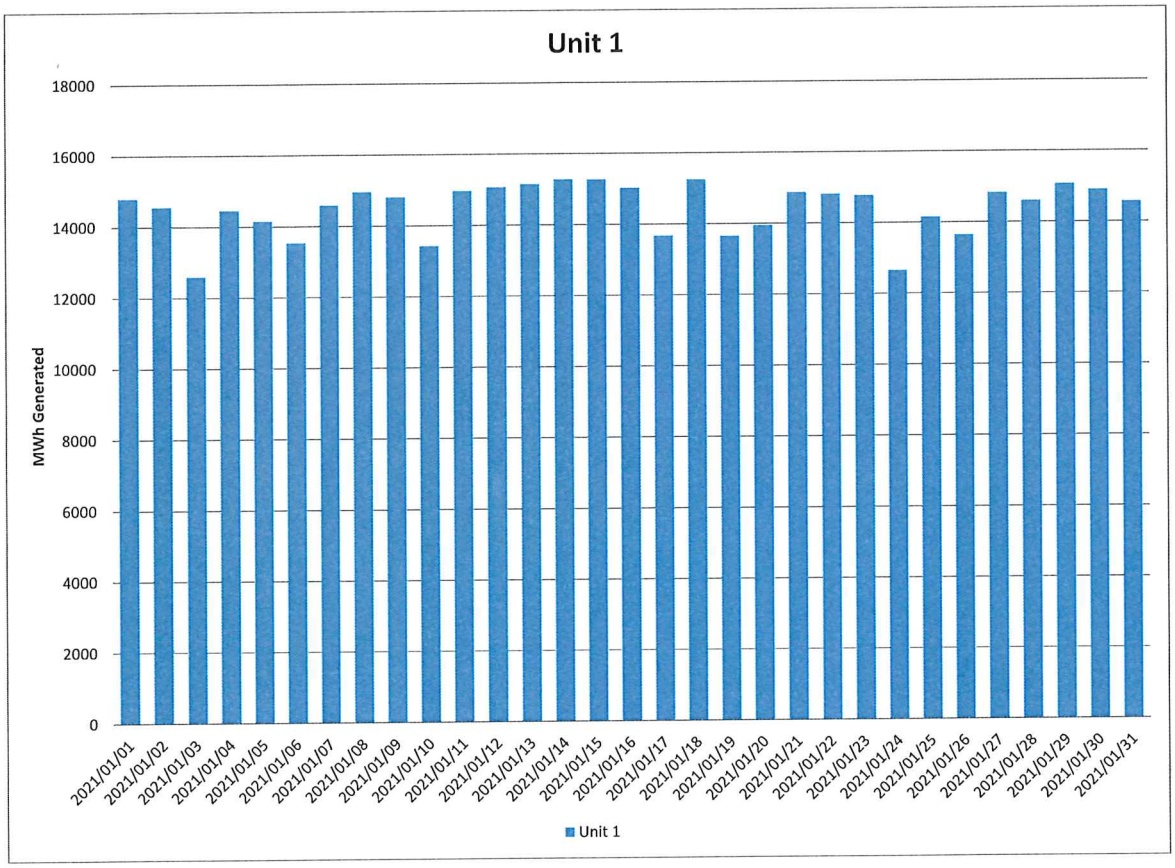

Figure 19: Unit 1 daily generated power in MWh for the month of January 2021

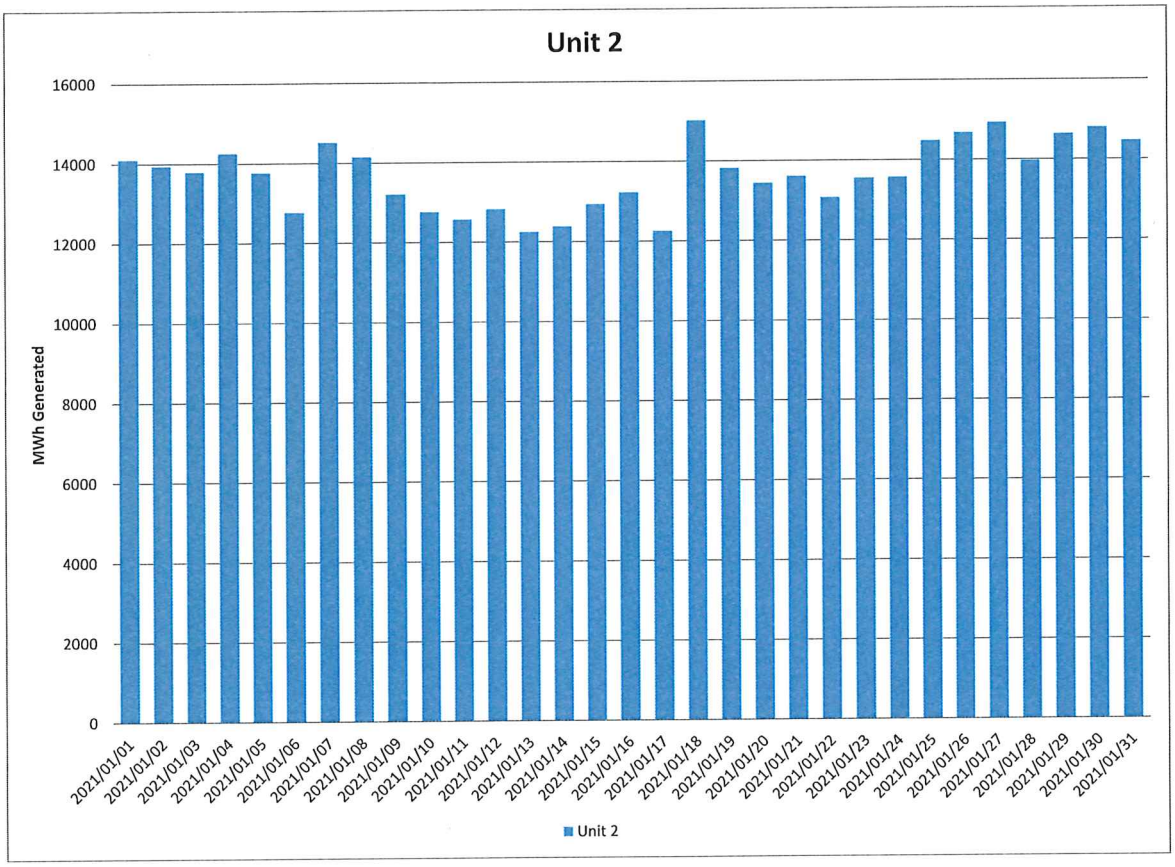

Figure 20: Unit 2 daily generated power in MWh for the month of January 2021

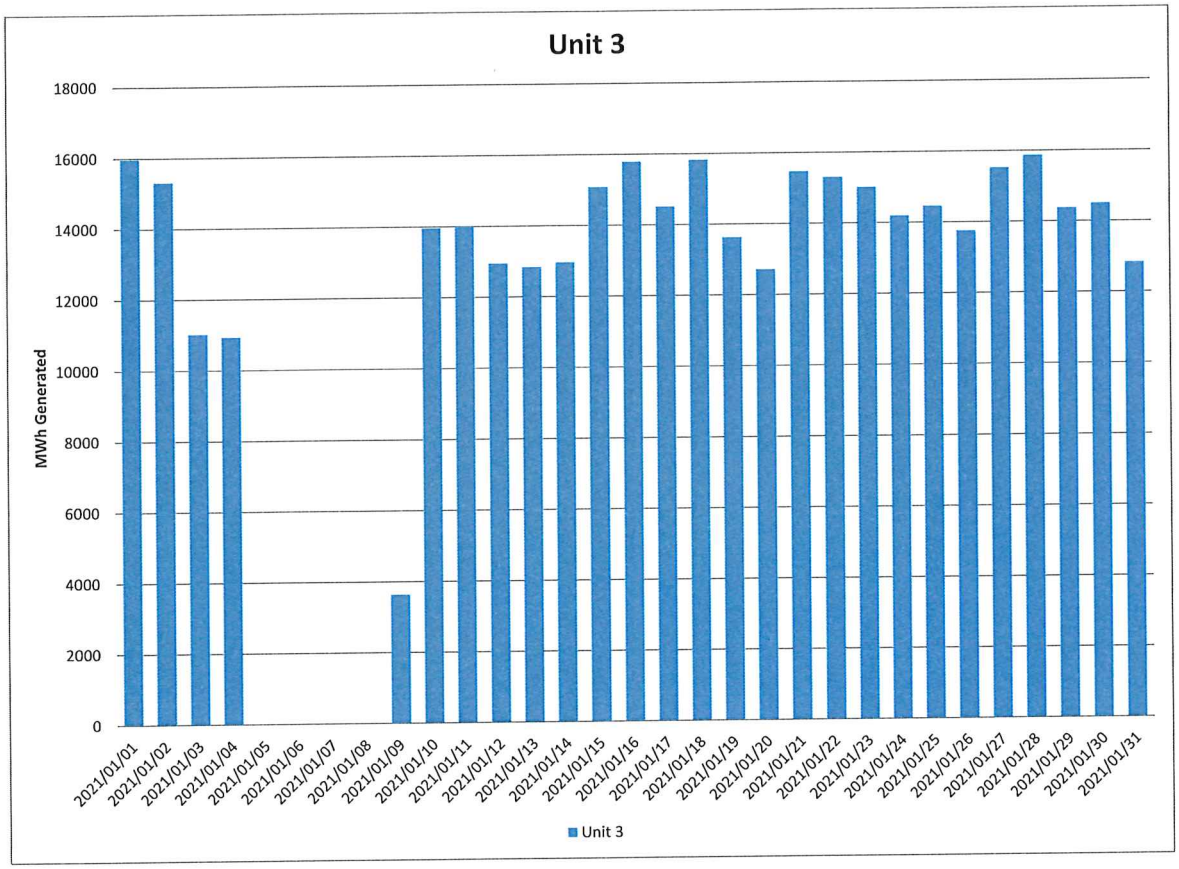

Figure 21: Unit 3 daily generated power in MWh for the month of January 2021

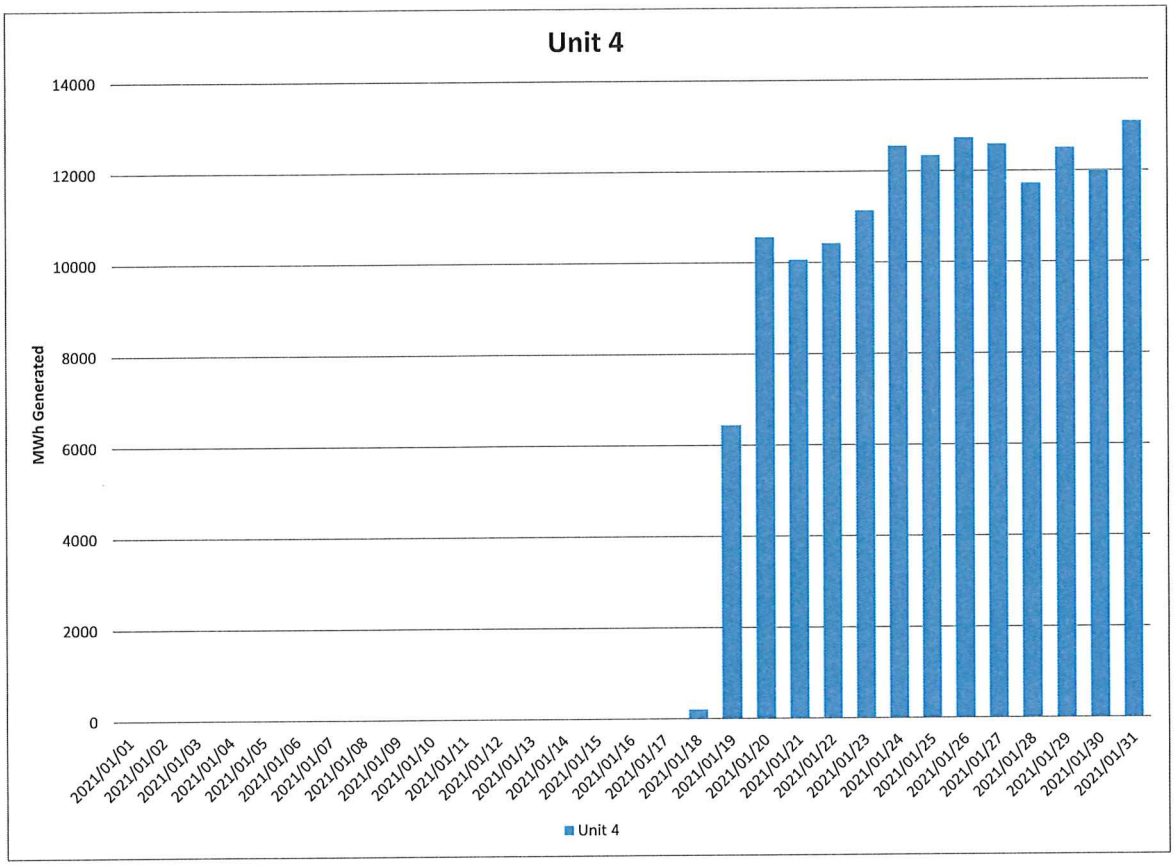

Figure 22: Unit 4 daily generated power in MWh for the month of January 2021

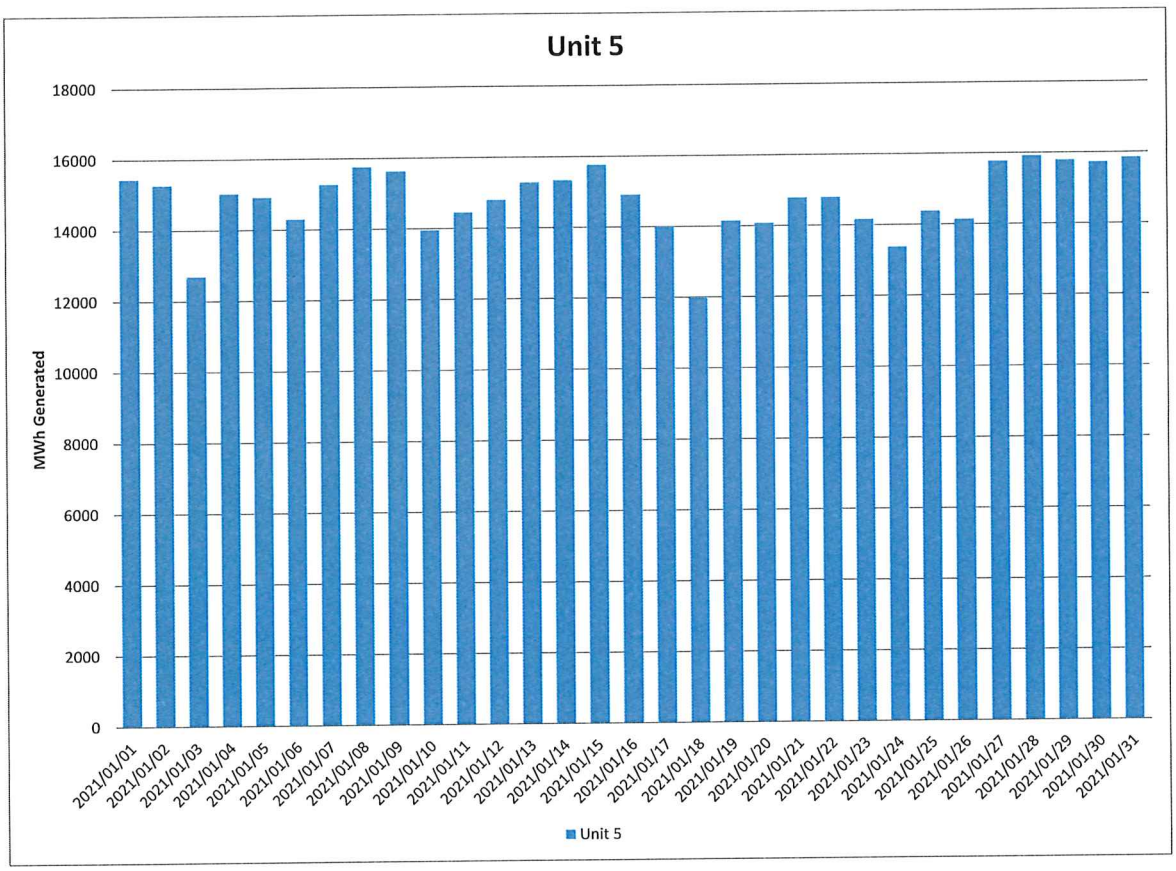

Figure 23: Unit 5 daily generated power in MWh for the month of January 2021

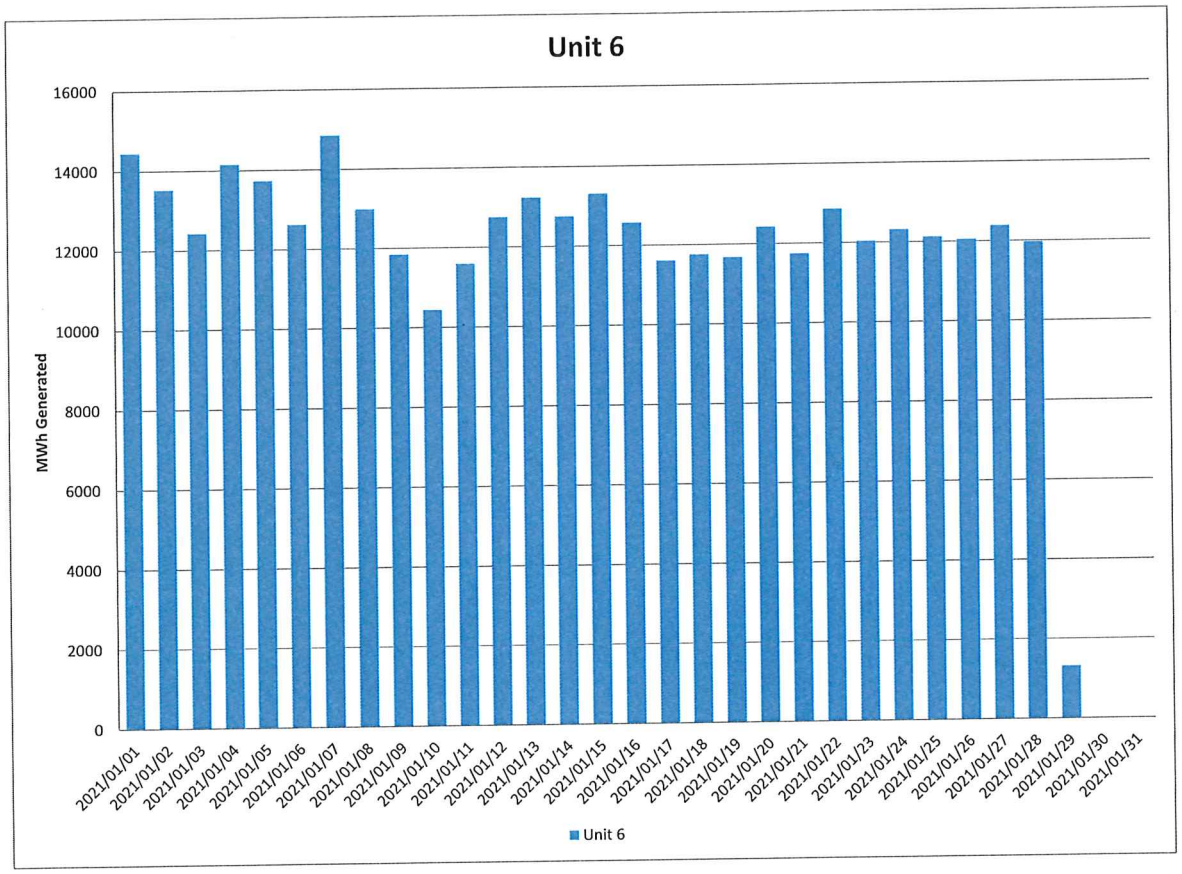

Figure 24: Unit 6 daily generated power in MWh for the month of January 2021

2.6 Pollutant Tonnages

Table 6: Pollutant tonnages for the month of January 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO_2 (tons)
Unit 1	45,8	6 211,0	963,8	427 235
Unit 2	35,1	7 358,0	1 034,7	478 904
Unit 3	55,2	6 348,2	996,6	402 568
Unit 4	24,9	2 160,8	409,9	142 524
Unit 5	50,4	6 202,8	887,1	427 538
Unit 6	68,4	5 669,5	963,0	352 332
SUM	279,8	33 950,4	5 255,2	2 231 101

The emitted pollutant tonnages for January 2021 are provided in table 6.

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	%	8,77	7,55	7,00	7,57	7,92	8,59
Moisture	%	5,32	5,30	5,49	2,37	5,52	4,30
Velocity	m/s	29,4	27,0	29,7	21,9	27,6	28,2
Temperature	°C	140,8	133,1	133,5	133,2	130,4	123,5
Pressure	mBar	929,4	931,1	914,8	879,0	926,2	889,1

Table 7 shows the reference values for the emission data provided for the month of January 2021.

2.8 Continuous Emission Monitors

2.8.1 Reliability

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

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100,0	56,7	56,7	0,0
Unit 2	100,0	56,3	56,3	53,1
Unit 3	100,0	96,7	96,7	57,9
Unit 4	100,0	0,0	0,0	0,0
Unit 5	100,0	96,6	96,6	96,5
Unit 6	99,9	39,2	39,2	39,2

Unit 1, unit 2, unit 4, unit 6 gaseous emission monitors and unit 3 CO_2 monitor performed below the required limit of 90% availability stipulated within the atmospheric emission license.

Unit 1 was available 100% of the time but provided faulty readings. The monitor was repaired on the 14th of January 2021. CO_2 and O_2 raw data was replaced with average Quality Assurance Level 2 (QAL2) values due to the monitors providing unreliable data.

Unit 2 gaseous emission monitor did not achieve 90% availability due to a failed computer. The computer was replaced on the 13th of January 2021 and the monitor returned to 100% availability.

Unit 4 gaseous emission monitor started providing faulty readings on the 20th of January 2021. Average QAL 2 values were used for reporting purposes.

Unit 6 gaseous emission monitor provided faulty readings from the 12th of January 2021 due to a faulty pressure sensor and failed computer. The sensor and computer has been repaired. The was on outage since the 30th of January 2021.

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

- Unit 2 Gaseous analyser did not achieve 90% availability as per the license requirement. This is due to a fluctuating availability after each calibration. The monitor has since been repaired again and is being closely monitored.
- 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

- Unit 4 Gaseous emission monitor is reading and is available, however, the data is not getting through to the servers for storage. Service provider has been contacted and monitor will be repaired by 28 February 2021.
- 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 gaseous monitor was not available from the 13th of January 2021. The monitor has since been repaired.
- No downtime or repairs done on the particulate monitors

2.8.3 Sampling dates and times

Continuous

2.9 Start-up information

Table 9: Start-up information

Unit	3	
Fires in	09h21	2021-01-09
Synchronization with Grid	16h35	2021-01-09
Emissions below limit	16h35	2021-01-09
Fires in to synchronization	7.38	HOURS
Synchronization to < Emission limit	0	HOURS

Unit	4	
Fires in	15h20	2021-01-17
Synchronization with Grid	05h37	2021-01-18
Emissions below limit	07h23	2021-01-18
Fires in to synchronization	14.28	HOURS
Synchronization to < Emission limit	1.77	HOURS

Unit	4	
Fires in	15h55	2021-01-18
Synchronization with Grid	23h14	2021-01-18
Emissions below limit	02h03	2021-01-19
Fires in to synchronization	7.32	HOURS
Synchronization to < Emission limit	2.82	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	620	620	490	207	620	563
Emergency Hours declared including hours after stand down	632	632	500	214	632	573
Days over the Limit during Emergency Generation	0	0	3	2	0	2

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

The monitoring site experienced incoming power interruptions due to a faulty earth leakage inside the monitoring hut. This affected the functioning of the analysers and led to low data recovery at the Marapong Air Quality Monitoring site.

The average data recovery for the period was 33,2% and the station availability was 32,6%.

Detailed information regarding this issue can be found in Attachment 1, "FEEDBACK Marapong January 2021 REPORT_Final".

2.14 Electrostatic precipitator and Sulphur plant status

Unit 1

- 0 out of 32 precipitator fields is out of 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

- 3 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.

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