Eskom	Matimba Power Station Emissions report	Matimba Power Station

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Compiled by	**Functional Responsibility**	**Authorized by**
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Environmental Officer	**Environmental Manager**	**General Manager**
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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 April 2021.

Due to recommendations received from an internal emission data review the Matimba Power Station April 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 five exceedances of the daily particulate matter emission limit (50mg/Nm^3). The 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) monitor for unit 6 is currently not in service. The monitor cannot be repaired at this time due to the stack lifts being closed after a safety incident that occurred in March 2021. The monitor will be repaired as soon as it is safe to do so.

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	1 124 089
	Fuel Oil	Tons/month	1 200	975,875
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	2 064,432

The coal and fuel oil consumptions rates for the month of April 2021 were within the permitted maximum limit. An increased amount of fuel oil was used, compared to other months, due to challenges experienced during the unit 6 light up.

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%	99,93%
Unit 3	Electrostatic Precipitator	100%	99,95%
Unit 4	Electrostatic Precipitator	100%	99,87%
Unit 5	Electrostatic Precipitator	100%	99,93%
Unit 6	Electrostatic Precipitator	100%	99,96%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	100%
Unit 2	SO_3 Plant	100%	100%
Unit 3	SO_3 Plant	100%	100%
Unit 4	SO_3 Plant	100%	100%
Unit 5	SO_3 Plant	100%	100%
Unit 6	SO_3 Plant	100%	86,67%

Unit 6 Sulphur plant availability was below the required 100% due to an unexpected breakdown.

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%	1,20%
	Ash Content	30-40%	35,10%

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

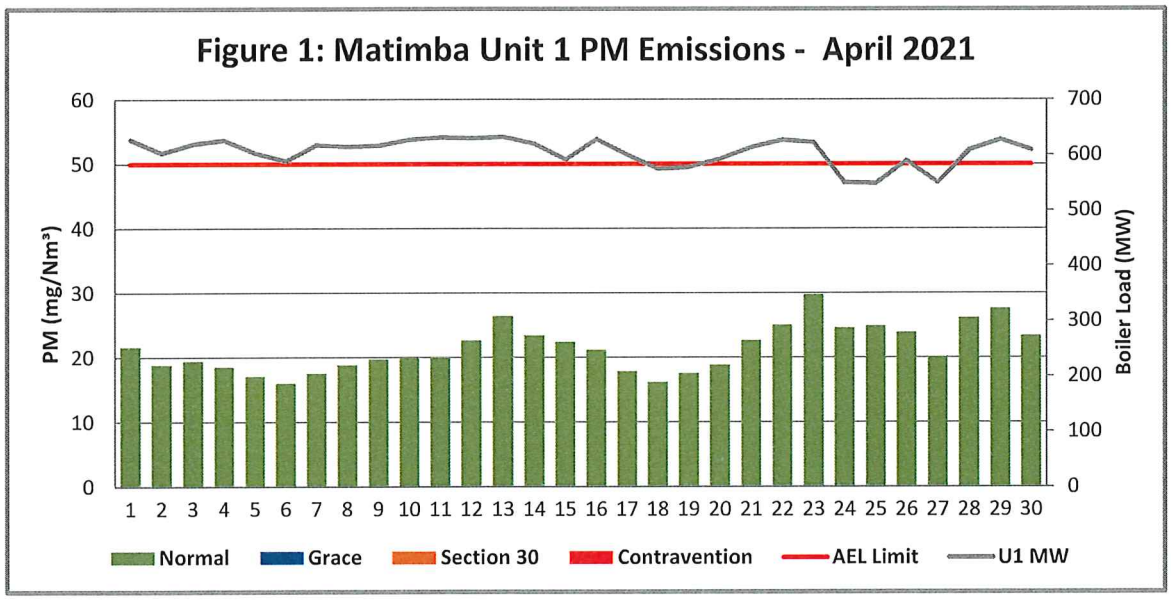

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of April 2021

Interpretation:

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

Unit 2 Particulate Emissions

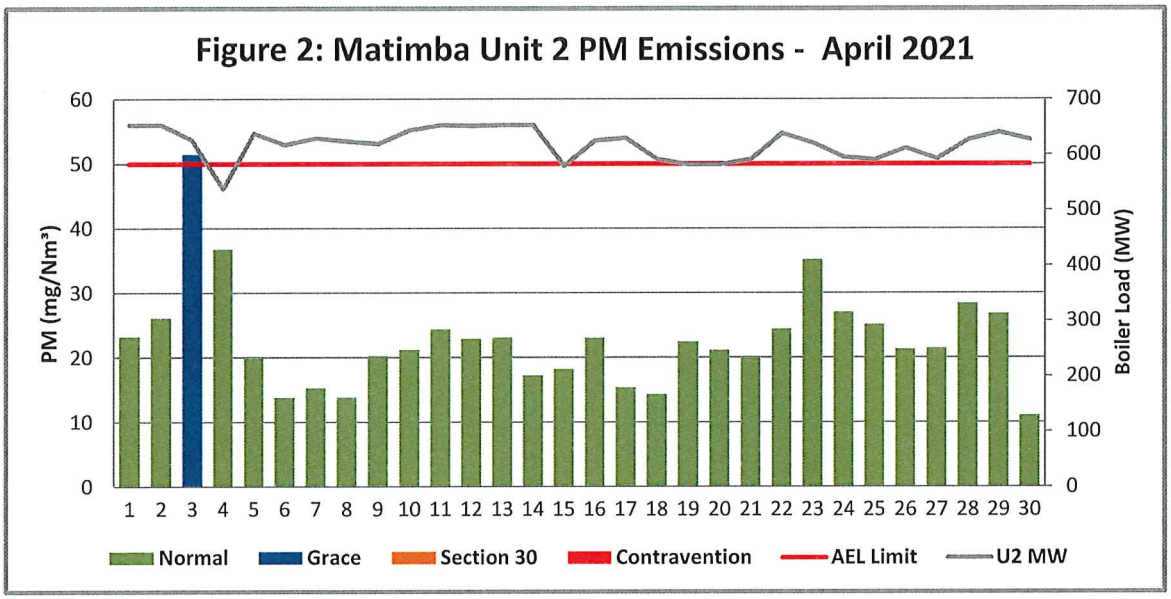

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of April 2021

Interpretation:

Unit 2 PM emissions exceeded the limit of 50mg/Nm^3 on the 3rd of April 2021. The exceedance did not exceed the 48 hour grace period.

Unit 3 Particulate Emissions

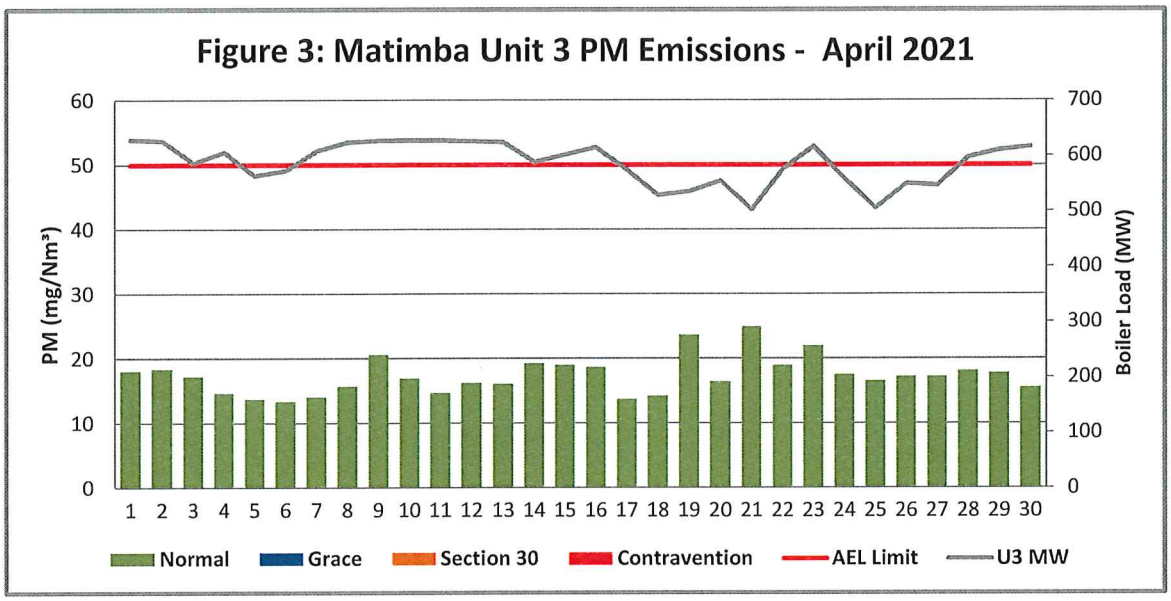

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of April 2021

Interpretation:

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

Unit 4 Particulate Emissions

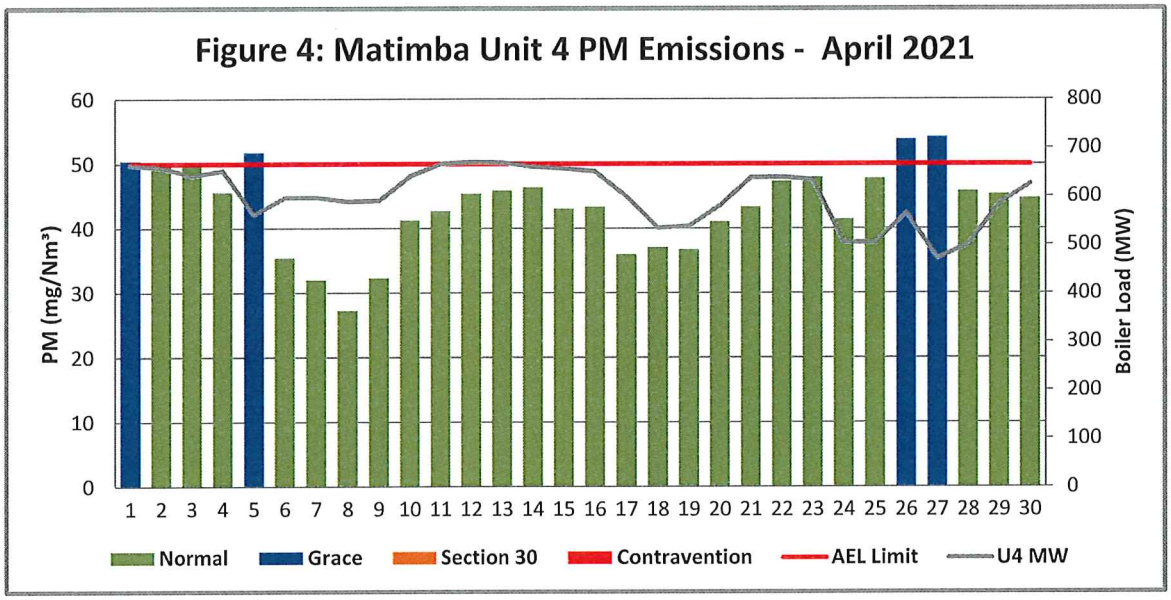

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of April 2021

Interpretation:

Unit 4 exceeded the particulate emission limit of 50 mg/Nm^3 on the 1st, 5th, 9th, 26th and 27th of April 2021. The exceedances was due to defects on the ash handling plant. The plant was repaired and emissions returned to normal. The exceedances did not exceed the 48-hour grace period.

Unit 5 Particulate Emissions

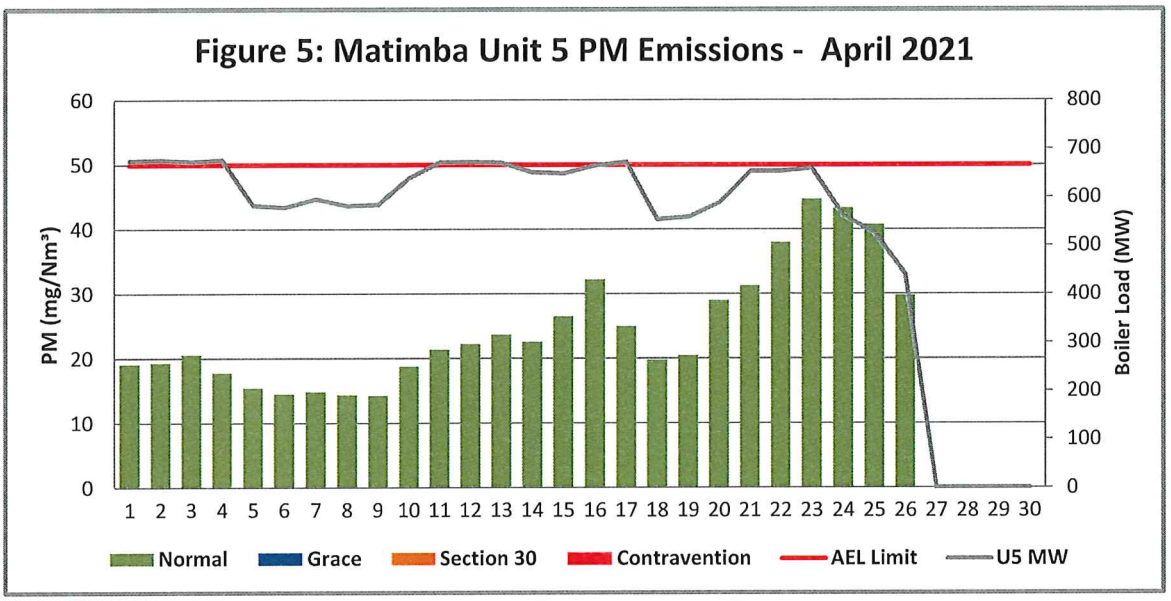

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of April 2021

Interpretation:

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

Unit 6 Particulate Emissions

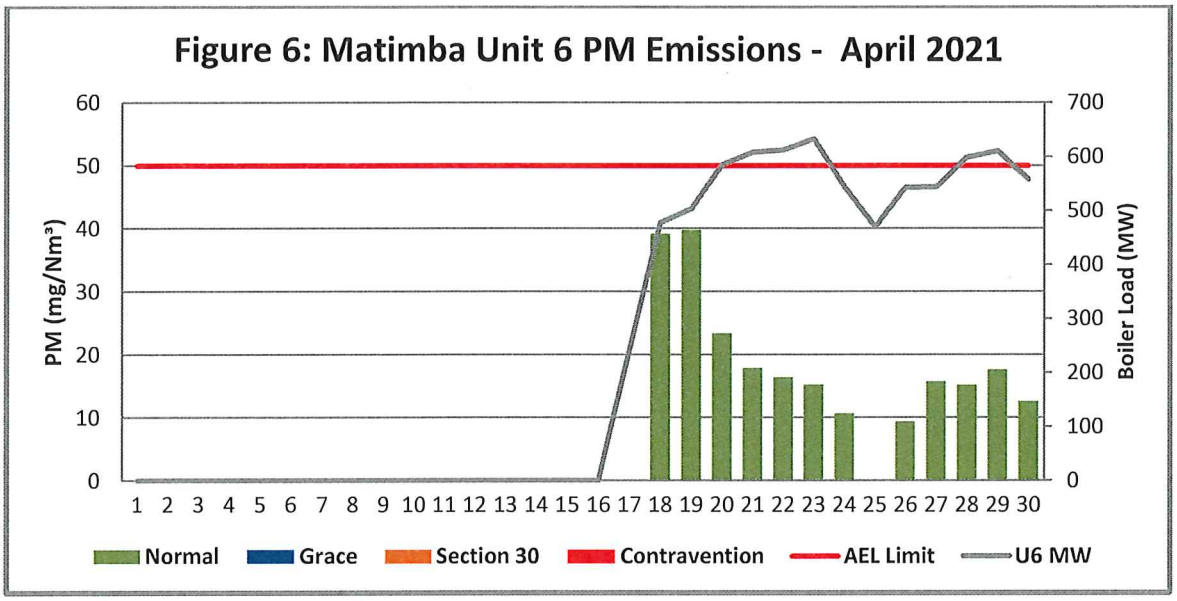

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of April 2021

Interpretation:

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

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

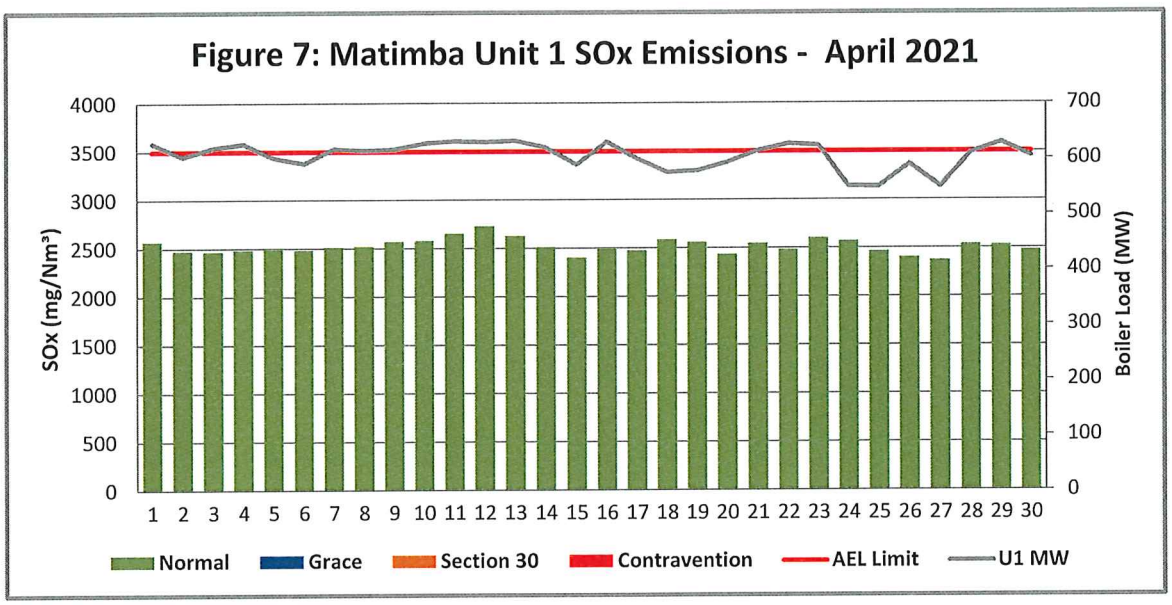

Figure 7: SO_2 daily average emissions against emission limit for unit 1 for the month of April 2021

Interpretation:

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

Unit 2 SO_2 Emissions

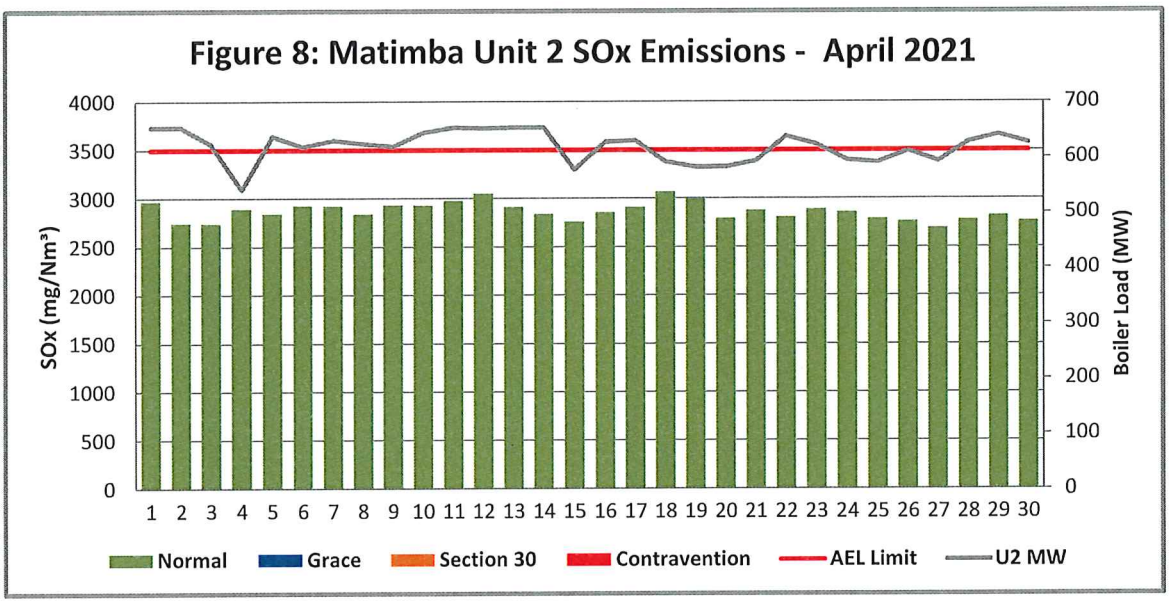

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of April 2021

Interpretation:

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

Unit 3 SO_2 Emissions

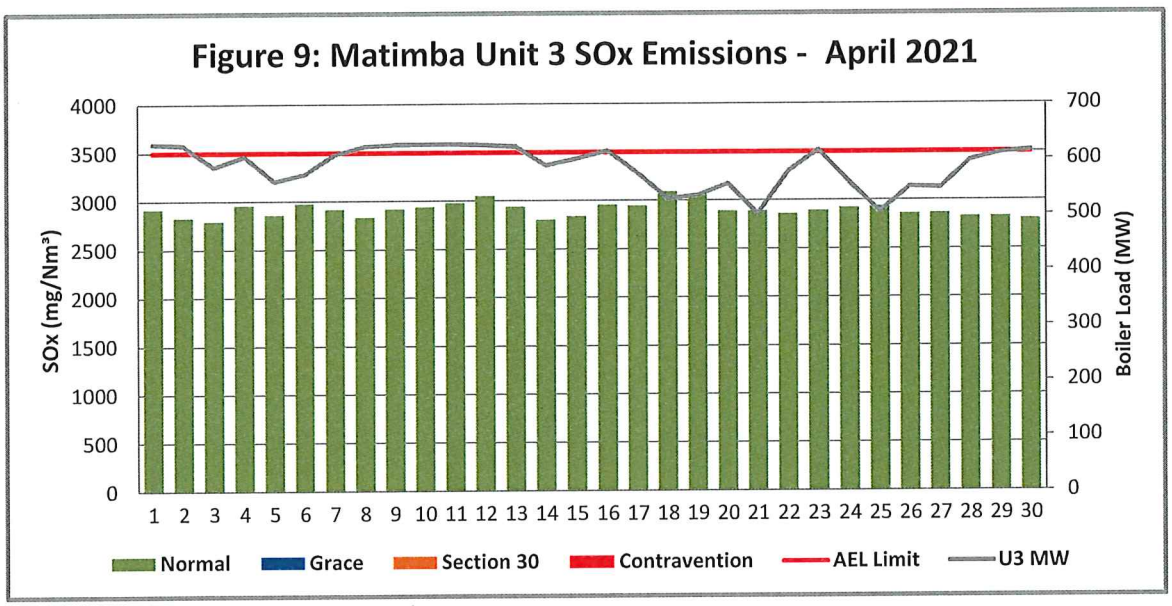

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of April 2021

Interpretation:

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

Unit 4 SO_2 Emissions

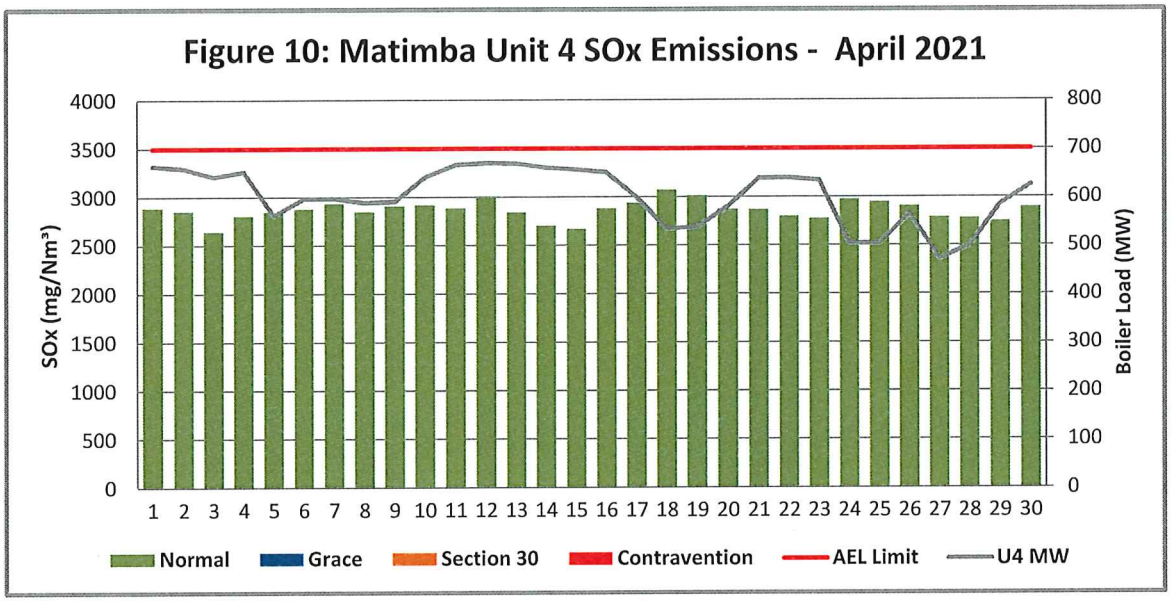

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of April 2021

Interpretation:

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

Unit 5 SO_2 Emissions

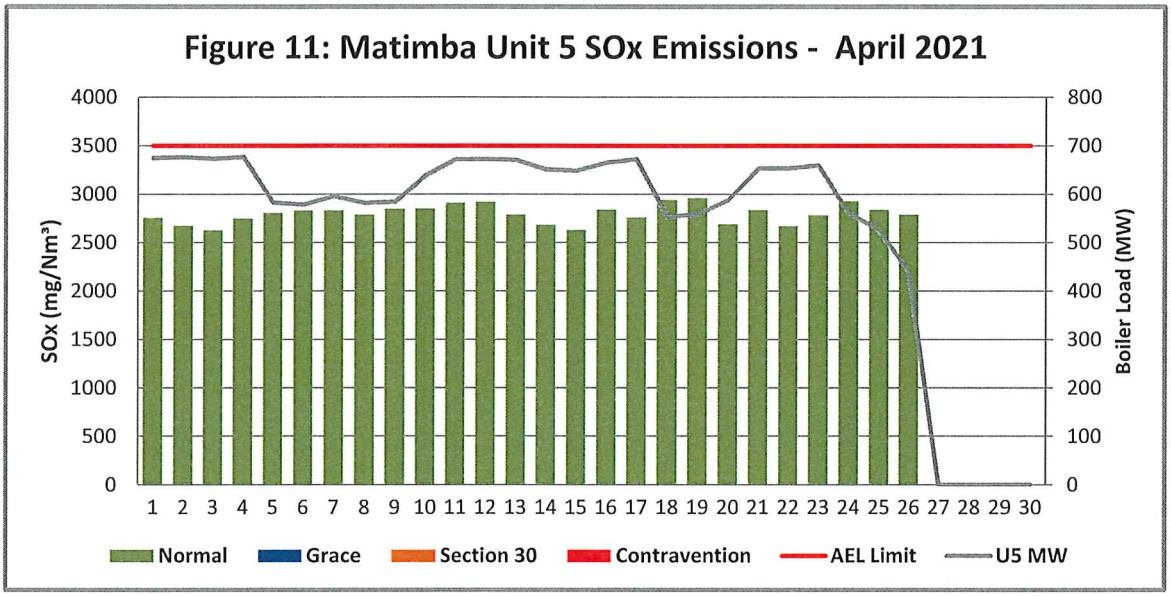

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of April 2021

Interpretation:

All daily averages below SO_2 emission monthly limit of 3500 mg/Nm³.

Unit 6 SO_2 Emissions

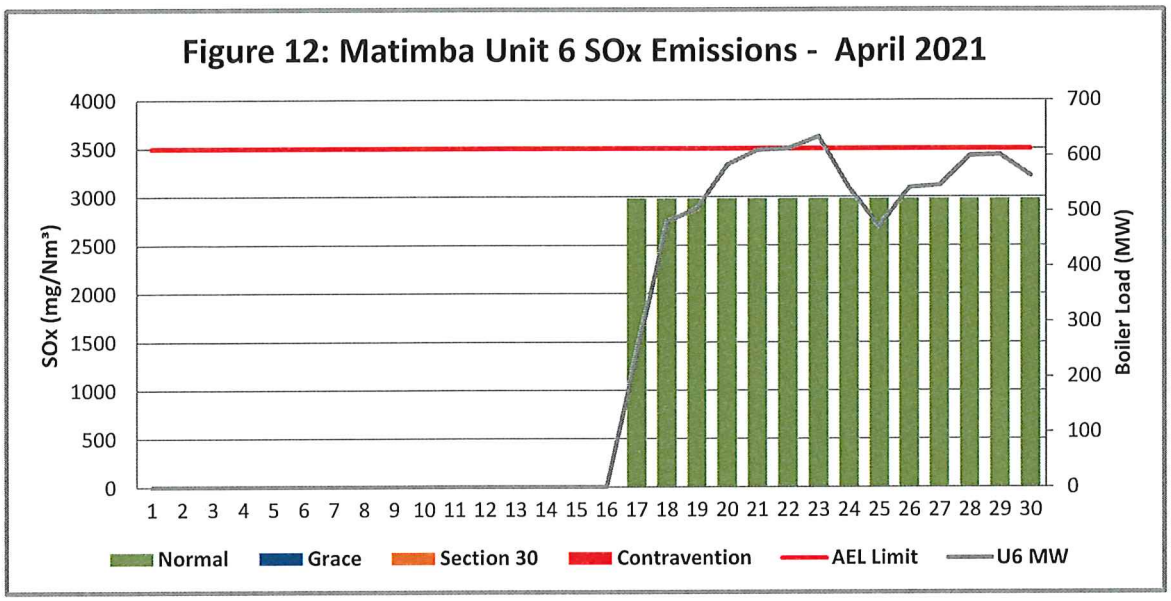

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of April 2021

Interpretation:

As per the notification sent to your office on the 7th of June 2021, the Gaseous emission monitor for unit 6 has been defective since the 17th of April 2021. The supplier has been notified but cannot access the monitor for repairs due to defects on the stack lift causing a safety risk. Average values from the QAL 2 report was used for reporting purposes.

Unit 1 NO_x Emissions

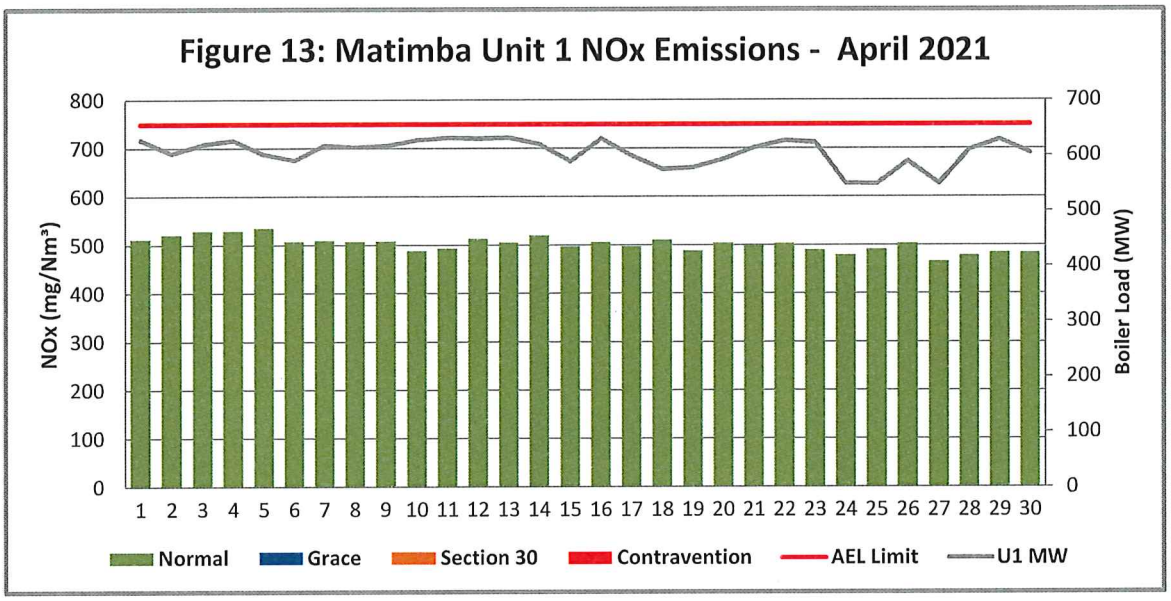

Figure 13: NOx daily average emissions against emission limit for unit 1 for the month of April 2021

Interpretation:

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

Unit 2 NO_x Emissions

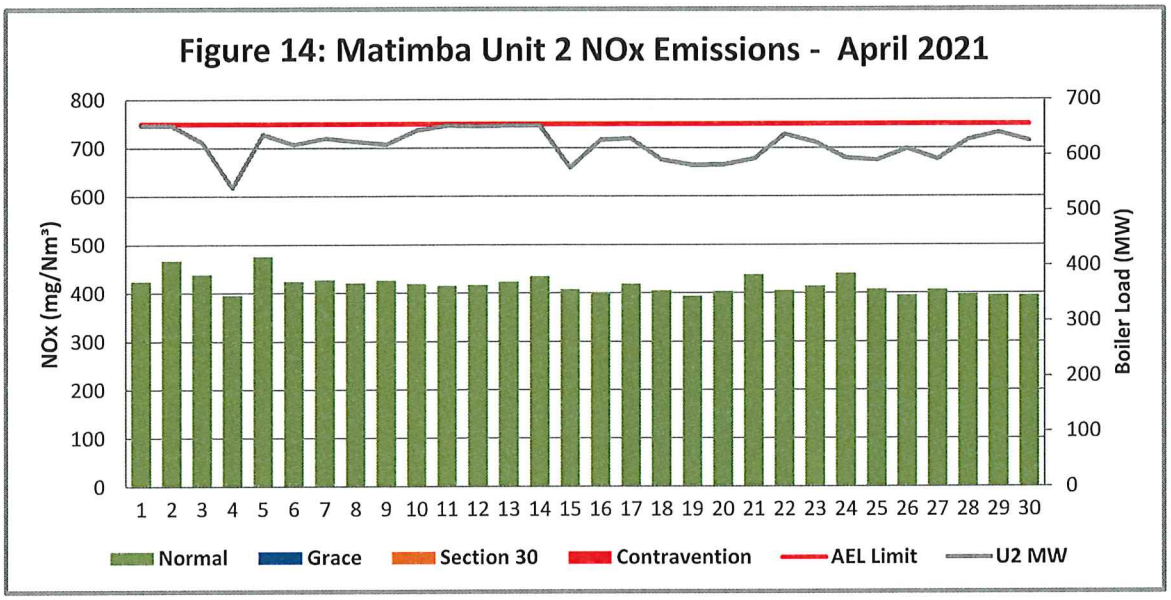

Figure 14: NOx daily average emissions against emission limit for unit 2 for the month of April 2021

Interpretation:

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

Unit 3 NO_x Emissions

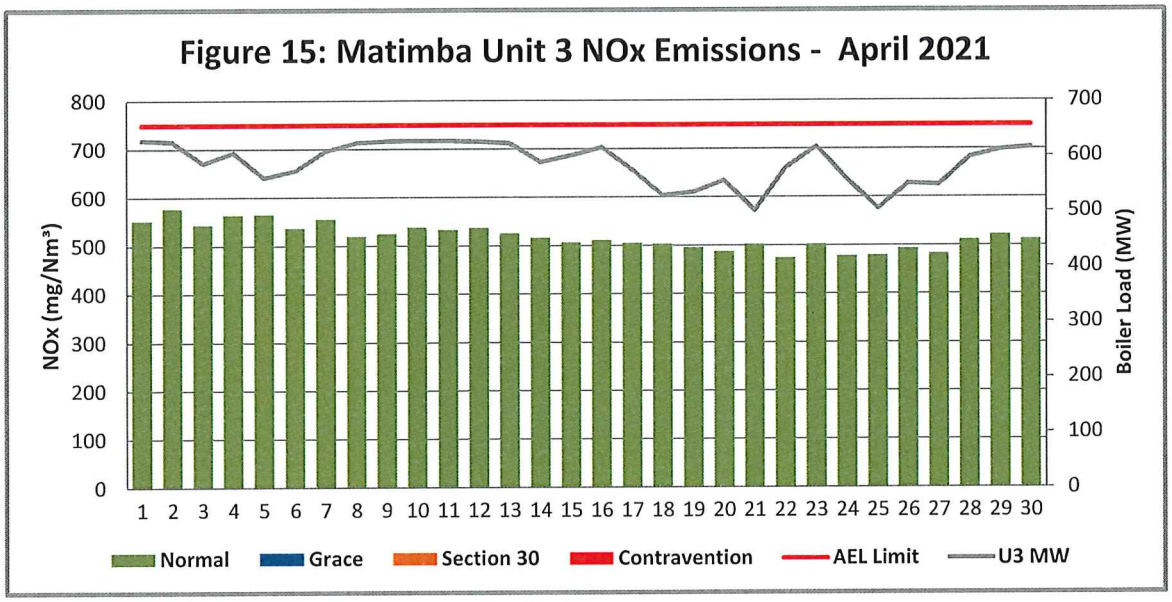

Figure 15: NOx daily average emissions against emission limit for unit 3 for the month of April 2021

Interpretation:

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

Unit 4 NO_x Emissions

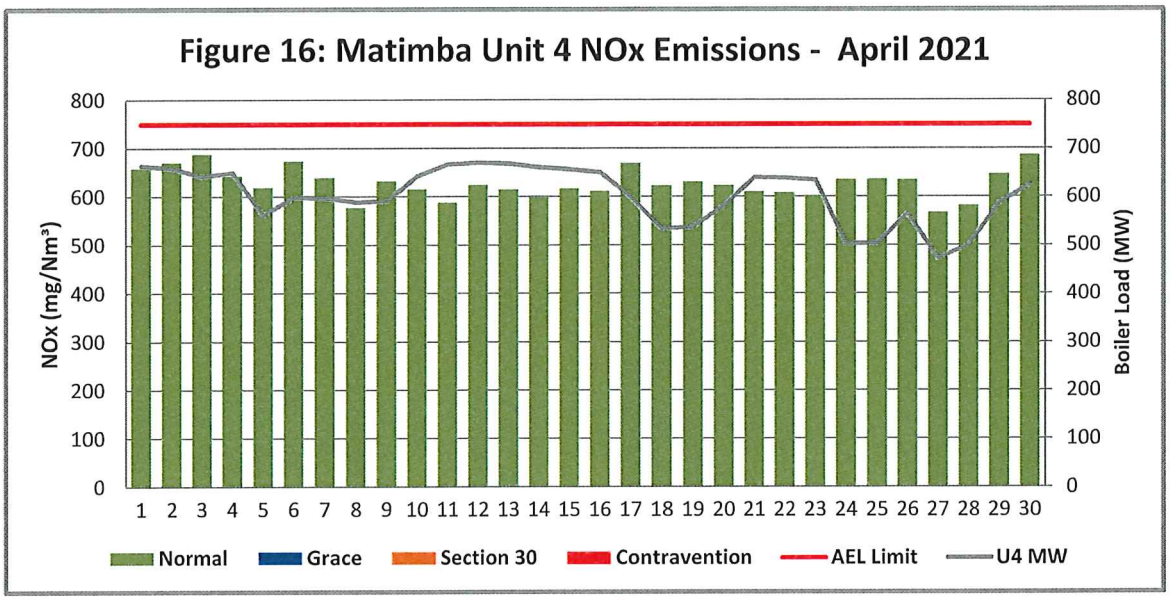

Figure 16: NOx daily average emissions against emission limit for unit 4 for the month of April 2021

Interpretation:

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

Unit 5 NO_x Emissions

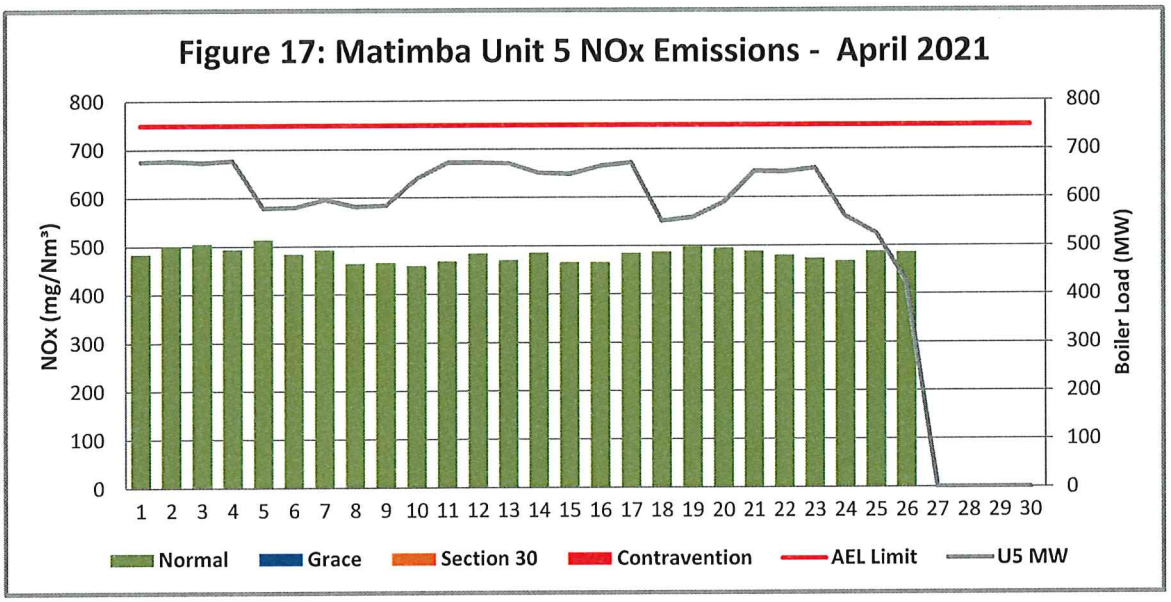

Figure 17: NOx daily average emissions against emission limit for unit 5 for the month of April 2021

Interpretation:

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

Unit 6 NO_x Emissions

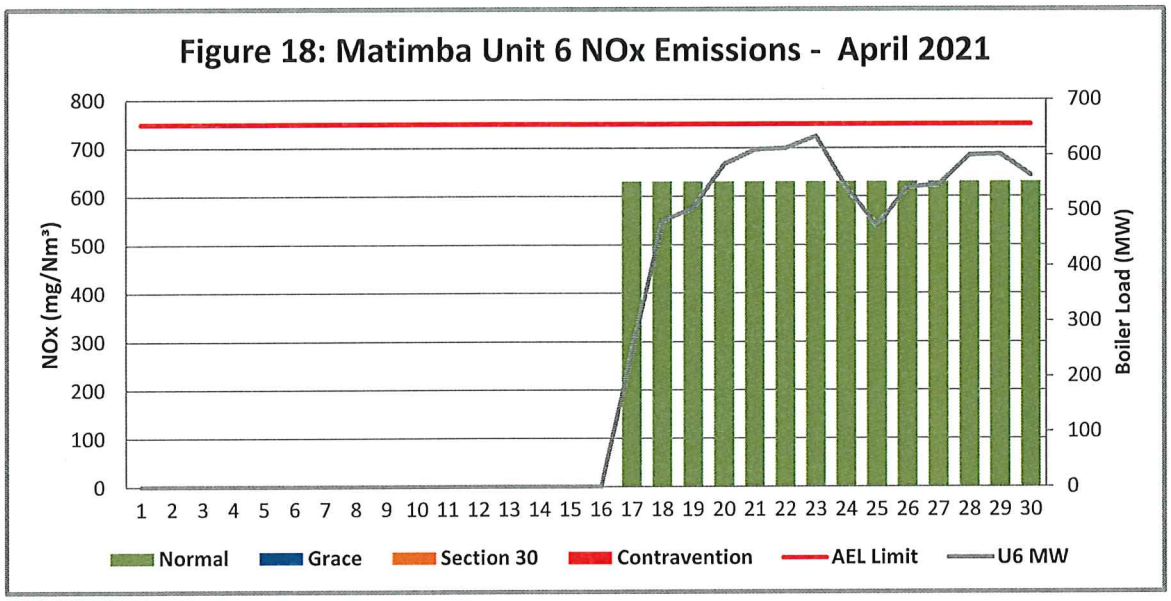

Figure 18: NOx daily average emissions against emission limit for unit 5 for the month of April 2021

Interpretation:

The Gaseous emission monitor for unit 6 has been defective since the unit was synchronised from outage on the 17th of April 2021. Average values from the QAL 2 report was used for reporting purposes.

2.4.3 Total Volatile Organic Compounds

Table 4: Total volatile compound estimates

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

Date:	Friday, 28 May 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:	April	
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:	975,875	tons/month
Molecular weight of the fuel oil:	166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	Data	Unit
Daily average ambient temperature	20,60	°C
Daily maximum ambient temperature	27,37	°C
Daily minimum ambient temperature	13,11	°C
Daily ambient temperature range	10,46	°C
Daily total insolation factor	3,84	kWh/m²/day
Tank paint colour	Grey/medium	NA
Tank paint solar absorbtance	0,68	NA
FINAL OUTPUT:	Result	Unit
Breathing losses:	0,48	kg/month
Working losses:	0,03	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	0,51	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 April 2021

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2021/04/01	15063,1	15455,9	15010,9	15823	16046,4	0
2021/04/02	14481,4	15457,1	14962,5	15683	16089,2	0
2021/04/03	14871,1	14794,5	13999,1	15285	16009,6	0
2021/04/04	15041,7	12731,5	14477	15539	16102	0
2021/04/05	14478,3	15112,9	13447,8	13385	13859,5	0
2021/04/06	14142,1	14614,6	13678,5	14214	13757,3	0
2021/04/07	14825	14893,5	14531,4	14203	14178,2	0
2021/04/08	14749,9	14761	14897,6	13988	13829,5	0
2021/04/09	14800,7	14642,9	14979	14035	13886,3	0
2021/04/10	15057,9	15236,8	14980,3	15251	15191	0
2021/04/11	15158,9	15456,1	14983,1	15886	15986,6	0
2021/04/12	15119,5	15428,3	14953,8	15968	15991,5	0
2021/04/13	15178,5	15459,1	14908,5	15939	15947,4	0
2021/04/14	14874,5	15463,1	14046,2	15734	15475,3	0
2021/04/15	14199,7	13717,9	14369,5	15657	15422,6	0
2021/04/16	15083,6	14788,4	14691,7	15520	15819,8	0
2021/04/17	14398,6	14916,5	13721,1	14292	15993,6	3683,47
2021/04/18	13797,1	14003,9	12614,3	12724	13168,5	11354,7
2021/04/19	13865,9	13765,1	12779	12812	13288,2	8065,6
2021/04/20	14220,8	13772,1	13226,7	13827	13987,3	13897,9
2021/04/21	14727,8	13989,4	6957	15201	15541,9	14467,3
2021/04/22	15035,4	15107,3	13740,7	15221	15534,6	14562,8
2021/04/23	14938,5	14695,5	14722,9	15095	15678,7	15067,4
2021/04/24	13199,4	14087,8	13321,5	12018	13362,9	10100,9
2021/04/25	13155,5	13968,7	12068,9	11973	12507,8	9150,8
2021/04/26	14146,2	14468,1	13112,9	13461	731,6	12917,9
2021/04/27	13204	14004,1	13038,8	11227	0	12965,7
2021/04/28	14620,2	14812,9	14255,4	11891	0	14251,7
2021/04/29	15071,9	15150,1	14570	13905	0	9611,6
2021/04/30	14615,1	14835,4	14718,9	14910	0	13303,9

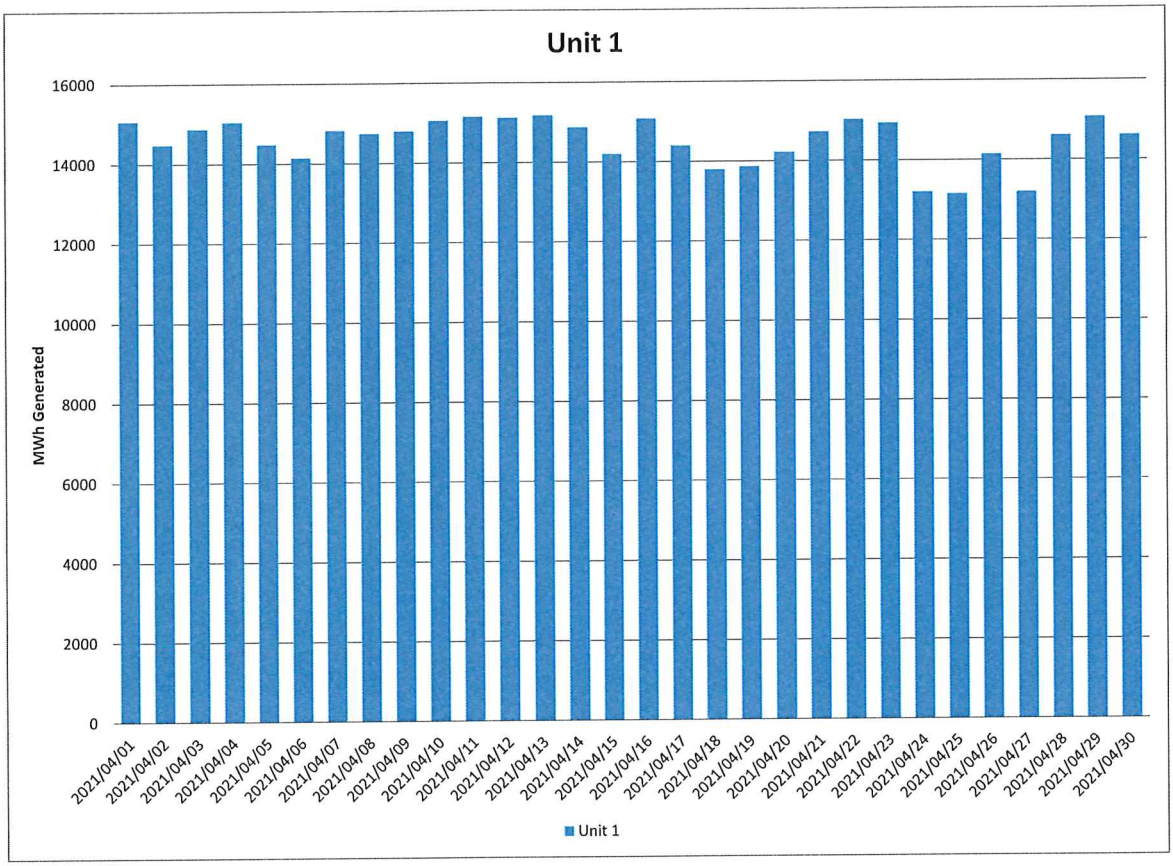

Figure 19: Unit 1 daily generated power in MWh for the month of April 2021

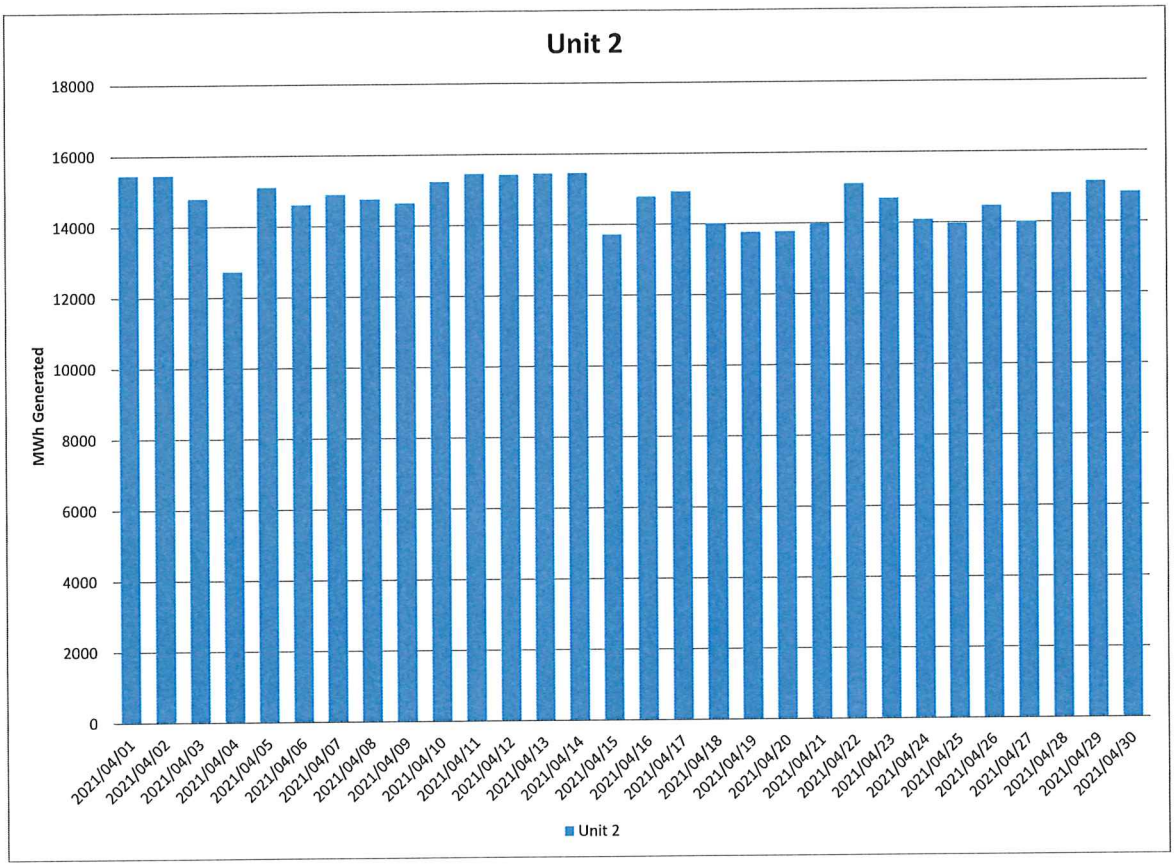

Figure 20: Unit 2 daily generated power in MWh for the month of April 2021

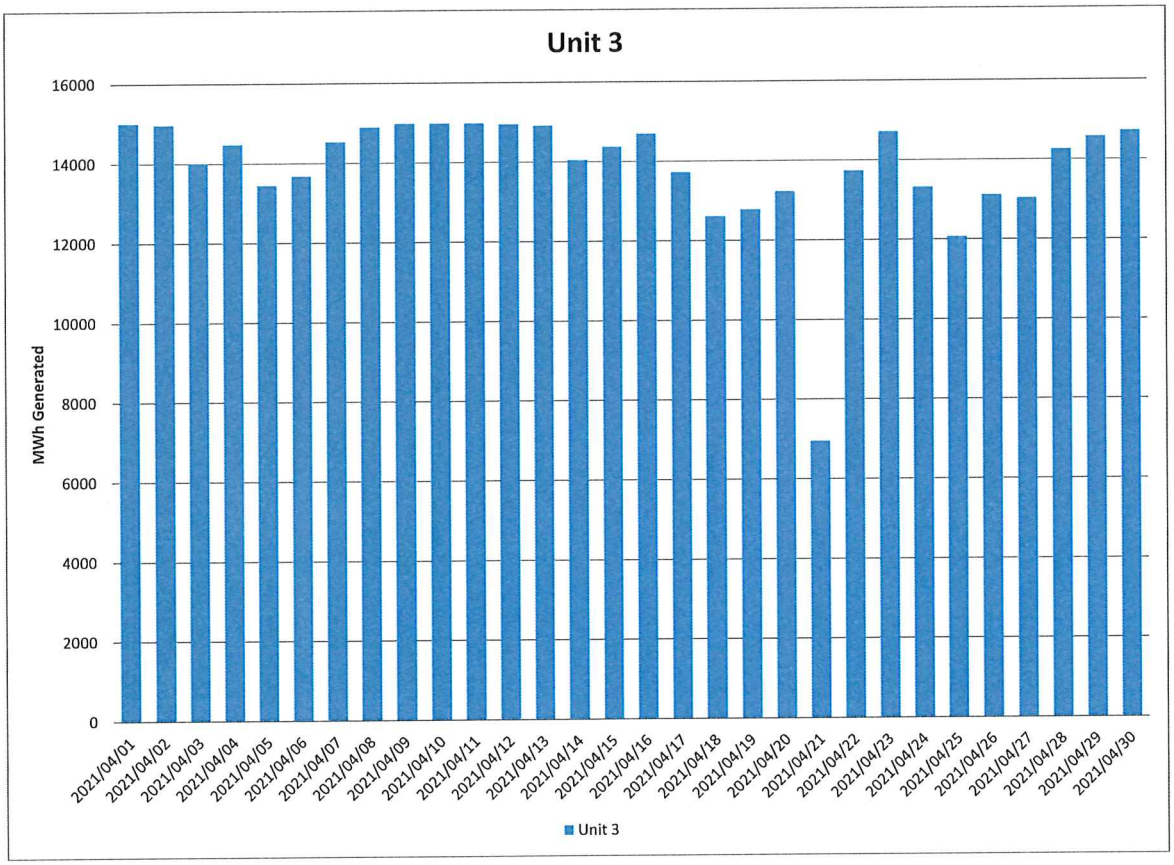

Figure 21: Unit 3 daily generated power in MWh for the month of April 2021

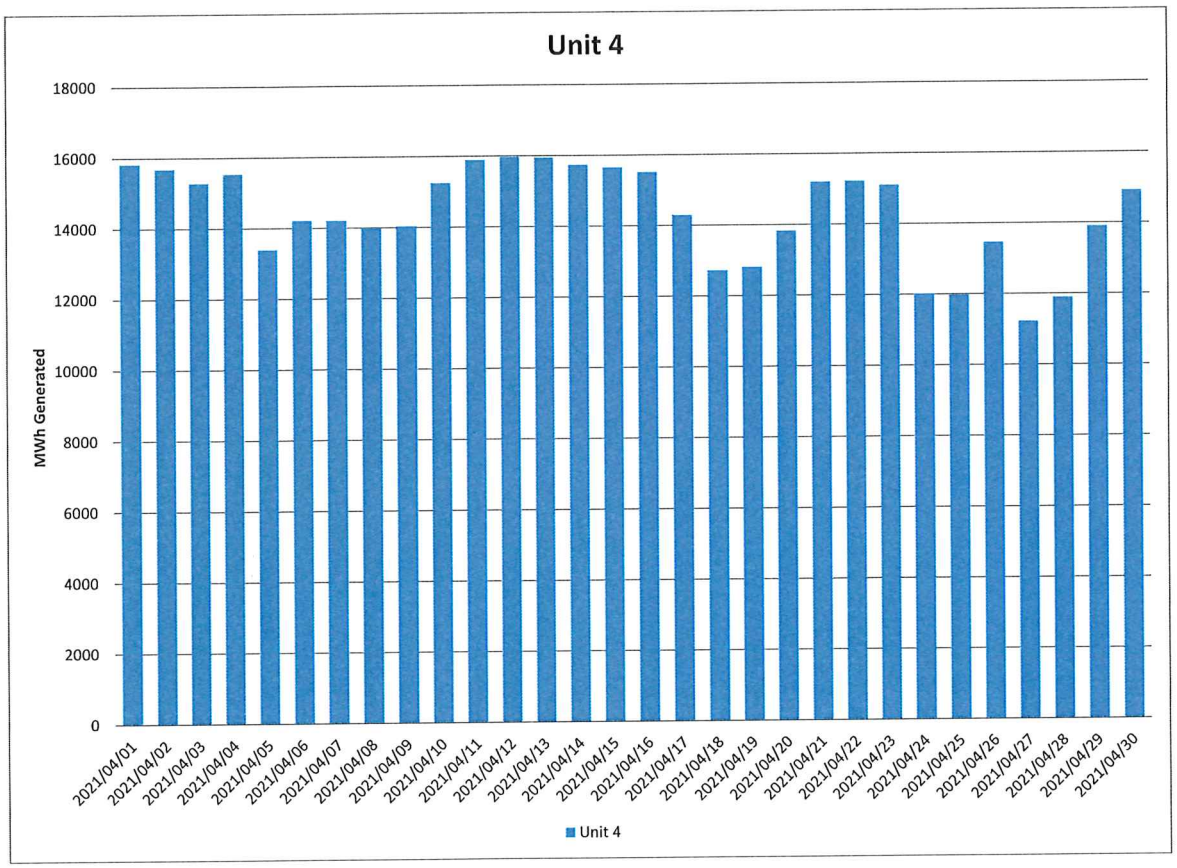

Figure 22: Unit 4 daily generated power in MWh for the month of April 2021

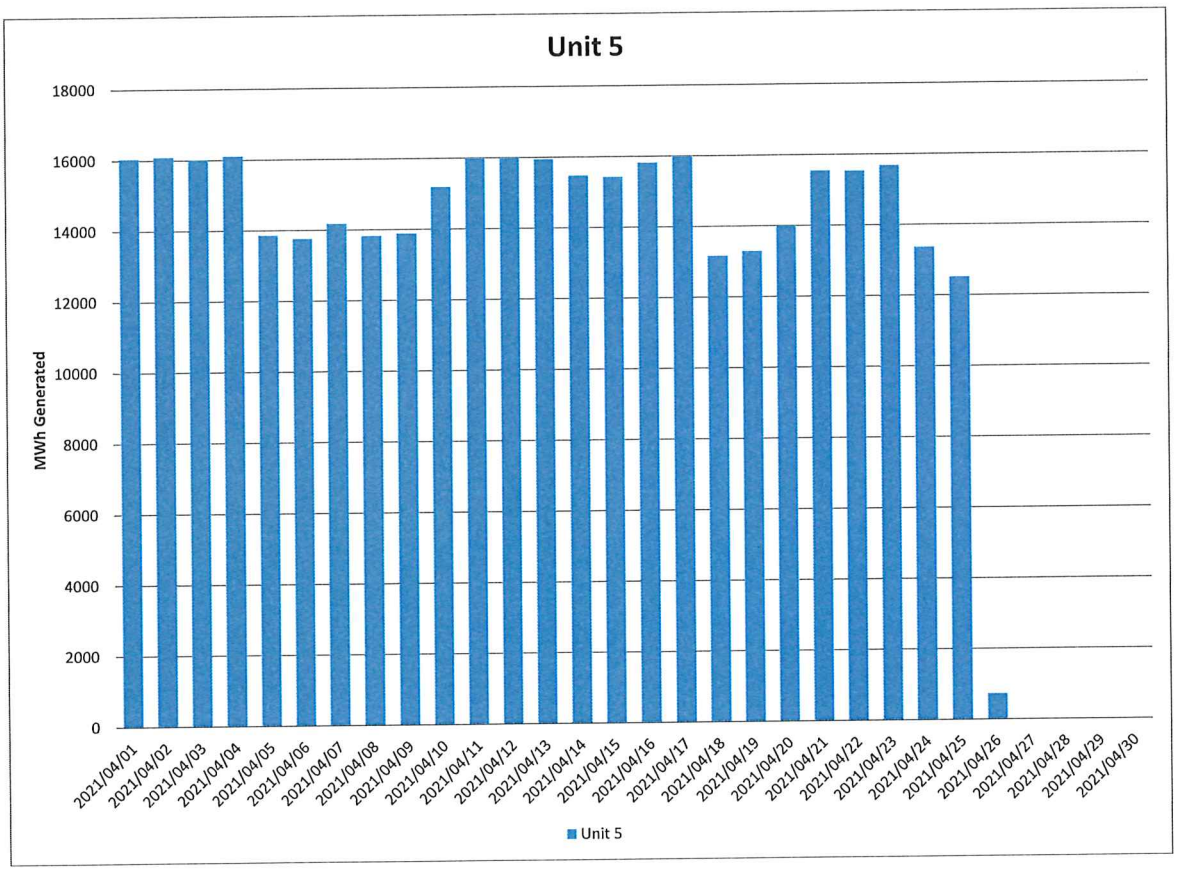

Figure 23: Unit 5 daily generated power in MWh for the month of April 2021

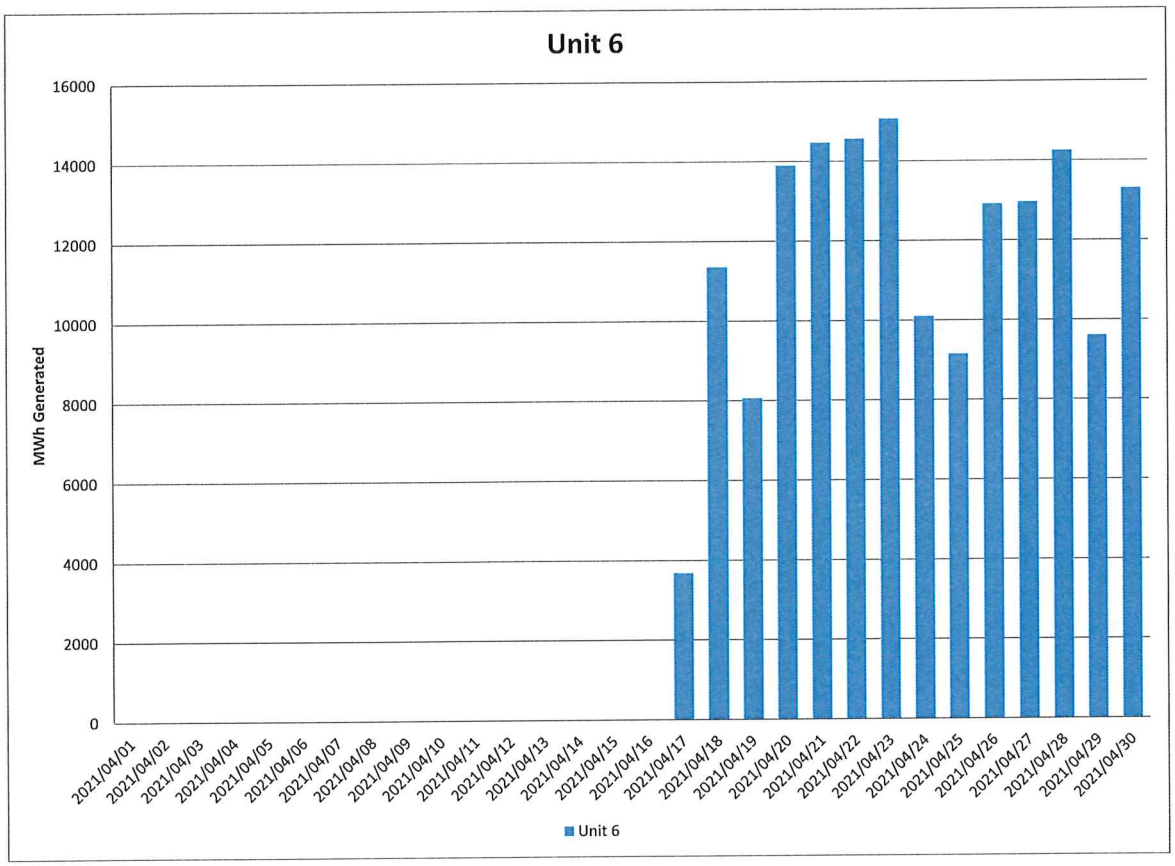

Figure 24: Unit 6 daily generated power in MWh for the month of April 2021

2.6 Pollutant Tonnages

Table 6: Pollutant tonnages for the month of April 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO_2 (tons)
Unit 1	50,3	5 470,4	1 088,9	456 063
Unit 2	47,4	5 917,3	864,8	401 134
Unit 3	32,9	6 538,3	1 169,1	424 533
Unit 4	84,6	5 844,7	1 283,8	380 035
Unit 5	44,3	4 725,6	816,6	324 001
Unit 6	10,4	2 587,4	547,1	160 468
SUM	269,9	31 083,7	5 770,3	2 146 234

The emitted pollutant tonnages for April 2021 are provided in table 6. The gaseous monitor for Unit 6 has been defective since the 17th of April 2021. Details are provided in section 2.8.1. For reporting purposes average gaseous values from the QAL 2 report was used to report unit 6 pollutant tonnages.

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	%	8,72	5,97	7,42	7,01	8,17	8,16
Moisture	%	4,86	5,22	4,29	3,39	5,20	4,12
Velocity	m/s	29,9	24,4	28,2	24,6	26,1	27,7
Temperature	°C	141,5	133,8	129,5	135,3	128,8	123,0
Pressure	mBar	936,2	887,5	920,5	926,8	934,8	892,9

Table 7 shows the reference values for the emission data provided for the month of April 2021. The gaseous monitor for Unit 6 has been defective since the 17th of April 2021. Details are provided in section 2.8.1.

2.8 Continuous Emission Monitors

2.8.1 Reliability

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

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100,0	100,0	100,0	100,0
Unit 2	100,0	100,0	100,0	0,0
Unit 3	100,0	100,0	100,0	100,0
Unit 4	100,0	100,0	100,0	100,0
Unit 5	100,0	100,0	100,0	100,0
Unit 6	91,7	0,0	0,0	0,0

Gaseous emission monitor for Unit 6 has been identified to be defective on the 16th of April 2021. On the 13th of March 2021 a safety incident, which occurred on one of the stack lifts, led to the inspection and closure of both stack lifts until certain maintenance activities are performed. Due to the stack lifts not being available the supplier cannot access the gaseous monitors with the required equipment to perform maintenance. Maintenance of the monitor will take place as soon as the lifts are available and safe for use.

Unit 2 CO2 monitor achieved 100% availability however, CO_2 data was replaced with average values from 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 gaseous emission monitor is defective.
- 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	21 April 2021	12h43
Synchronization with Grid	21 April 2021	16h58
Emissions below limit	21 April 2021	18h04
Fires in to synchronization	4,25	HOURS
Synchronization to < Emission limit	1,1	HOURS

Unit	6	
Fires in	16 April 2021	05h52
Synchronization with Grid	17 April 2021	08h36
Emissions below limit	17 April 2021	14h00
Fires in to synchronization	26,73	HOURS
Synchronization to < Emission limit	5,4	HOURS

Unit	6	
Fires in	19 April 2021	15h54
Synchronization with Grid	19 April 2021	19h46
Emissions below limit	19 April 2021	20h03
Fires in to synchronization	3,87	HOURS
Synchronization to < Emission limit	17	MINUTES

Unit	6	
Fires in	24 April 2021	23h11
Synchronization with Grid	25 April 2021	04h26
Emissions below limit	25 April 2021	05h00
Fires in to synchronization	5,25	HOURS
Synchronization to < Emission limit	34	MINUTES

Unit	6	
Fires in	29 April 2021	17h55
Synchronization with Grid	29 April 2021	23H52
Emissions below limit	30 April 2021	03h10
Fires in to synchronization	5.95	HOURS
Synchronization to < Emission limit	3,3	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	305,75	305,75	295,55	305,75	263,40	54,50
Emergency Hours declared including hours after stand down	321,75	321,75	311,55	321,75	274,40	65,50
Days over the Limit during Emergency Generation	0	0	0	3	0	0

Unit 4 particulate emissions exceeded the 50mg/Nm^3 emission limit during emergency generation on the 5th, 26th and 27th of April 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

Six exceedances of the SO_2 10-minute limit, eight exceedances of the SO_2 hourly limit , one exceedance of the SO_2 daily limit, six exceedances of the $PM_{2.5}$ daily limit and five exceedances of the PM_{10} daily limit were 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 94,3% and the station availability was 91%.

Detailed results can be found in Attachment 1, "Marapong monthly Report_April 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

- 6 out of 32 precipitator fields is out of 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

- 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 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

Marapong monthly Report_April 2021

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