Eskom	**Matimba Power Station Emissions report**	**Matimba Power Station**

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Environmental Officer	**Environmental Manager**	**General Manager**
Date: 2022/07/06	Date: 06/07/2022	Date: 2022-07-07

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1. Report Summary

Matimba Power Station was issued with an Atmospheric Emission License (H16/1/13-WDM05) in November 2021. The License requires the license holder to submit monthly reports to the Department. This report contains the required information as specified in the license for May 2022.

During the period under review, nine exceedances of the daily particulate matter emission limit (50mg/Nm^3) occurred. An increase in SO_x emissions were observed however, no exceedances of the monthly SO_x limit (3500mg/Nm^3) or the daily NO_x emission limit (750mg/Nm^3) occurred.

More information regarding above mentioned issues is provided in the relevant sections within the report.

2. Emission information

2.1 Raw materials and products

Table 1: Quantity of Raw Materials and Products used/produced for the month

Raw Materials and Products used	Raw Material Type	Unit	Maximum Permitted Consumption Rate (Quantity)	Consumption Rate
	Coal	Tons/month	1 500 000	1 164 159
	Fuel Oil	Tons/month	1 200	956,288
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	2128,709

The consumption rates for the month of May 2022 were within the permitted maximum limits.

2.2 Abatement technology

Table 2: Abatement Equipment Control Technology Utilised

Associated Unit	Technology Type	Minimum utilisation (%)	Efficiency (%)
Unit 1	Electrostatic Precipitator	100%	99,9%
Unit 2	Electrostatic Precipitator	100%	99,9%
Unit 3	Electrostatic Precipitator	100%	99,9%
Unit 4	Electrostatic Precipitator	100%	99,9%
Unit 5	Electrostatic Precipitator	100%	99,9%
Unit 6	Electrostatic Precipitator	100%	99,9%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	93,66%
Unit 2	SO_3 Plant	100%	99,86%
Unit 3	SO_3 Plant	100%	98,37%
Unit 4	SO_3 Plant	100%	100%
Unit 5	SO_3 Plant	100%	99,32%
Unit 6	SO_3 Plant	100%	97,20%

Flue gas conditioning plant availability was below the required 100% for unit 1, unit 2, unit 3, unit 5 and unit 6 due to unexpected breakdowns and low loads. The defects were addressed, and the plants are operational.

2.3 Energy source characteristics

Table 3: Energy Source Material Characteristics.

	Characteristic	Stipulated Range (Unit)	Monthly Average Content
Coal burned	**Sulphur Content**	1.6%	1,14%
	Ash Content	40%	35,30%

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

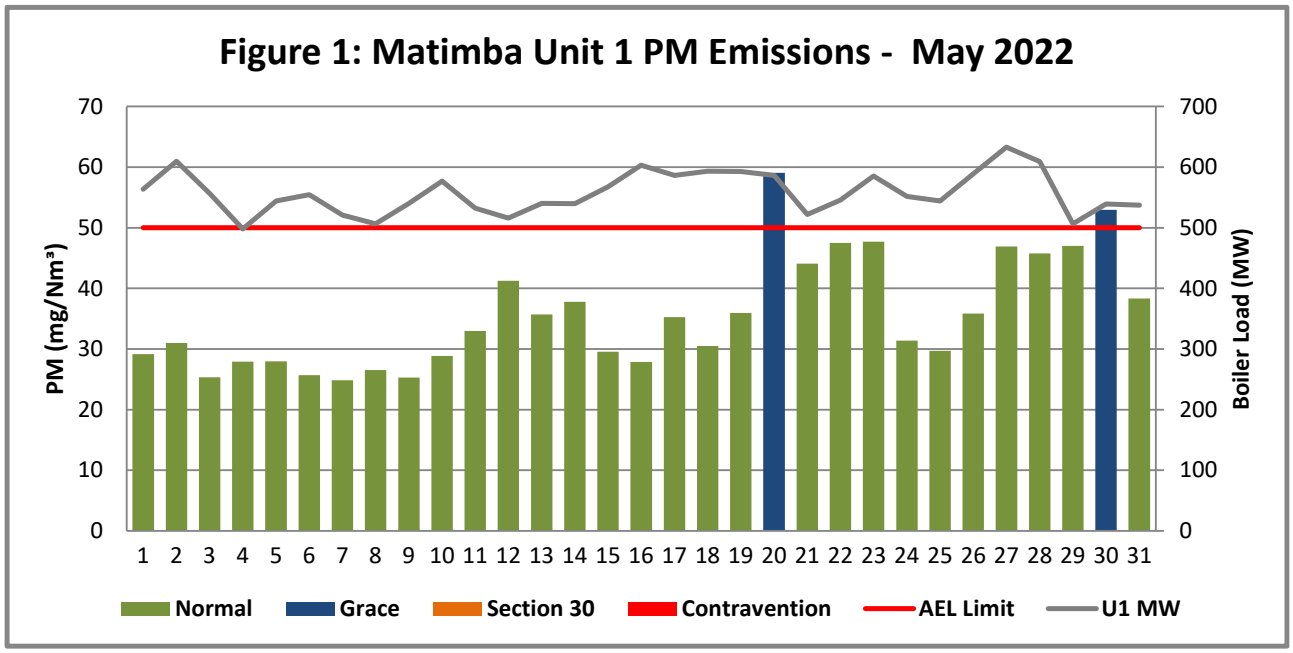

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of May 2022

Interpretation:

Unit 1 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 20 May 2022 and 30 May 2022. The exceedances were due to breakdowns on the flue gas conditioning plant and the ash removal system. The defective plants were repaired, and the exceedance remained within the 48-hour grace period.

Unit 2 Particulate Emissions

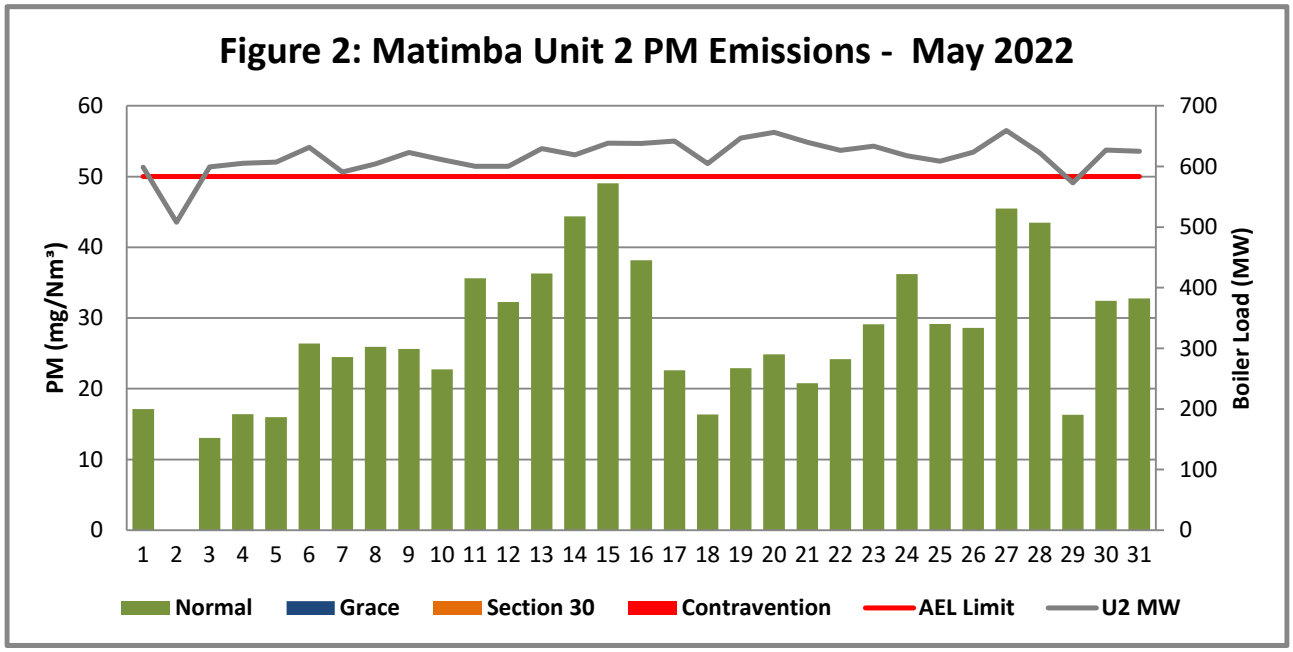

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of May 2022

Interpretation:

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

Unit 3 Particulate Emissions

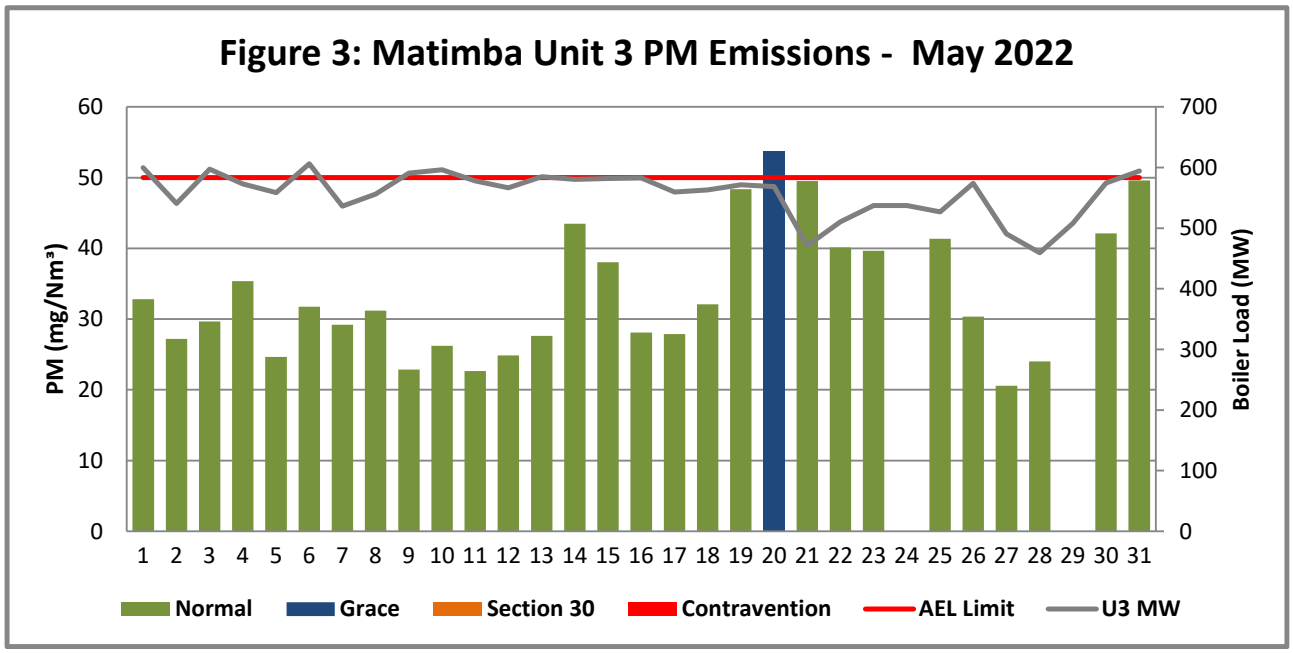

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of May 2022

Interpretation:

Unit 3 Particulate matter exceeded the daily limit of 50 mg/Nm^3 on 20 May 2022. The exceedance was due to breakdowns on the ash removal system. The defective plants were repaired, and the exceedance remained within the 48-hour grace period.

Unit 4 Particulate Emissions

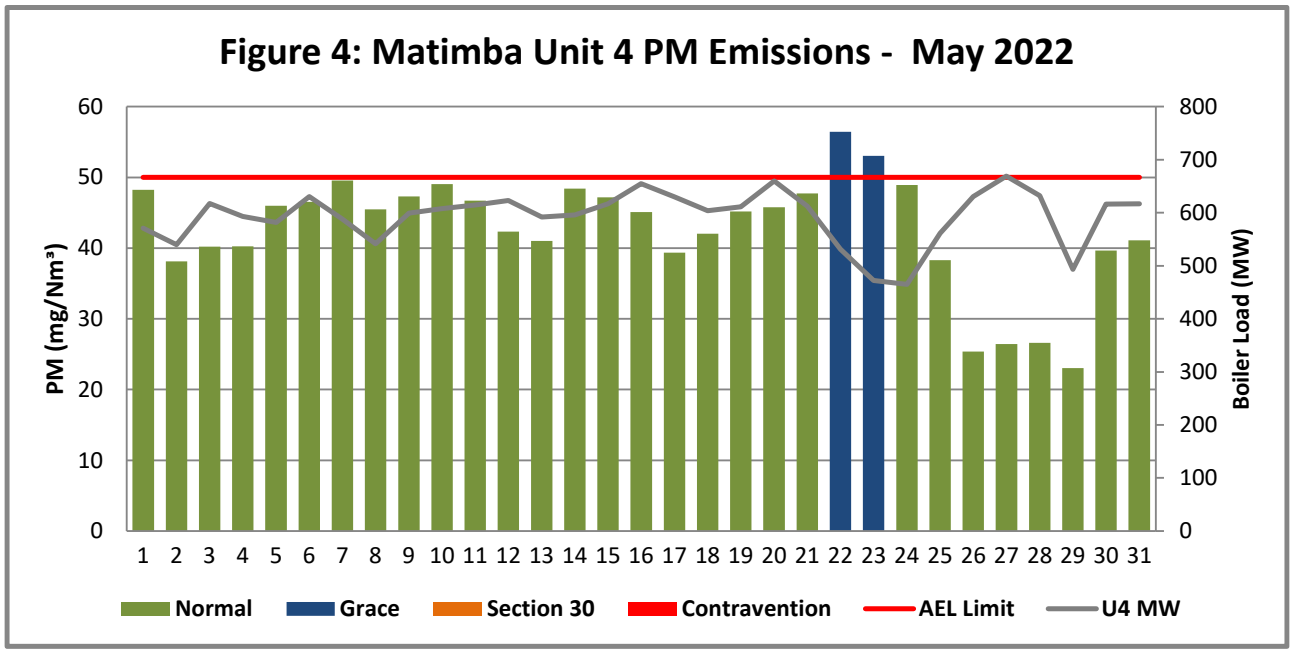

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of May 2022

Interpretation:

Unit 4 exceeded the 50 mg/Nm^3 limit on 22 May 2022 and 23 May 2022. The exceedances were due to breakdowns on the ash removal system. The defective plants were repaired, and the exceedance remained within the 48-hour grace period.

Unit 5 Particulate Emissions

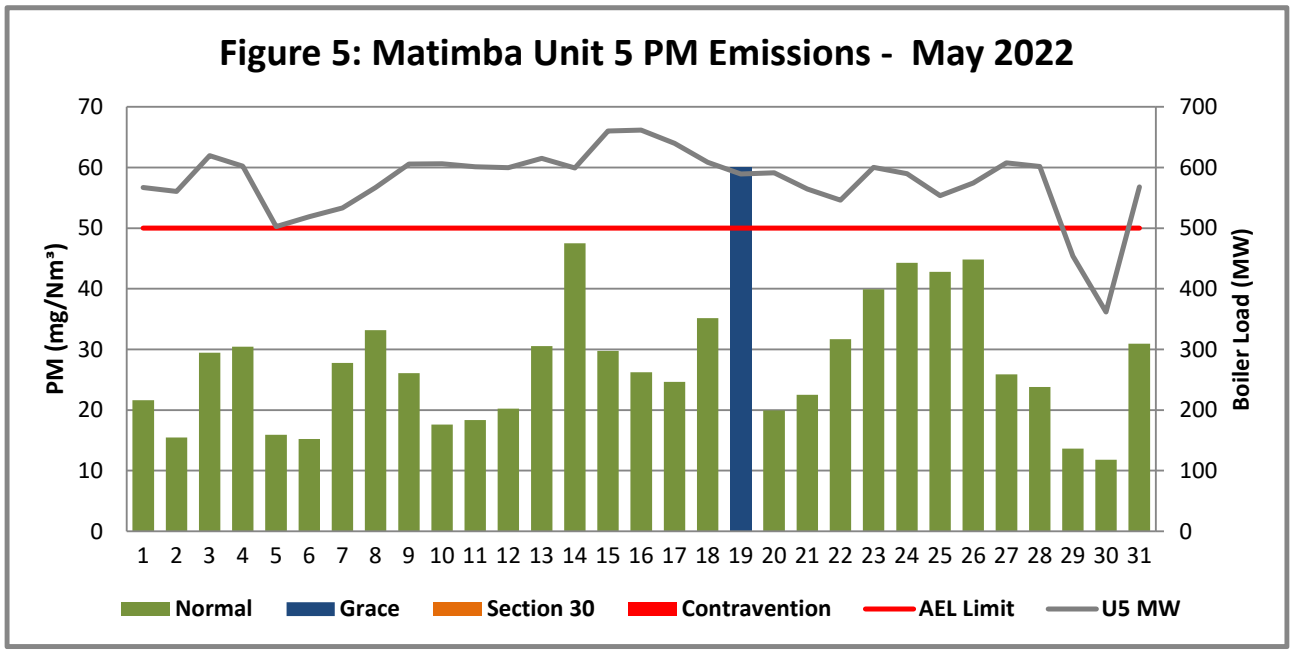

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of May 2022

Interpretation:

Unit 5 exceeded the 50 mg/Nm^3 limit on 19 May 2022. The exceedance was due to breakdowns on the ash removal system. The defective plants were repaired, and the exceedance remained within the 48-hour grace period.

Unit 6 Particulate Emissions

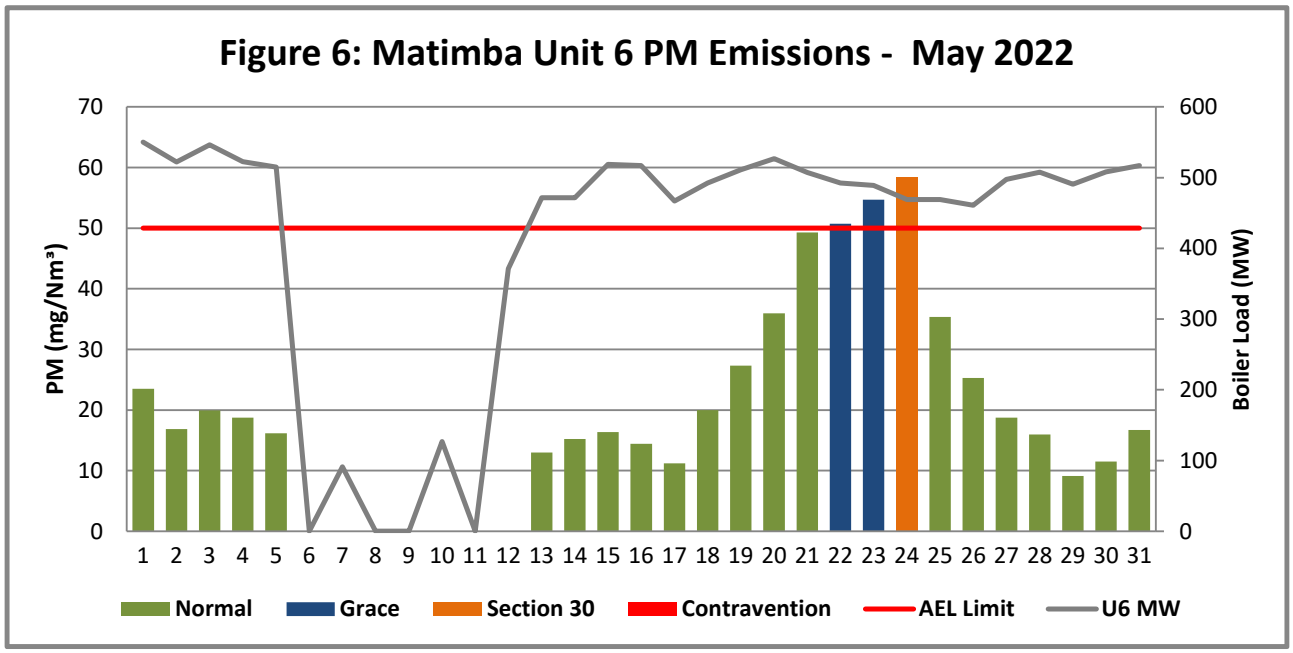

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of May 2022

Interpretation:

Unit 6 exceeded the 50 mg/Nm^3 limit on 22, 23 and 24 May 2022. The 48-hour grace period was exceeded on 24 May 2022 and a section 30 notification was sent to the department on 25 May 2022. The exceedance was due to breakdowns on the ash removal system. These breakdowns resulted in an ash backlog within the flue gas stream reducing the effectiveness on the electrostatic precipitators and therefore increasing particulate matter emissions. The defective plants were repaired, and the emissions returned to below the limit on 25 May 2022.

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

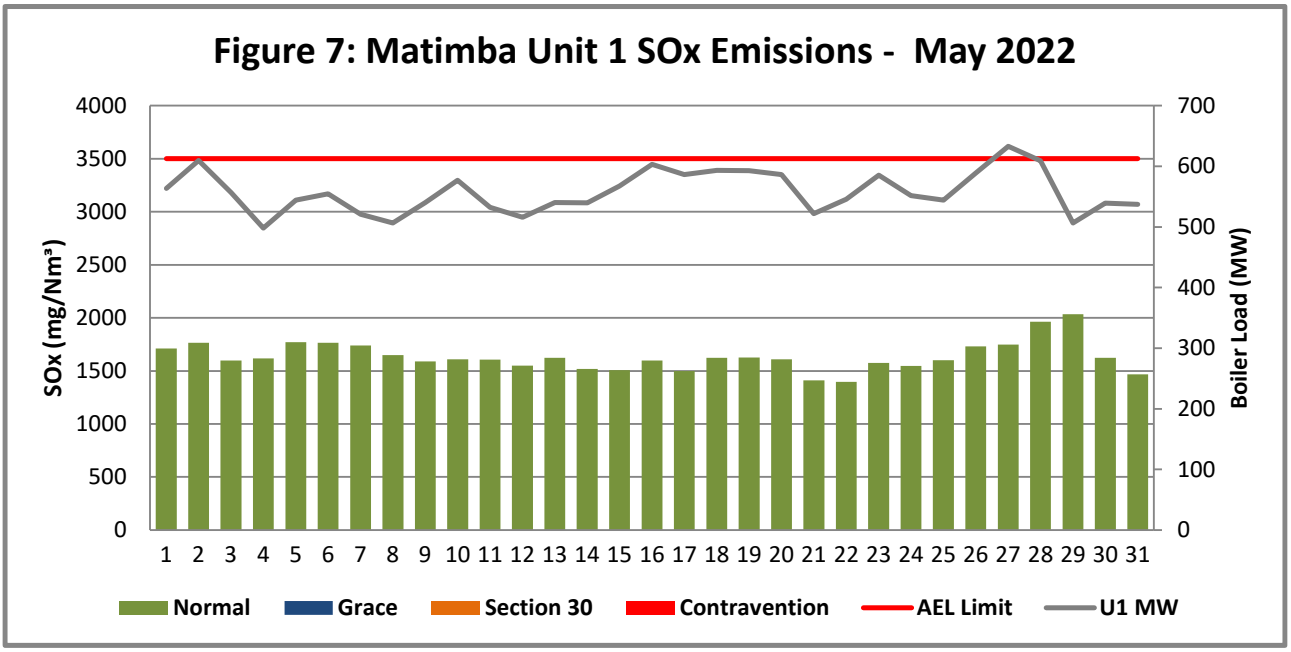

Figure 7: SO2 daily average emissions against emission limit for unit 1 for the month of May 2022

Interpretation:

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

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Unit 2 SO_2 Emissions

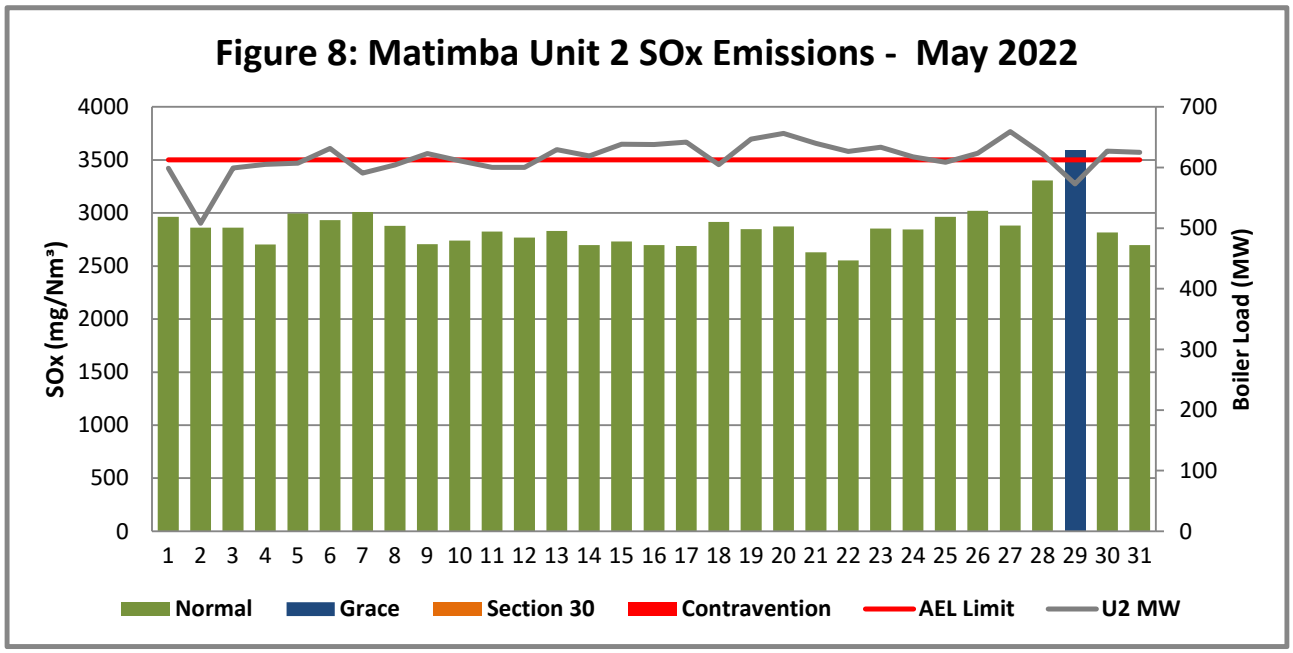

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of May 2022

Interpretation:

Unit 2 experienced increased SO_2 emissions on 29 May 2022. The increased emissions were due to an increase in sulphur content of the coal as well as an increase in the oxygen within the flue gas stream. SO_2 emission monthly limit of 3500 mg/Nm^3 was not exceeded with a monthly average of 2860,6 mg/Nm^3.

Unit 3 SO_2 Emissions

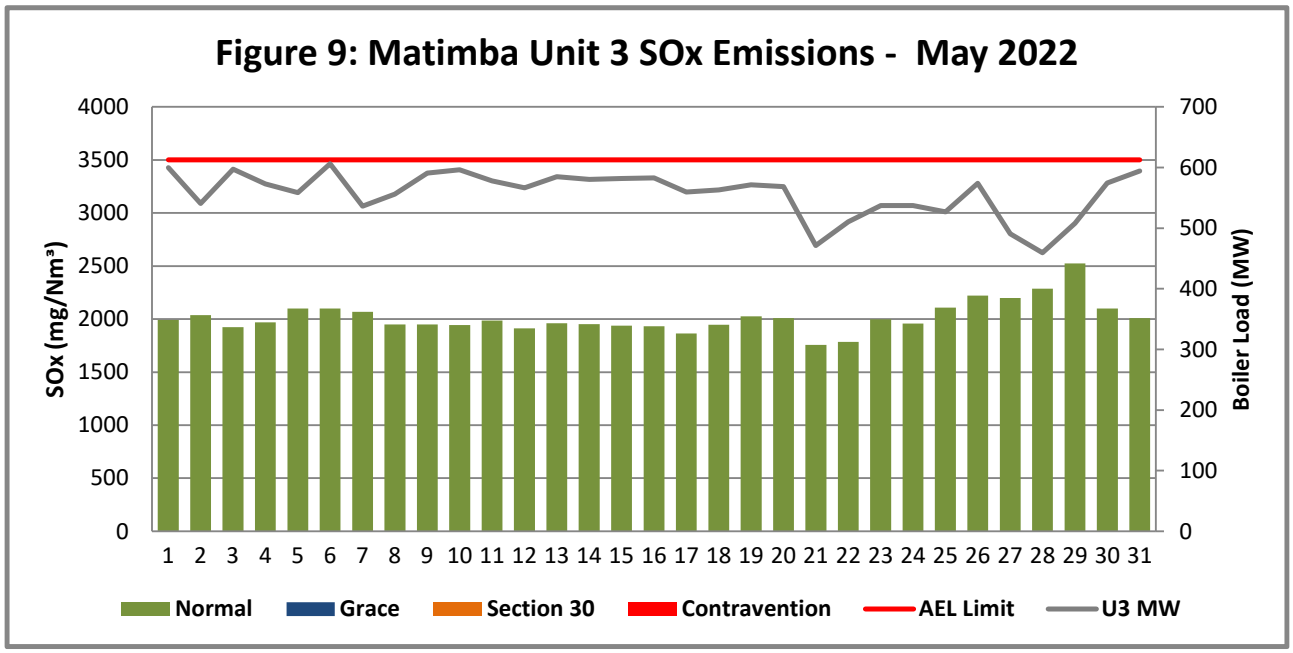

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of May 2022

Interpretation:

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

Unit 4 SO_2 Emissions

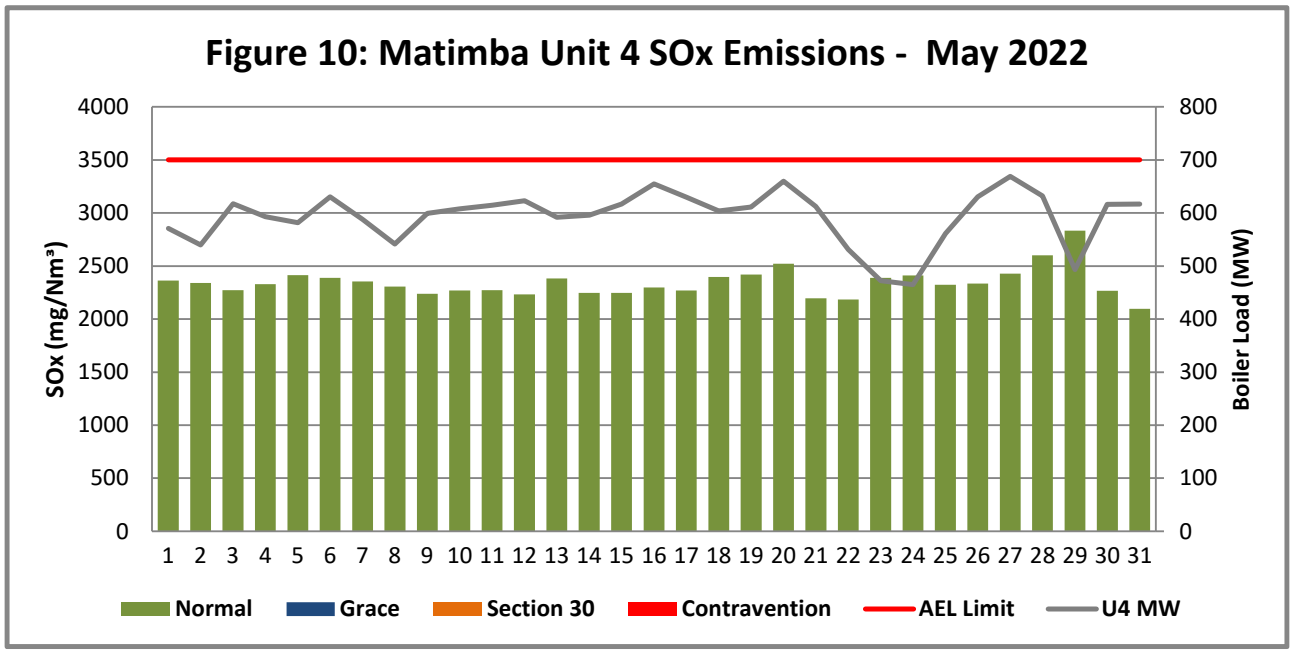

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of May 2022

Interpretation:

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

Unit 5 SO_2 Emissions

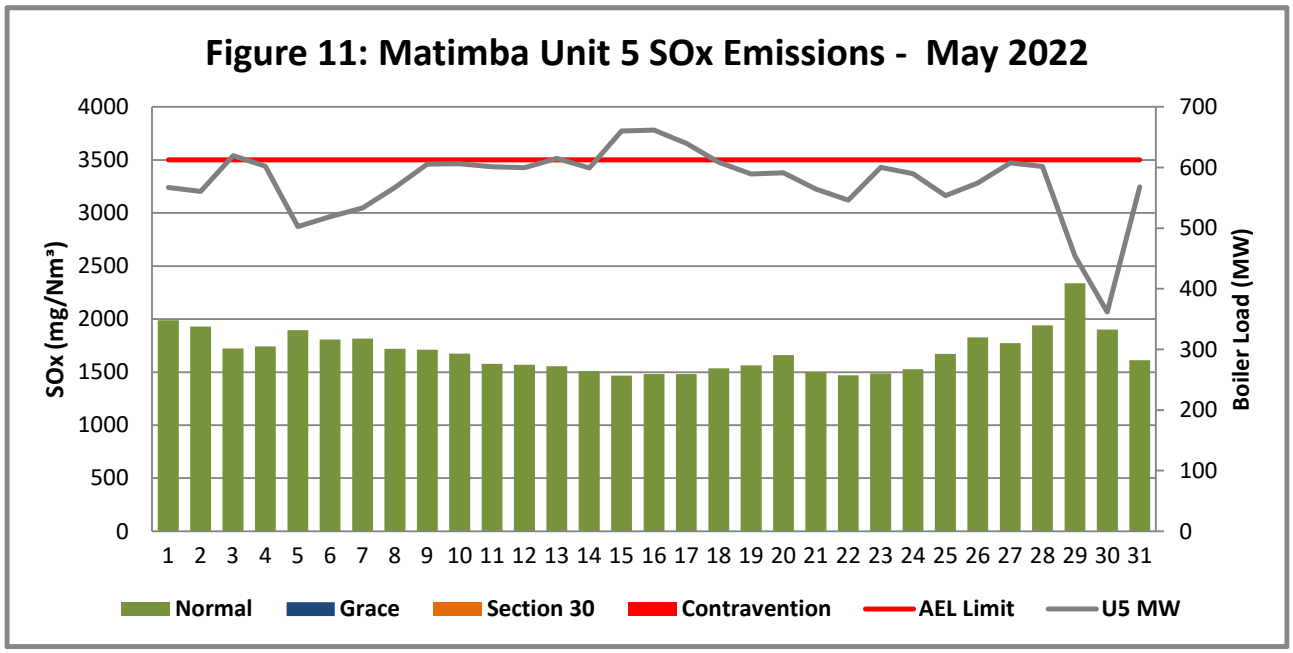

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of May 2022

Interpretation:

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

Unit 6 SO_2 Emissions

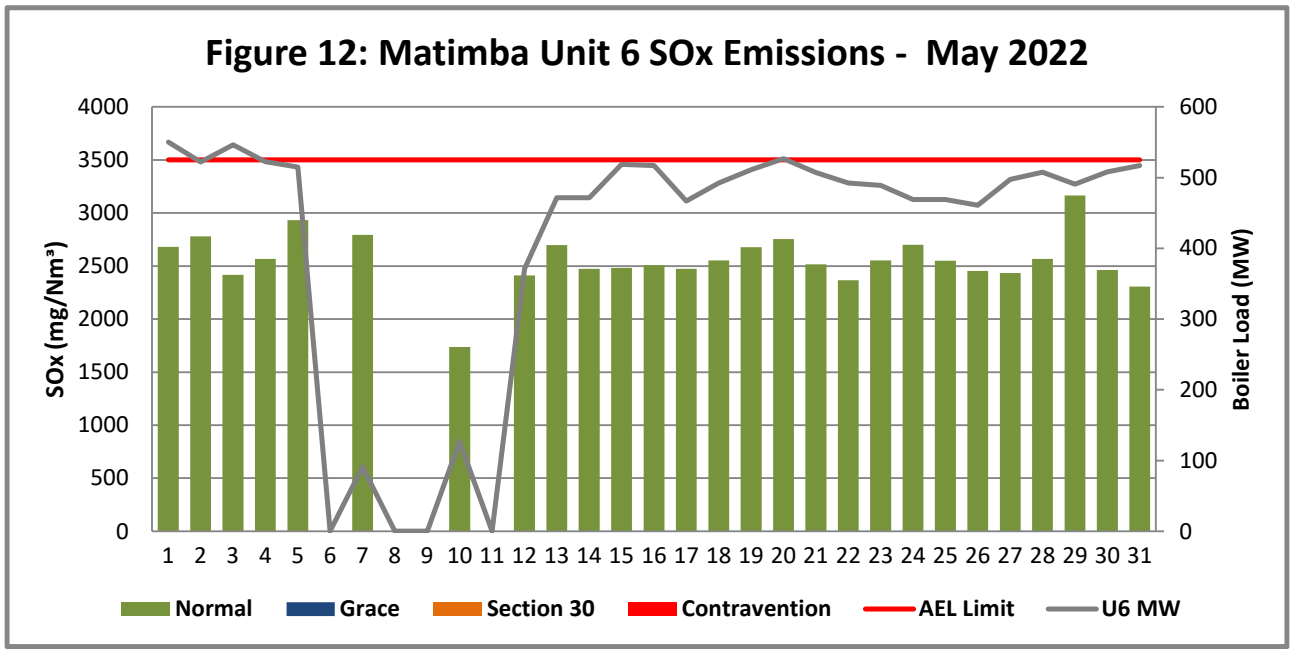

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of May 2022

Interpretation:

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

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Unit 1 NO_x Emissions

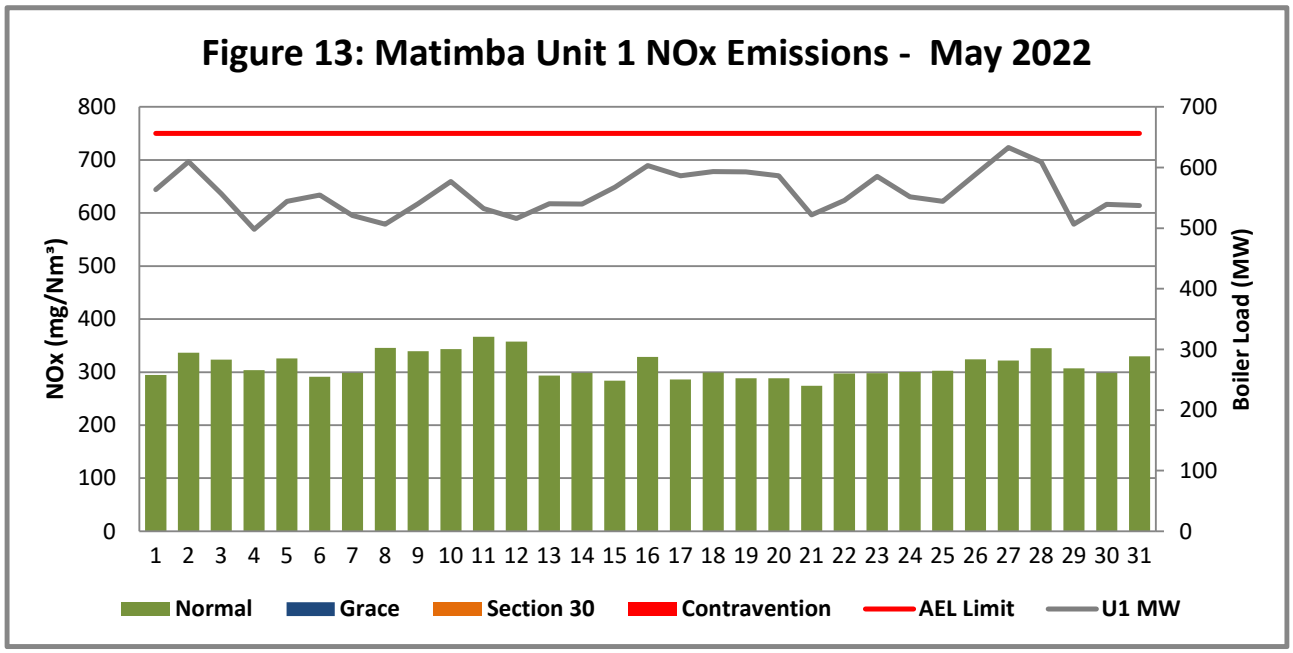

Figure 13: Figure 14: NOx daily average emissions against emission limit for unit 1 for the month of May 2022

Interpretation:

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

Unit 2 NO_x Emissions

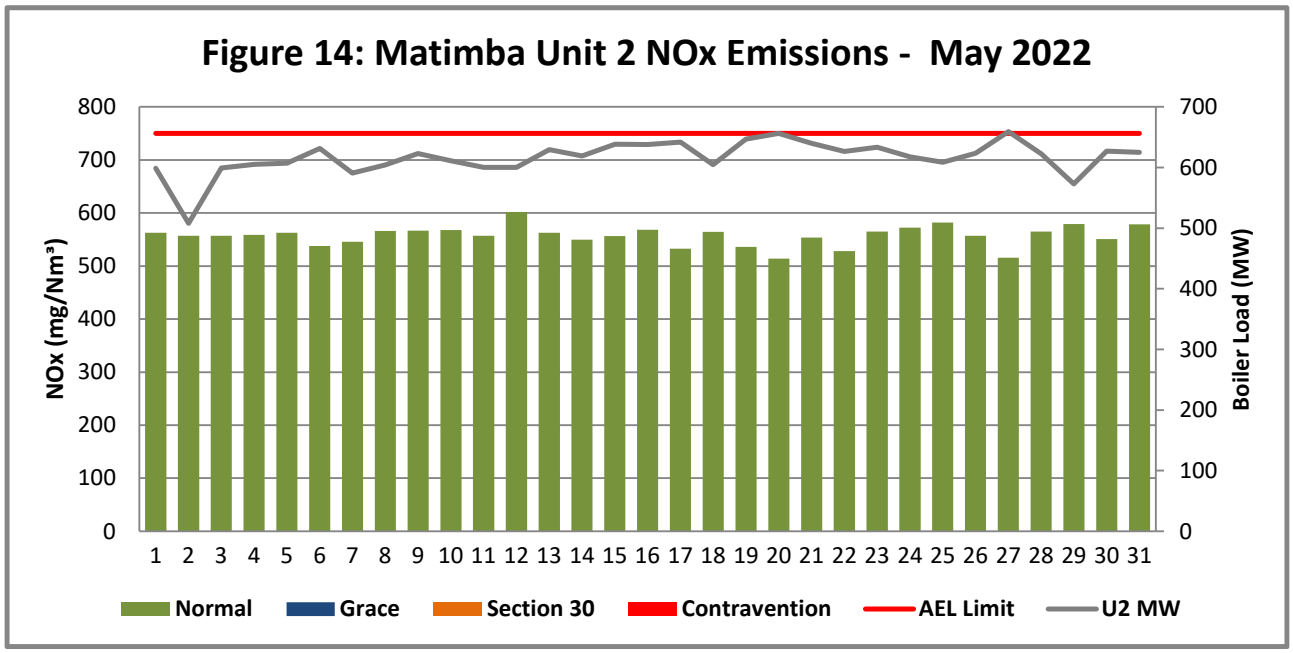

Figure 15: NOx daily average emissions against emission limit for unit 2 for the month of May 2022

Interpretation:

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

Unit 3 NO_x Emissions

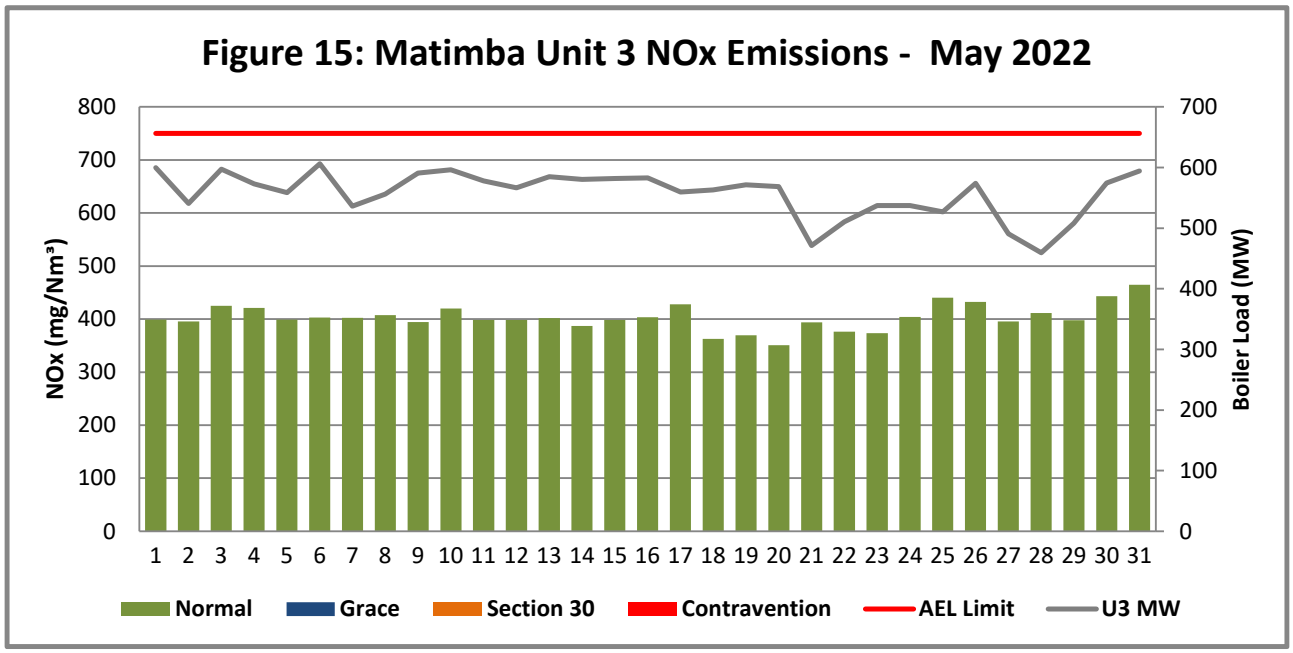

Figure 16: NOx daily average emissions against emission limit for unit 3 for the month of May 2022

Interpretation:

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

Unit 4 NO_x Emissions

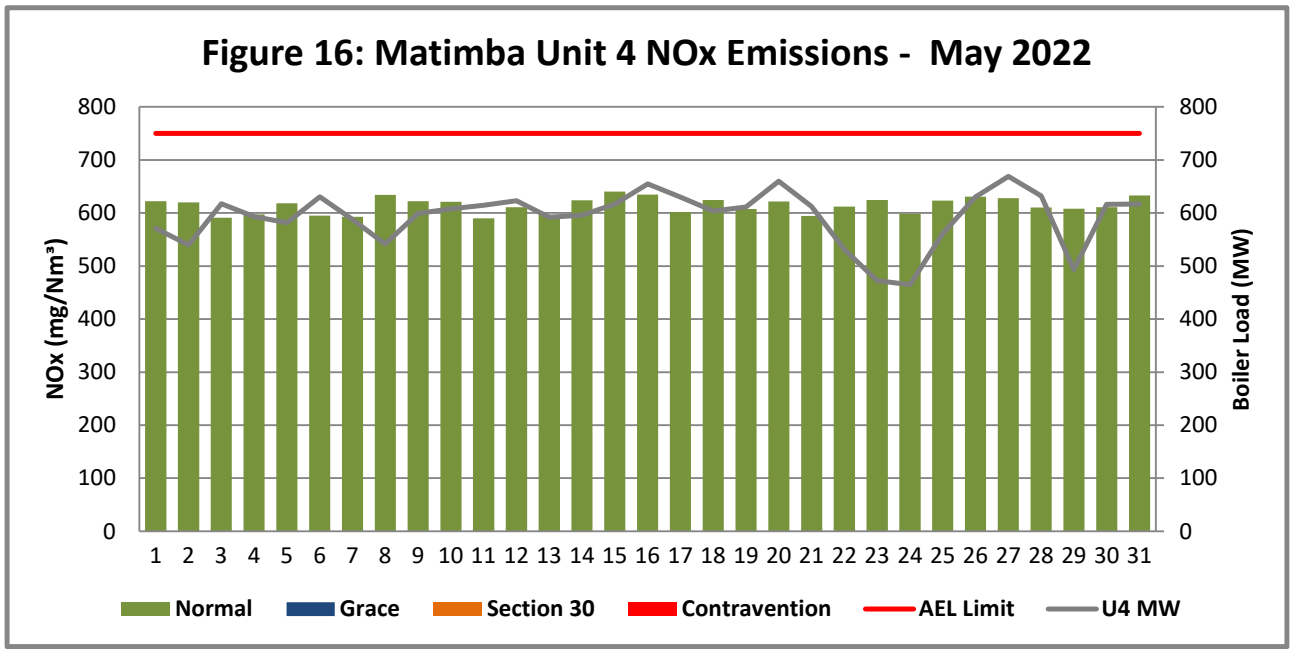

Figure 17: NOx daily average emissions against emission limit for unit 4 for the month of May 2022

Interpretation:

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

Unit 5 NO_x Emissions

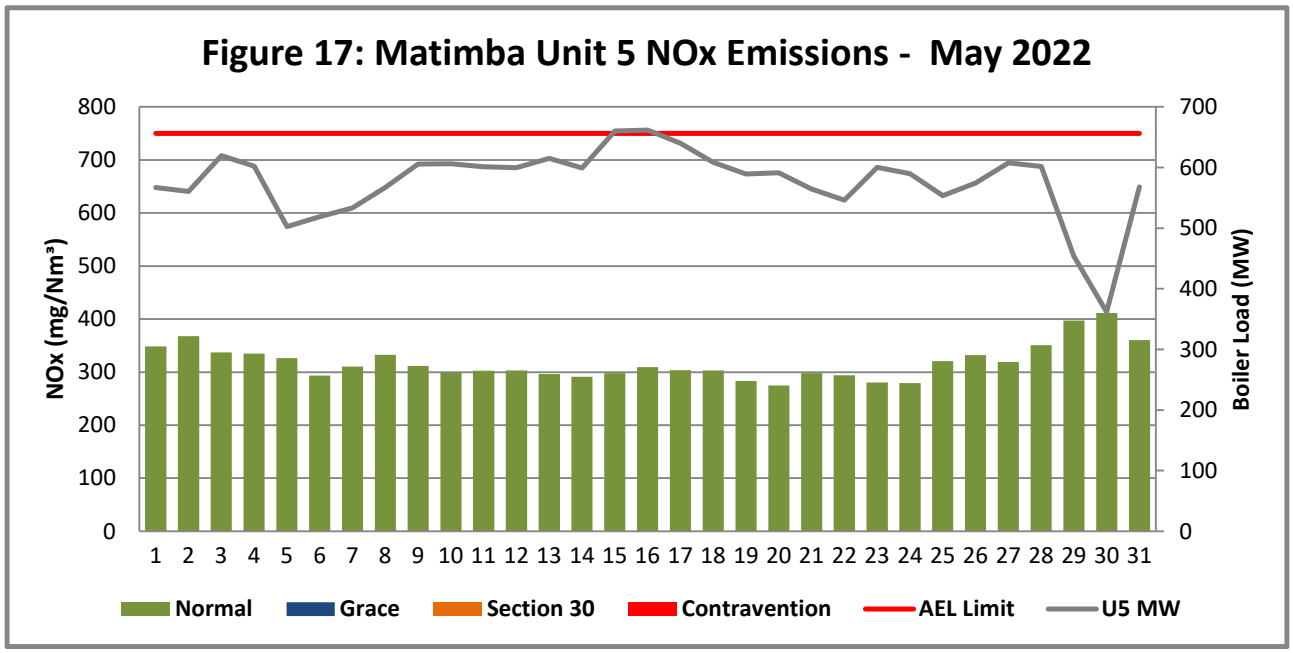

Figure 18: NOx daily average emissions against emission limit for unit 5 for the month of May 2022

Interpretation:

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

Unit 6 NO_x Emissions

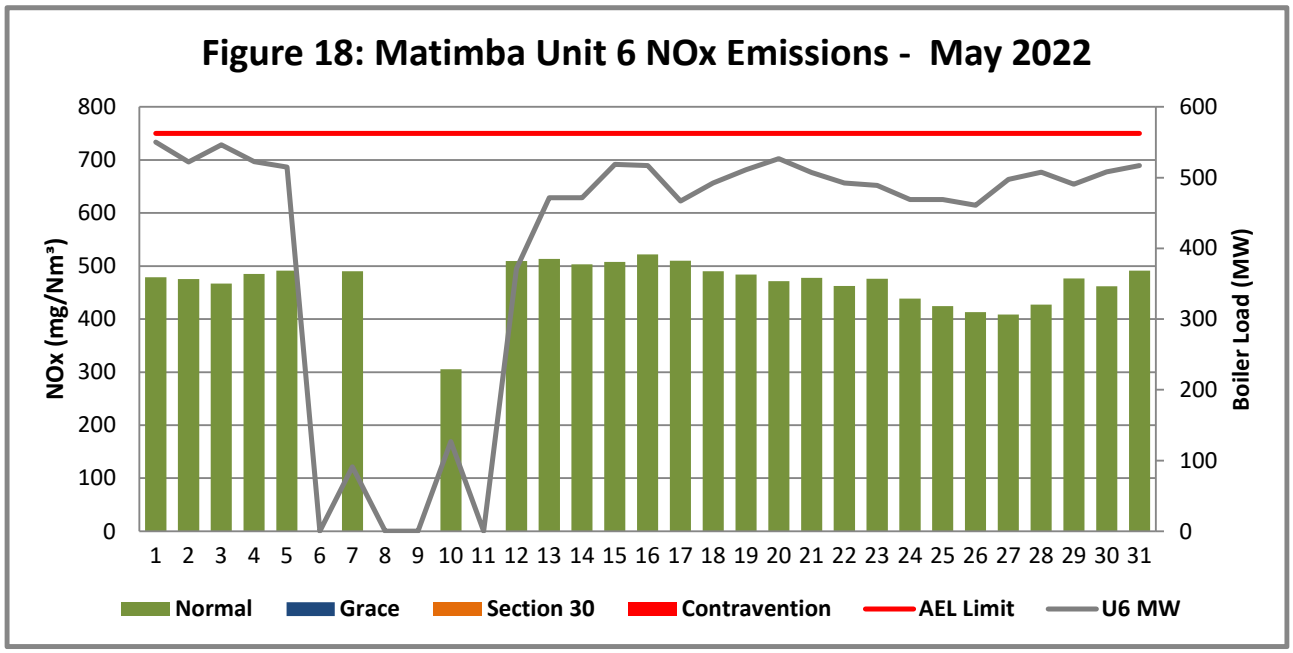

Figure 19: NOx daily average emissions against emission limit for unit 6 for the month of May 2022

Interpretation:

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

2.4.3 Total Volatile Organic Compounds

Table 4: Total volatile compound estimates

Eskom

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

Date:	Tuesday, 14 June 2022
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:	**May**	
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:	***956,288***	
Molecular weight of the fuel oil:	166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	**Data**	**Unit**
Daily average ambient temperature	19,51	°C
Daily maximum ambient temperature	28,42	°C
Daily minimum ambient temperature	12,06	°C
Daily ambient temperature range	15,04	°C
Daily total insolation factor	3,91	kWh/m²/day
Tank paint colour	***Grey/medium***	NA
Tank paint solar absorbtance	0,68	NA
FINAL OUTPUT:	**Result**	**Unit**
Breathing losses:	0,54	kg/month
Working losses:	0,03	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	**0,57**	**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 May 2022

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2022/05/01	13465	9483	14320	13678	13398	13056
2022/05/02	14662	5525	12966	12929	13346	12405
2022/05/03	13350	14154	14252	14749	14758	13000
2022/05/04	11914	14300	13680	14141	14334	12416
2022/05/05	13039	14339	13296	13883	11942	6250
2022/05/06	13320	14916	14518	15118	12368	0
2022/05/07	12463	13927	12756	14022	12653	148,8
2022/05/08	12166	14271	13303	12973	13505	0
2022/05/09	12897	14941	14091	14299	14376	0
2022/05/10	13872	14767	14270	14560	14461	218,9
2022/05/11	12744	14537	13781	14655	14280	0
2022/05/12	12385	14563	13528	14890	14253	2714
2022/05/13	12927	14883	13960	14130	14671	11196
2022/05/14	12932	14613	13859	14211	14193	11190
2022/05/15	13580	15117	13883	14719	15686	12307
2022/05/16	14498	15033	13958	15636	15732	12308
2022/05/17	14040	15205	13330	15119	15285	11117
2022/05/18	14227	14279	13433	14419	14453	11665
2022/05/19	14143	15254	13635	14574	12294	12122
2022/05/20	11731	15516	13605	15775	14057	12516
2022/05/21	12491	15160	11250	14683	13426	12065
2022/05/22	13048	14794	12155	12697	13030	11691
2022/05/23	14036	15001	9266	11293	14191	11606
2022/05/24	13229	14594	11733	11124	14071	11135
2022/05/25	13001	14362	12533	13345	13117	11132
2022/05/26	14110	14714	13695	15068	13669	10939
2022/05/27	15176	15580	11777	15977	14443	11808
2022/05/28	14639	14744	10512	15138	14344	12063
2022/05/29	12154	13530	11376	11833	10870	11663
2022/05/30	12922	14809	13721	14732	8569	12051
2022/05/31	9951	14770	14154	14746	13509	12300

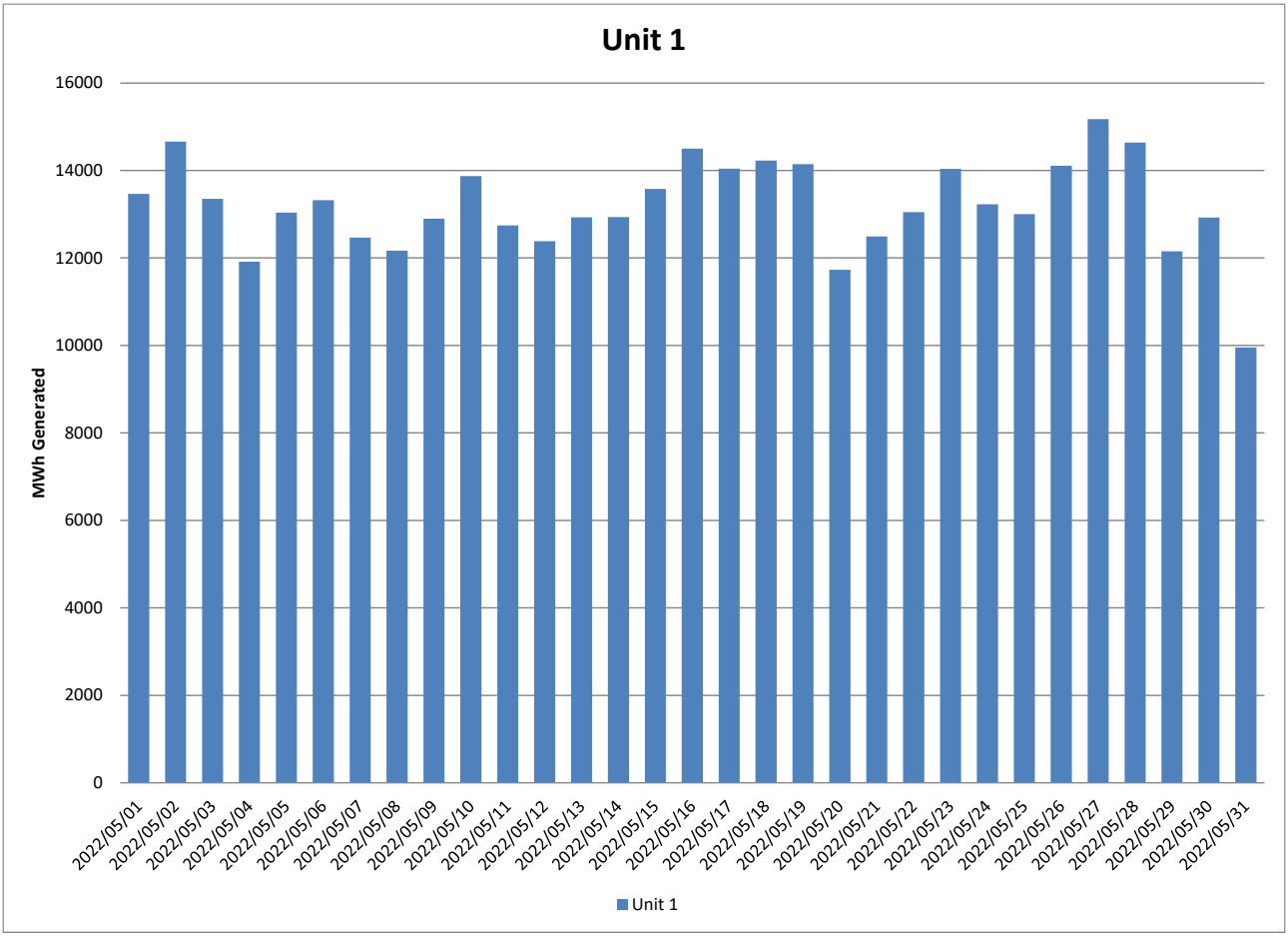

Figure 20: Unit 1 daily generated power in MWh for the month of May 2022

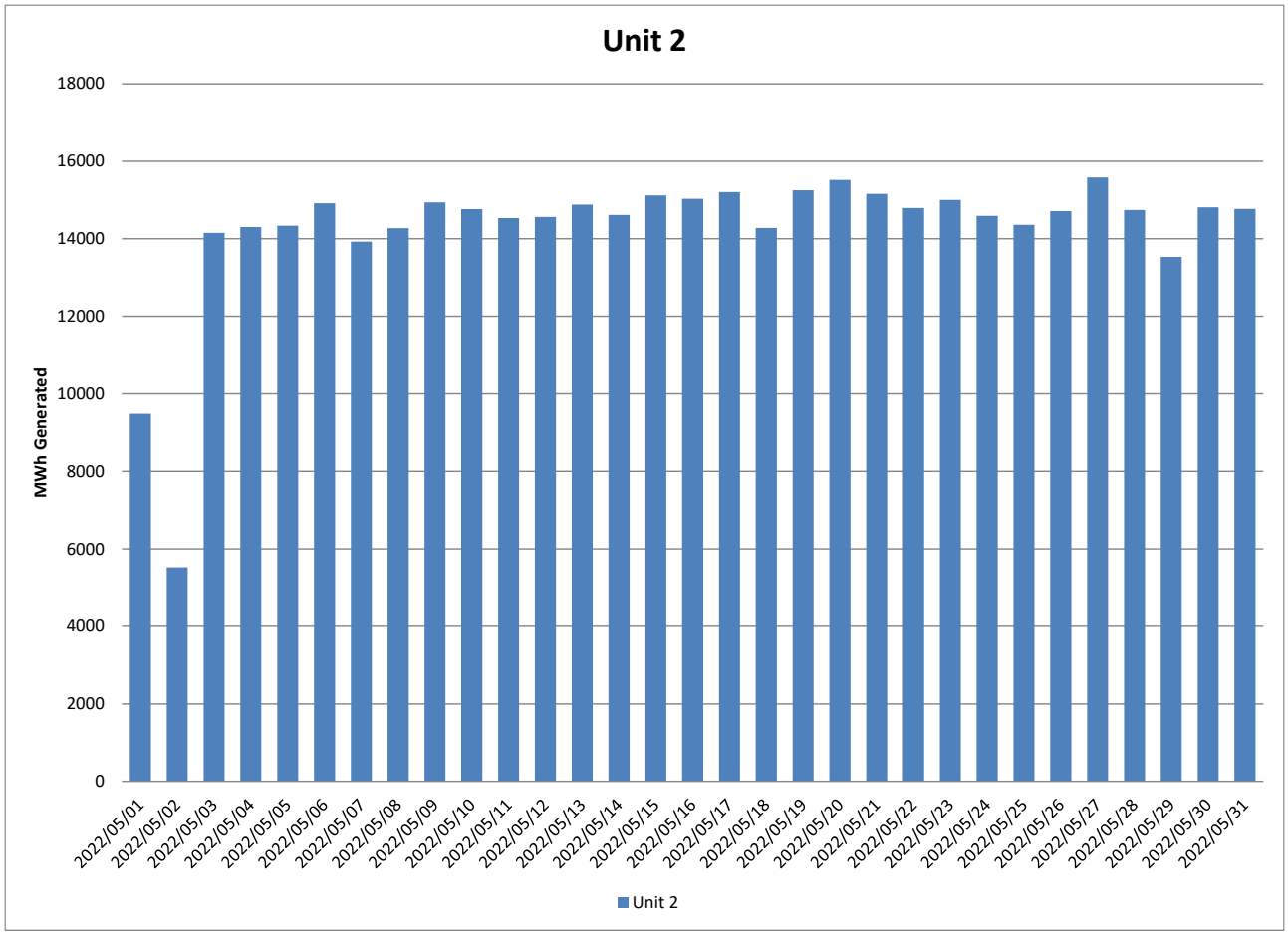

Figure 21: Unit 2 daily generated power in MWh for the month of May 2022

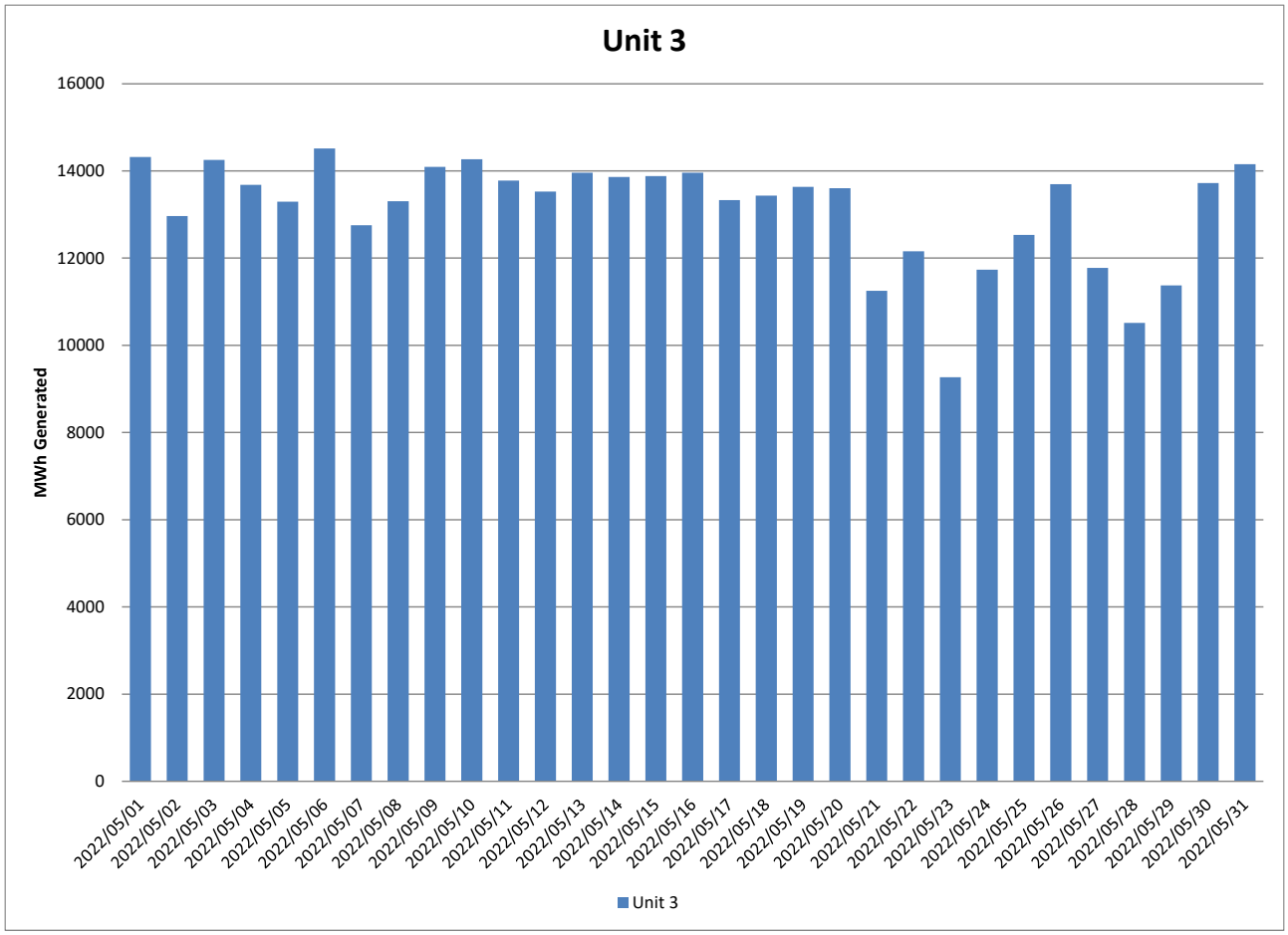

Figure 22: Unit 3 daily generated power in MWh for the month of May 2022

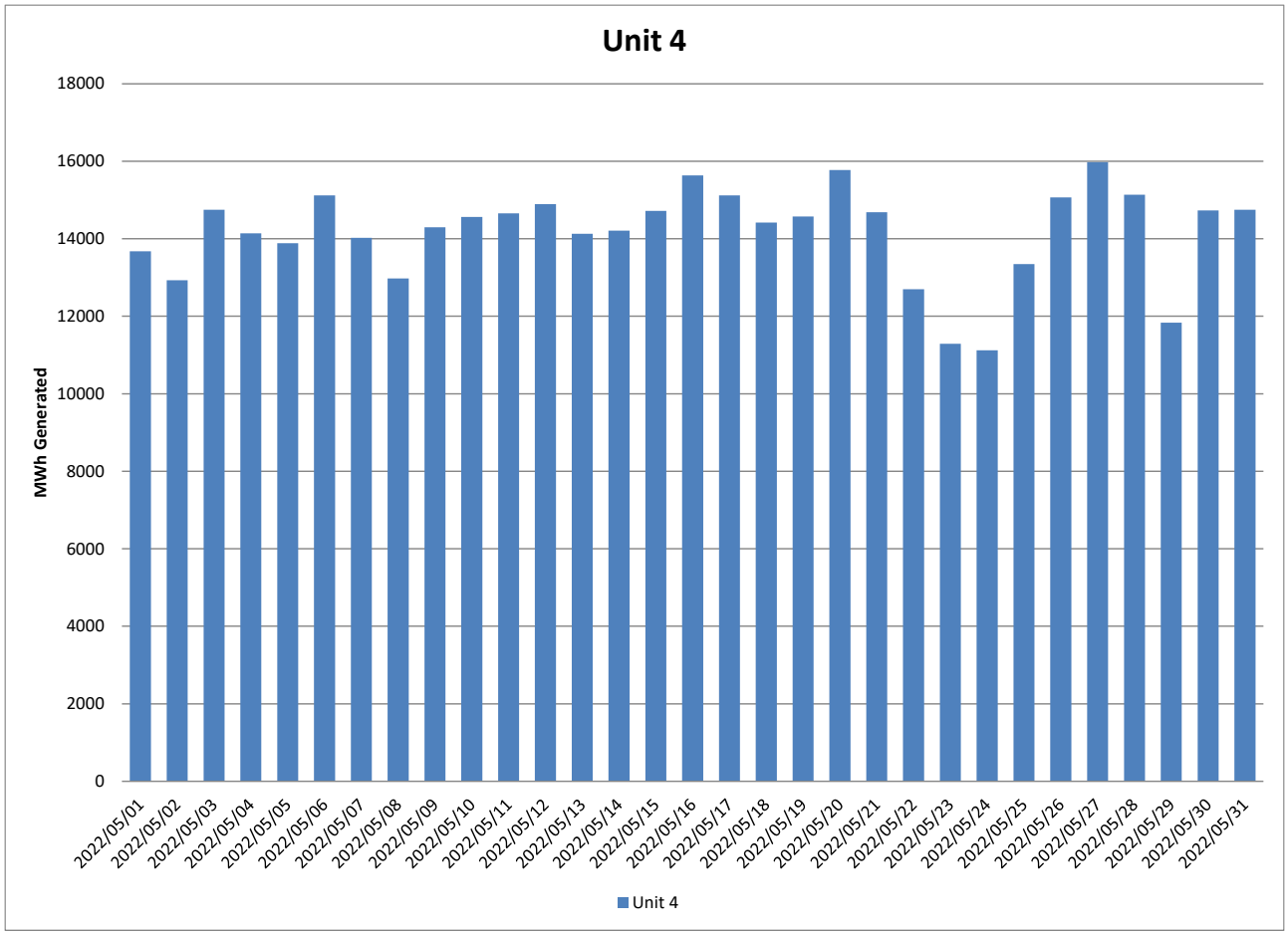

Figure 23: Unit 4 daily generated power in MWh for the month of May 2022

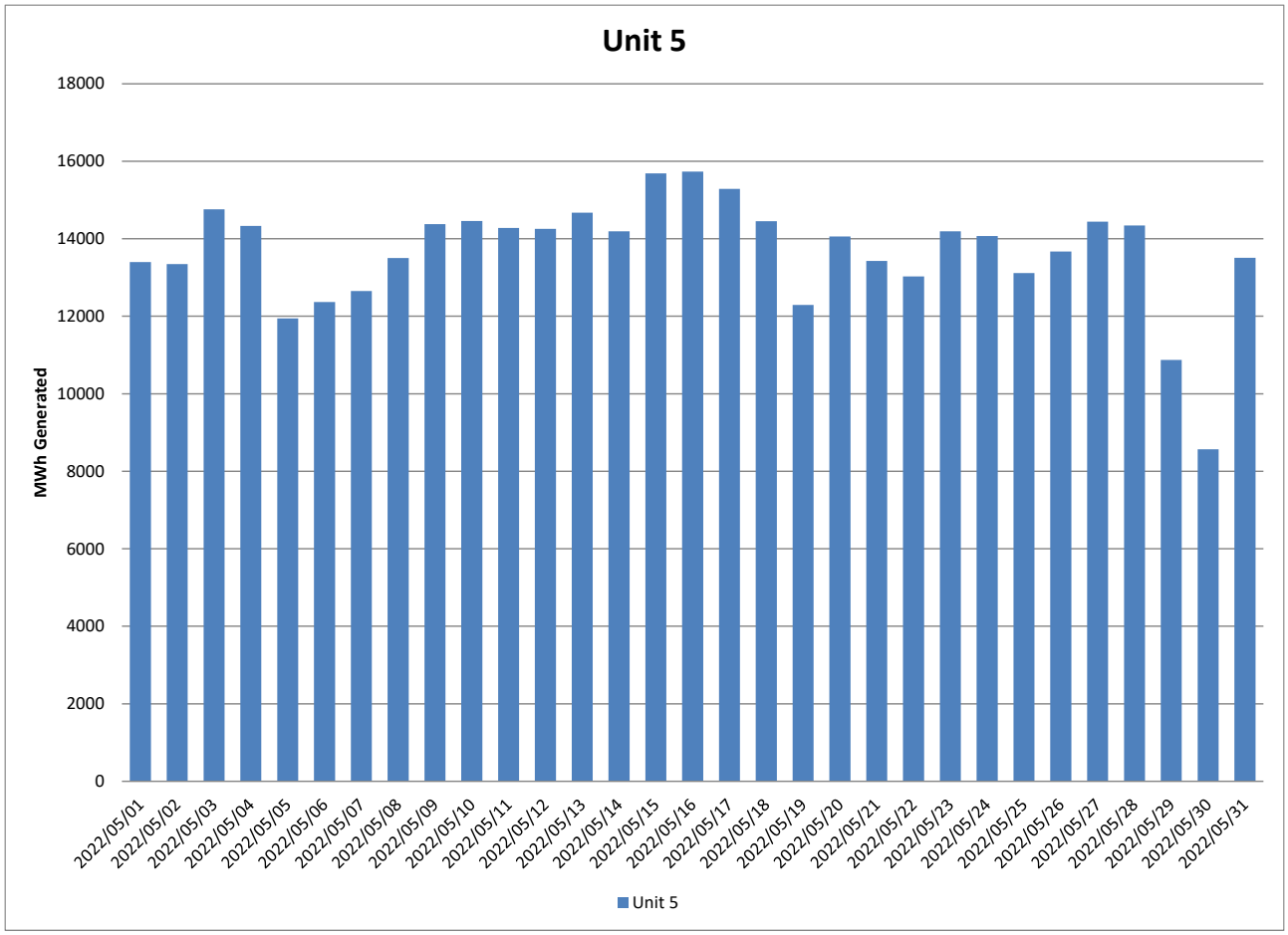

Figure 24: Unit 5 daily generated power in MWh for the month of May 2022

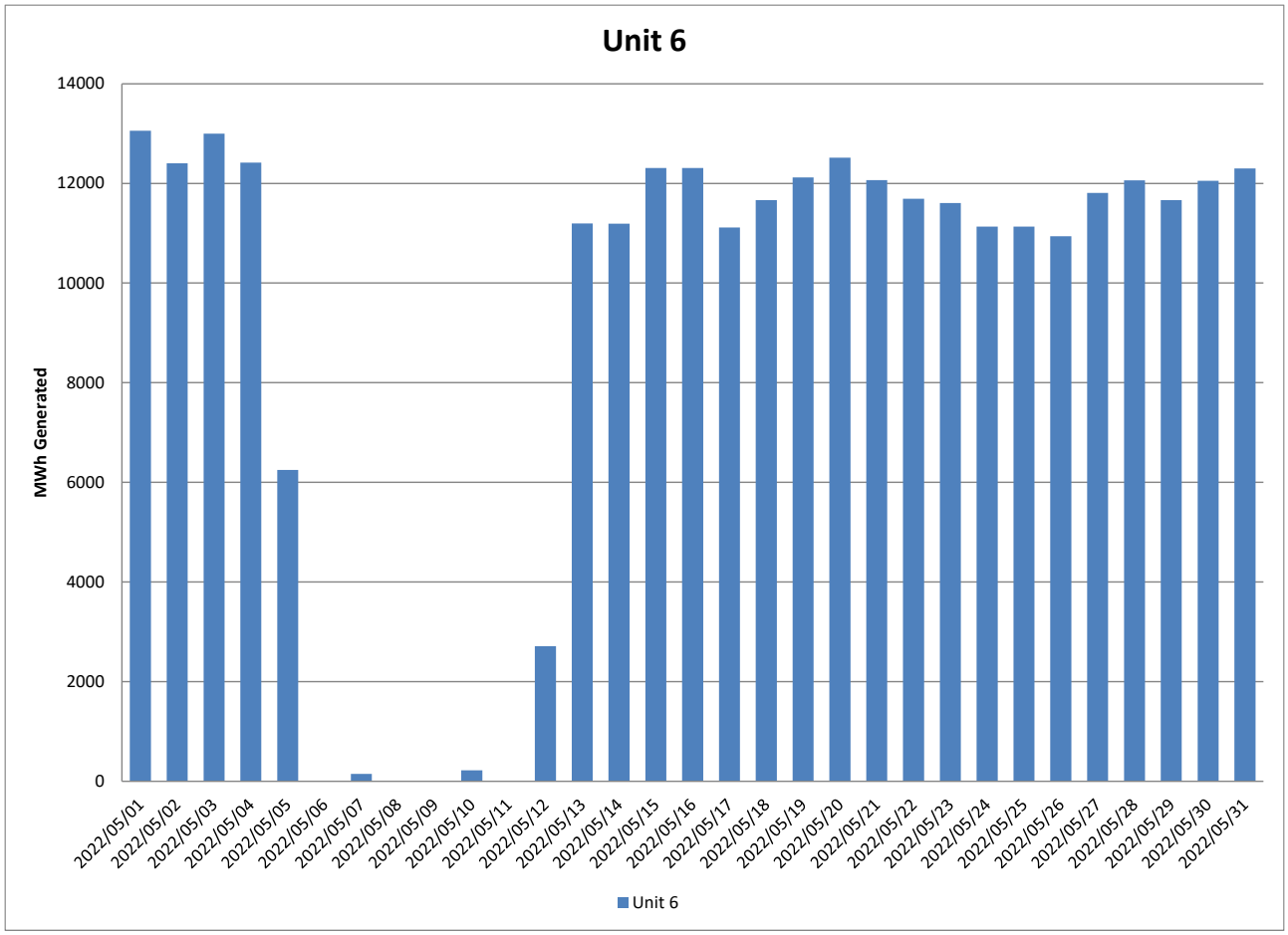

Figure 25: Unit 6 daily generated power in MWh for the month of May 2022

2.6 Pollutant Tonnages

The emitted pollutant tonnages for May 2022 are provided in table 6. Averaged values were used for CO_2 data for Unit 1 from 20 to 22 May 2022 and for Unit 6 from 1 to 7 May 2022, 12 to 17 May 2022 and 19 to 22 May 2022 due to the analyser being defective and providing unreliable data. CO_2 values for units 3, 4 and 5 were calculated per balance, using O_2 values, due to analyser 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 May 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	75,8	3 778,8	722,5
Unit 2	59,0	9 166,7	1 787,7
Unit 3	62,1	5 219,7	1 047,1
Unit 4	81,6	4 996,0	1 311,3
Unit 5	55,8	3 633,3	684,7
Unit 6	35,3	3 951,8	726,2
SUM	369,6	30 746,2	6 279,4

2.7 Reference values

Table 7: Reference values for data provided, May 2022

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	6,00	9,47	5,65	6,77	7,35	9,69
Moisture	%	4,74	4,86	5,19	3,87	5,31	2,96
Velocity	m/s	25,1	36,1	28,1	25,4	25,5	26,9
Temperature	^{o}C	134,3	130,5	127,4	136,9	120,2	121,8
Pressure	mBar	934,7	1 193,7	918,0	903,6	928,9	926,2

2.8 Continuous Emission Monitors

2.8.1 Reliability

CO_2 monitor reliability for units 3, 4, 5 and 6 performed below the required 80% reliability as per the AEL. The monitors for these units were 100% available for May 2022 however the data received were removed and replaced with calculated values and averaged values due to data received from the monitors not being reliable.

Averaged values were used for CO_2 data for Unit 1 from 20 to 22 May 2022 and for Unit 6 from 1 to 7 May 2022, 12 to 17 May 2022 and 19 to 22 May 2022 due to the analyser being defective and providing unreliable data. CO_2 values for units 3, 4 and 5 were calculated per balance, using O_2 values, due to analyser providing unreliable data.

Table 8: Average percentage (%) availability of monitors for the month of May 2022.

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100,0	100,0	98,8	97,0
Unit 2	100,0	92,3	92,3	92,3
Unit 3	100,0	100,0	100,0	0,0
Unit 4	100,0	100,0	100,0	0,0
Unit 5	100,0	100,0	100,0	0,0
Unit 6	100,0	100,0	100,0	45,4

2.8.2 Changes, downtime and repairs

Unit 1

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 2

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 3

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 4

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 5

- U No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

Unit 6

- No adjustments done on the CEMs. Calibration of gaseous analysers is done every second week.
- No downtime or repairs done on the particulate monitors

2.8.3 Sampling dates and times

Continuous

2.9 Units Start-up information

Table 9: Start-up information

Unit	1	
Fires in	2022/05/20	19h25
Synchronization with Grid	2022/05/20	22h36
Emissions below limit	2022/05/21	01h00
Fires in to synchronization	3,18	HOURS
Synchronization to < Emission limit	2,4	HOURS

Unit	1	
Fires in	2022/05/31	20h32
Synchronization with Grid	2022/05/31	22h34
Emissions below limit	2022/06/01	00h01
Fires in to synchronization	2,03	HOURS
Synchronization to < Emission limit	1,45	HOURS

Unit	2	
Fires in	2022/05/02	08h54
Synchronization with Grid	2022/05/02	12h54
Emissions below limit	2022/05/02	14h39
Fires in to synchronization	4	HOURS
Synchronization to < Emission limit	1,75	HOURS

Unit	3	
Fires in	2022/05/24	00h18
Synchronization with Grid	2022/05/24	02h03
Emissions below limit	2022/05/24	03h00
Fires in to synchronization	1,75	HOURS
Synchronization to < Emission limit	0,95	HOURS

Unit	3	
Fires in	2022/05/28	23h00
Synchronization with Grid	2022/05/29	01h29
Emissions below limit	2022/05/29	01h29
Fires in to synchronization	2,48	HOURS
Synchronization to < Emission limit	0	HOURS

Unit	5	
Fires in	2022/05/19	19h49
Synchronization with Grid	2022/05/19	21h44
Emissions below limit	2022/05/19	23h00
Fires in to synchronization	1,92	HOURS
Synchronization to < Emission limit	1,27	HOURS

Unit	6	
Fires in	2022/05/07	08h07
Synchronization with Grid	2022/05/07	12h51
Emissions below limit	2022/05/07	12h51
Fires in to synchronization	4,73	HOURS
Synchronization to < Emission limit	0	HOURS

Unit	6	
Fires in	2022/05/10	16h43
Synchronization with Grid	2022/05/10	21h55
Emissions below limit	2022/05/10	22h01
Fires in to synchronization	5,2	HOURS
Synchronization to < Emission limit	0,1	HOURS

Unit	6	
Fires in	2022/05/12	09h47
Synchronization with Grid	2022/05/12	16h29
Emissions below limit	2022/05/12	16h29
Fires in to synchronization	6,7	HOURS
Synchronization to < Emission limit	0	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	459	517	465	517	499	433
Emergency Hours declared including hours after stand down	488	548	491	548	529	458
Days over the Limit during Emergency Generation	2	0	1	2	1	3

Unit 1 exceeded the 50mg/Nm^3 limit for two days during emergency generation, on 20 and 30 May 2022. Unit 3 exceeded the 50mg/Nm^3 limit for one day during emergency generation, on 20 May 2022. Unit 4 exceeded the 50mg/Nm^3 limit for two days during emergency generation, on 22 and 23 May 2022. Unit 5 exceeded the 50mg/Nm^3 limit for one day during emergency generation, 19 May 2022. Unit 6 exceeded the 50mg/Nm^3 limit for three days during emergency generation, on 22, 23 and 24 May 2022.

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
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

Four exceedances of the $PM_{2.5}$ daily limit and ten exceedances for the PM_{10} daily limit occurred during the period under review. The SO_2 national ambient air quality hourly standard was exceeded once and three exceedances of the SO_2 national ambient air quality 10-minute limit were recorded.

The average data recovery for the period was 60% and the station availability was 65.6%. The reason for low data recovery and low station availability is that there was a loss of data for 10 days which was caused by a faulty data logger battery charger.

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

Detailed results can be found in Attachment 1, “Marapong Monthly Report_May 2022”.

2.14 Electrostatic precipitator and Sulphur plant status

Unit 1

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

Unit 2

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

Unit 3

- All precipitator fields in service.
- Unit 3 Variable speed drive failed and was replaced.

Unit 4

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

Unit 5

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

Unit 6

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

SO3 common plant

- No abnormalities on the sulphur storage plant.

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

Attachment 1 – Marapong Monthly Report_May 2022

Attachment 2 – Matimba Power Station Dust fallout monitoring report May 2022

4. Report Conclusion

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

Hoping the above will meet your satisfaction.

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

Yours sincerely

GENERAL MANAGER: MATIMBA POWER STATION