Eskom	Matimba Power Station Emissions report	Matimba Power Station

Title:	**Matimba Power Station September 2021 emissions report**	Document Identifier:	**RP/247/012**
		Plant Location:	**Emission management**
		Area of Applicability:	**Matimba Power Station**
		Functional Area Applicability:	**Environment**
		Revision:	**1**
		Total Pages:	**40**
		Report Date:	**September 2021**
		Disclosure Classification:	**Controlled**

Compiled by	**Functional Responsibility**	**Authorized by**
WC Mocke	**MC Mamabolo**	**CO Mabotja**
Environmental Officer	**Environmental Manager**	**General Manager**
Date: 2021/10/25	Date: 25/10/2021	Date: 2021/10/27

Content

Figures

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 September 2021.

During the period under review, Matimba experienced 6 exceedances of the daily particulate matter emission limit (50mg/Nm^3) all these 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 SO_x emission monitor for unit 6 did not achieve the 90% availability required by the license, the monitor was repaired on 14 September 2021 and the monitor is currently operational.

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	1 073 118
	Fuel Oil	Tons/month	1 200	520,674
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	1 652,949

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

2.2 Abatement technology

Table 2: Abatement Equipment Control Technology Utilised

Associated Unit	Technology Type	Minimum utilisation (%)	Efficiency (%)
Unit 1	Electrostatic Precipitator	100%	99,89%
Unit 2	Electrostatic Precipitator	100%	99,93%
Unit 3	Electrostatic Precipitator	100%	99,91%
Unit 4	Electrostatic Precipitator	100%	99,90%
Unit 5	Electrostatic Precipitator	100%	99,96%
Unit 6	Electrostatic Precipitator	100%	99,94%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	96,67%
Unit 2	SO_3 Plant	100%	93,33%
Unit 3	SO_3 Plant	100%	93,33%
Unit 4	SO_3 Plant	100%	100%
Unit 5	SO_3 Plant	100%	93,33%
Unit 6	SO_3 Plant	100%	100%

Fluegas conditioning plant availability was below the required 100% for unit 1, unit 2, unit 3 and unit 5 due to unexpected breakdowns. An investigation is currently in progress to determine root cause for breakdowns.

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%	1,12%
	Ash Content	30-40%	35,18%

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

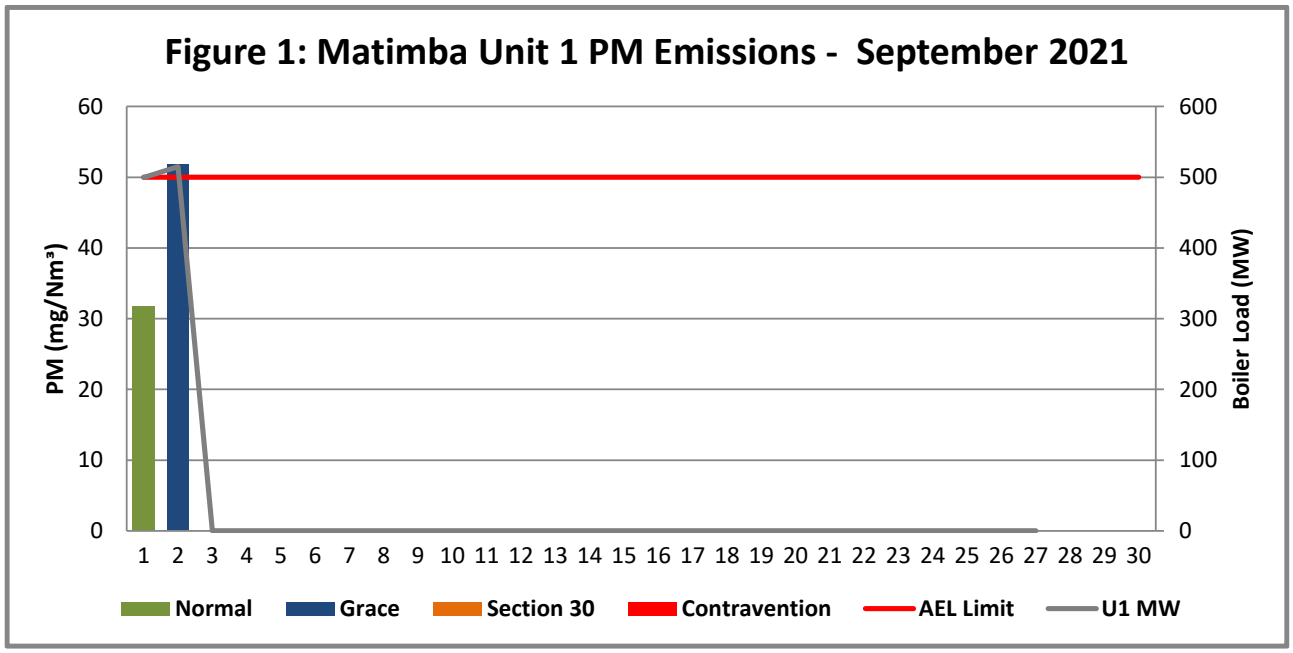

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of September 2021

Interpretation:

Unit 1 exceeded the 50mg/Nm^3 limit on 2 September 2021 due to issues experienced on the SO_3 plant. The unit was shut down for planned maintenance on the same day.

Unit 2 Particulate Emissions

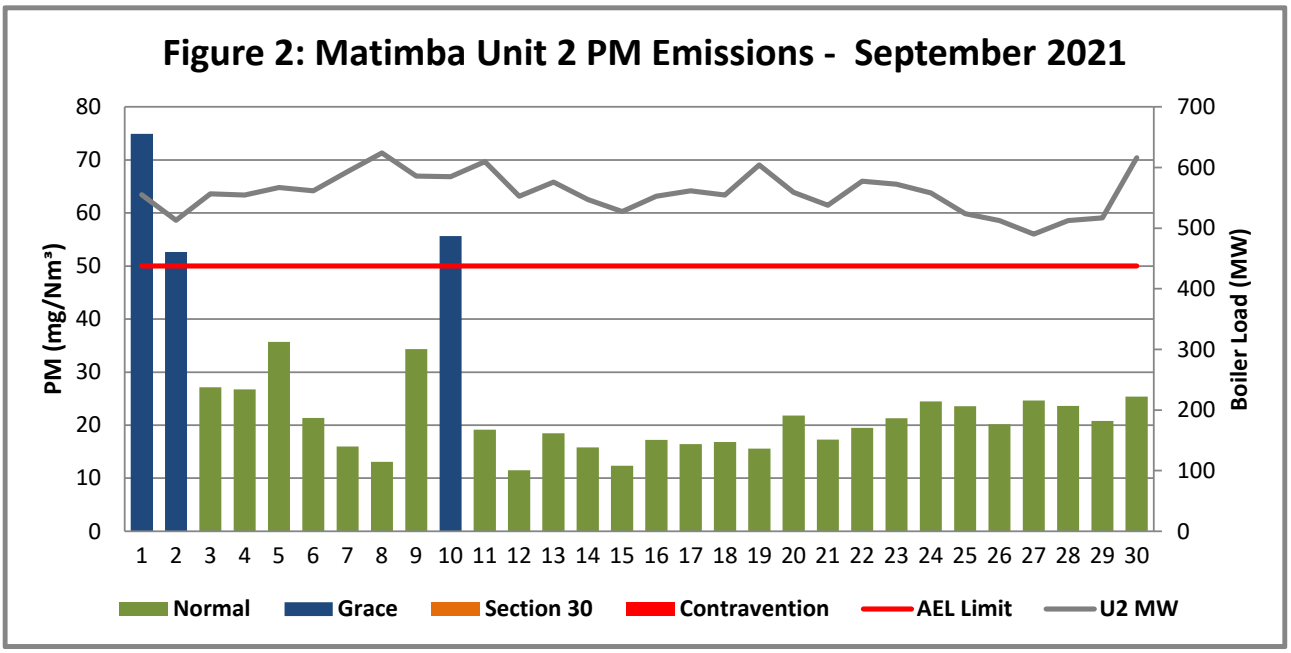

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of September 2021

Interpretation:

Unit 2 exceeded the 50mg/Nm^3 emission limit on 1, 2 and 10 September 2021. The exceedances were due to unexpected failures that occurred on the SO_3 plant. The plant was repaired and emissions returned to below the limit. All exceedances remained within the 48 hour grace period.

Unit 3 Particulate Emissions

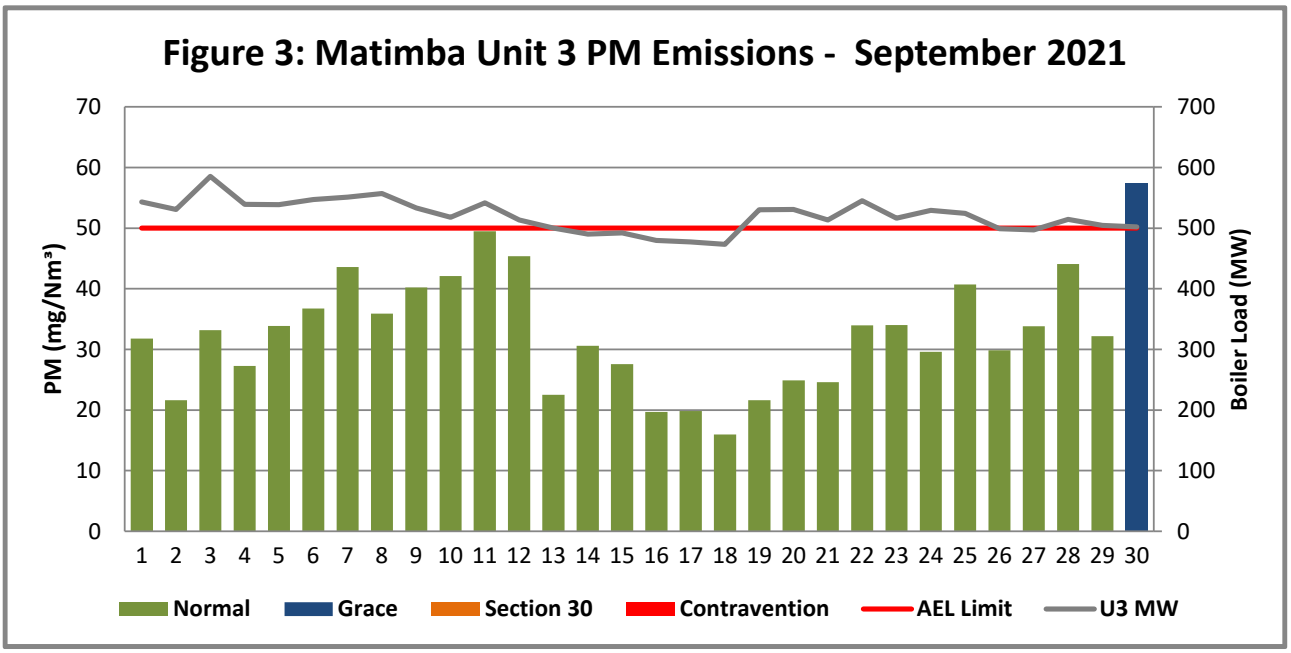

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of September 2021

Interpretation:

Unit 3 exceeded the daily limit of 50mg/Nm^3 on 30 September 2021. The exceedance was due to maintenance that was done on the SO_3 plant. The exceedance remained within the 48 hour grace period.

Unit 4 Particulate Emissions

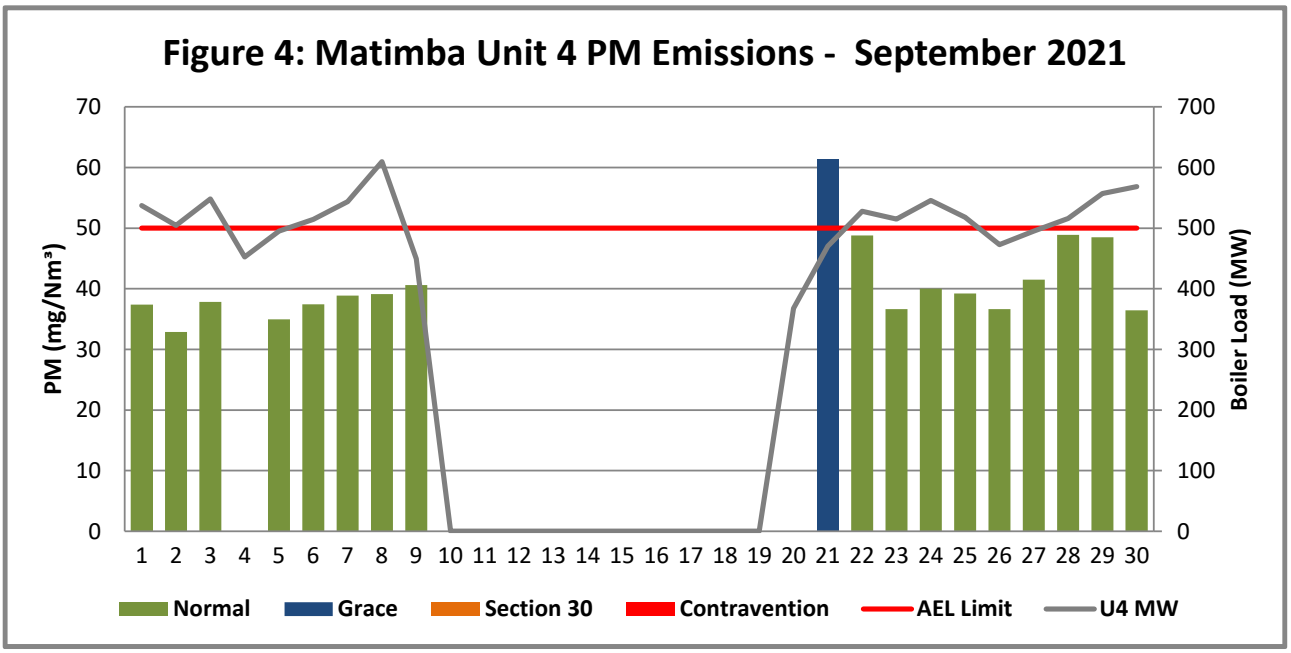

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of September 2021

Interpretation:

Unit 4 exceeded the daily limit of 50mg/Nm^3 on 21 September 2021. The exceedance occurred after a unit start-up where there were challenges reaching the required load for bringing SO3 plant online. The exceedance remained within the 48 hour grace period.

Unit 5 Particulate Emissions

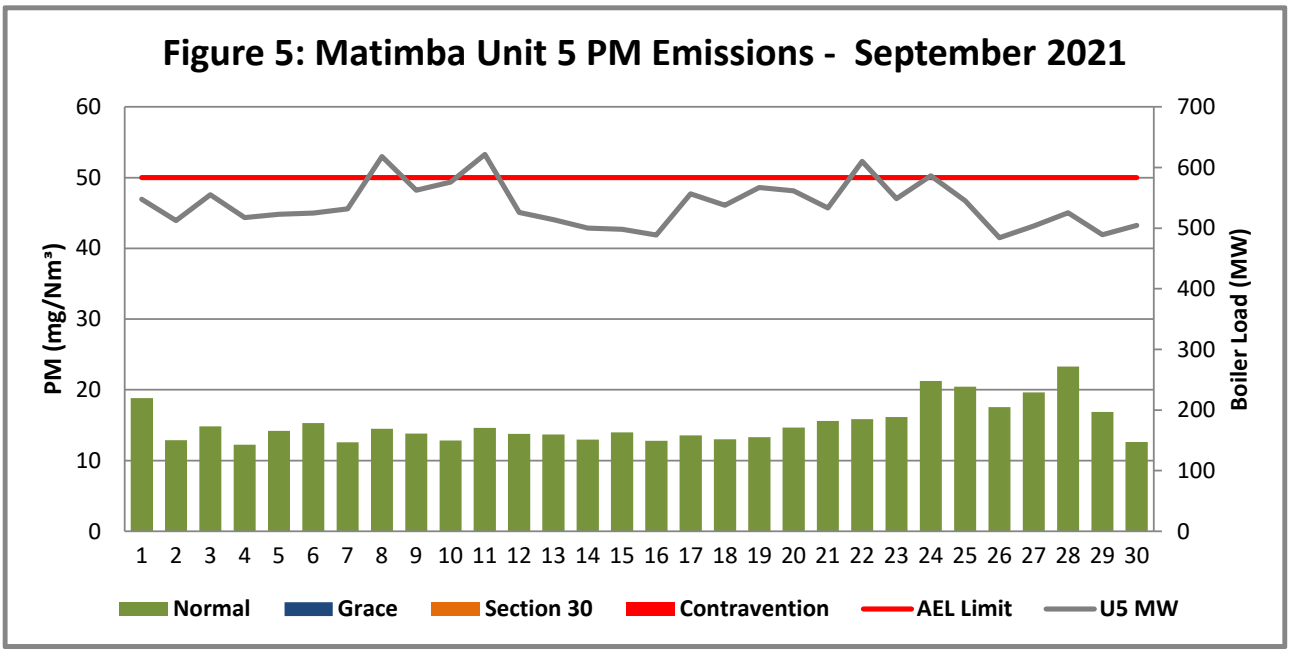

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of September 2021

Interpretation:

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

Unit 6 Particulate Emissions

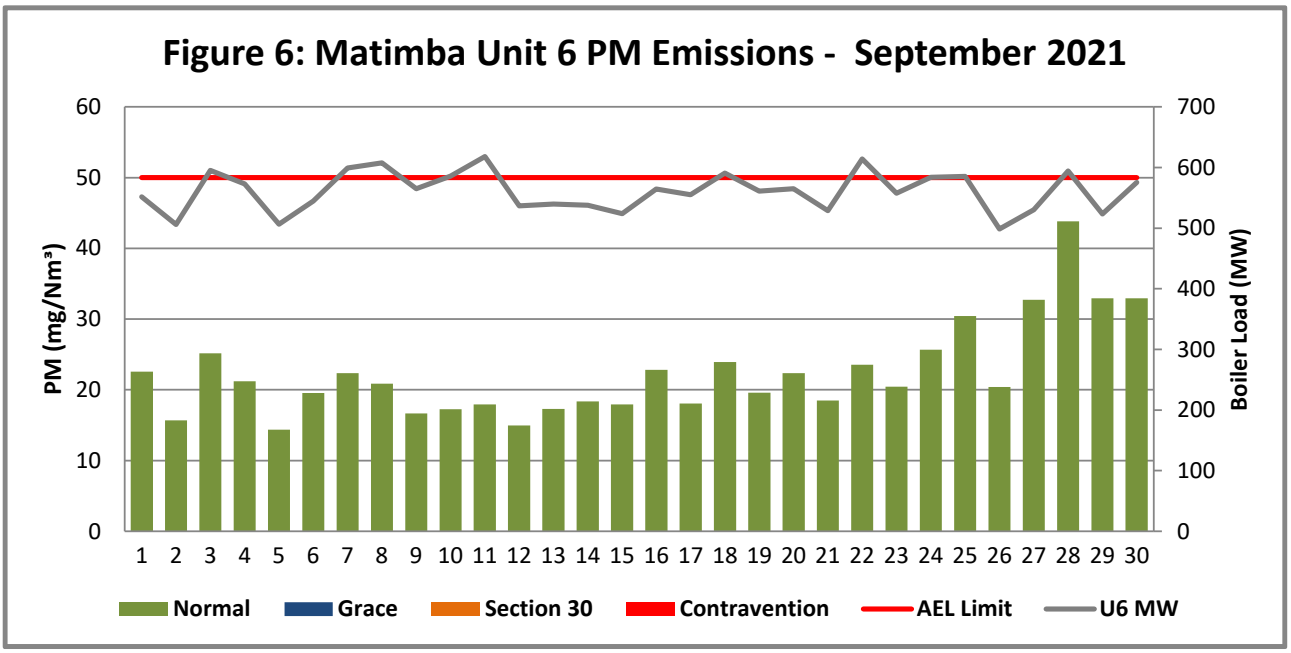

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of September 2021

Interpretation:

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

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

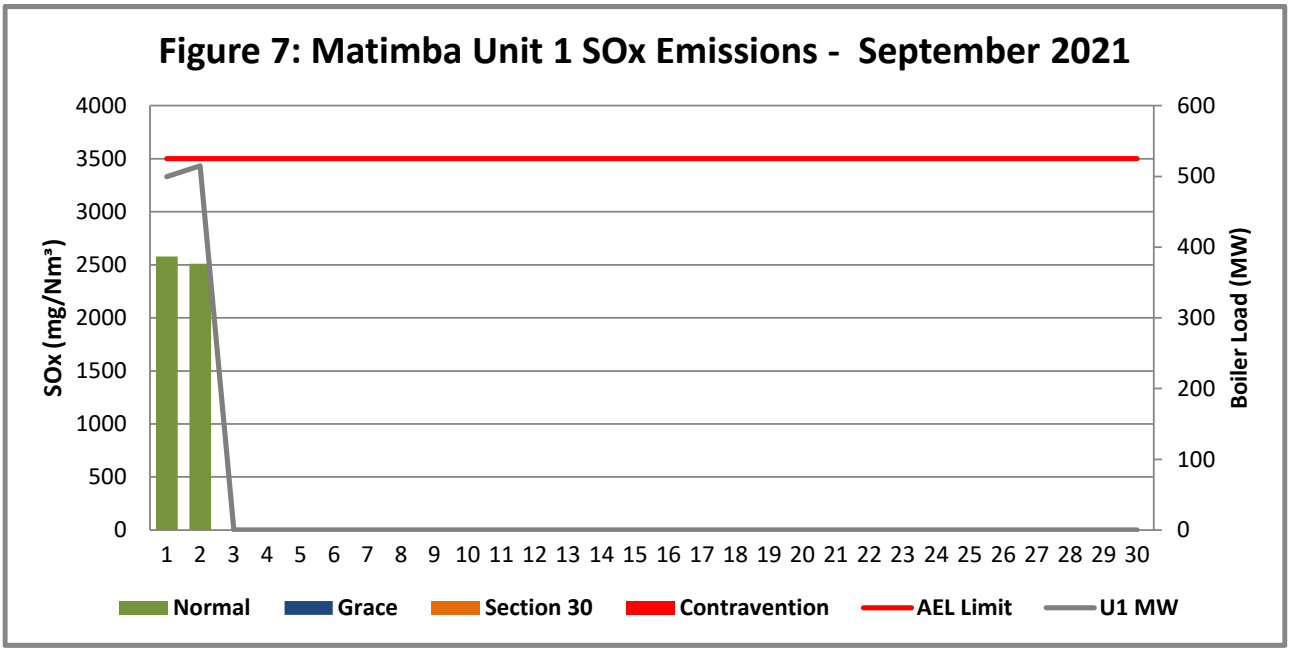

Figure 7: SO_2 daily average emissions against emission limit for unit 1 for the month of September 2021

Interpretation:

All daily averages below SO_2 emission monthly limit of 3500 mg/Nm^3. Unit 1 is on outage from 2 September 2021.

Unit 2 SO_2 Emissions

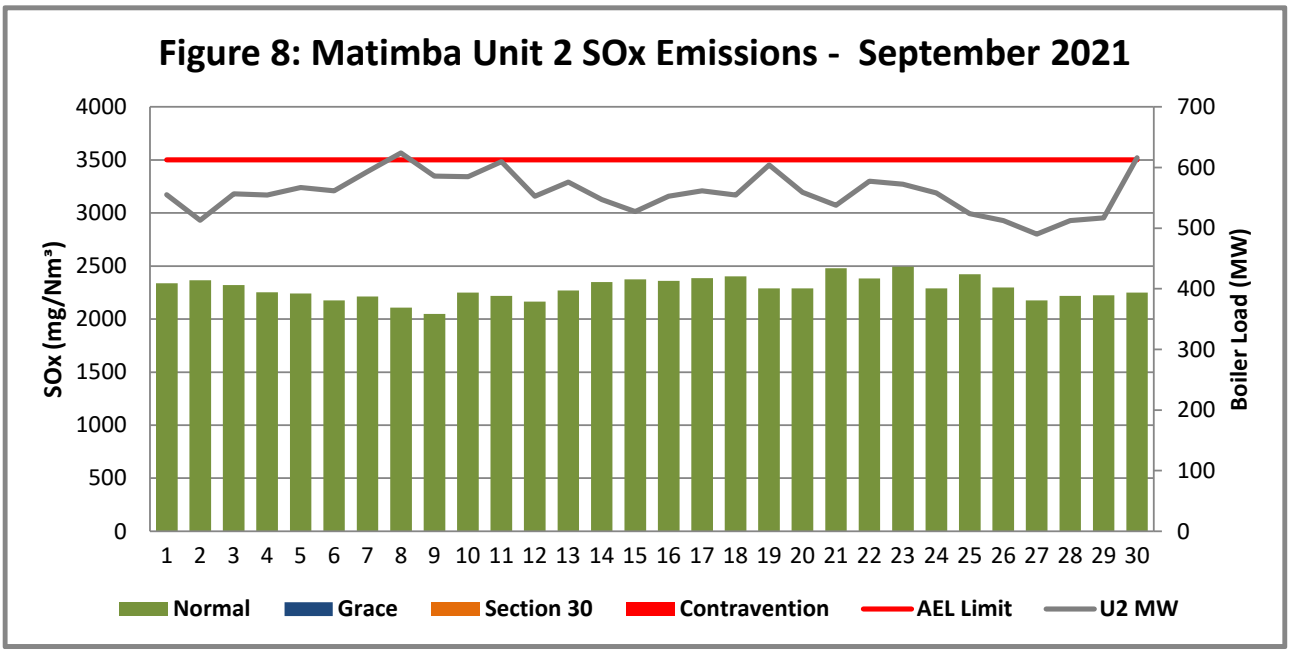

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of September 2021

Interpretation:

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

Unit 3 SO_2 Emissions

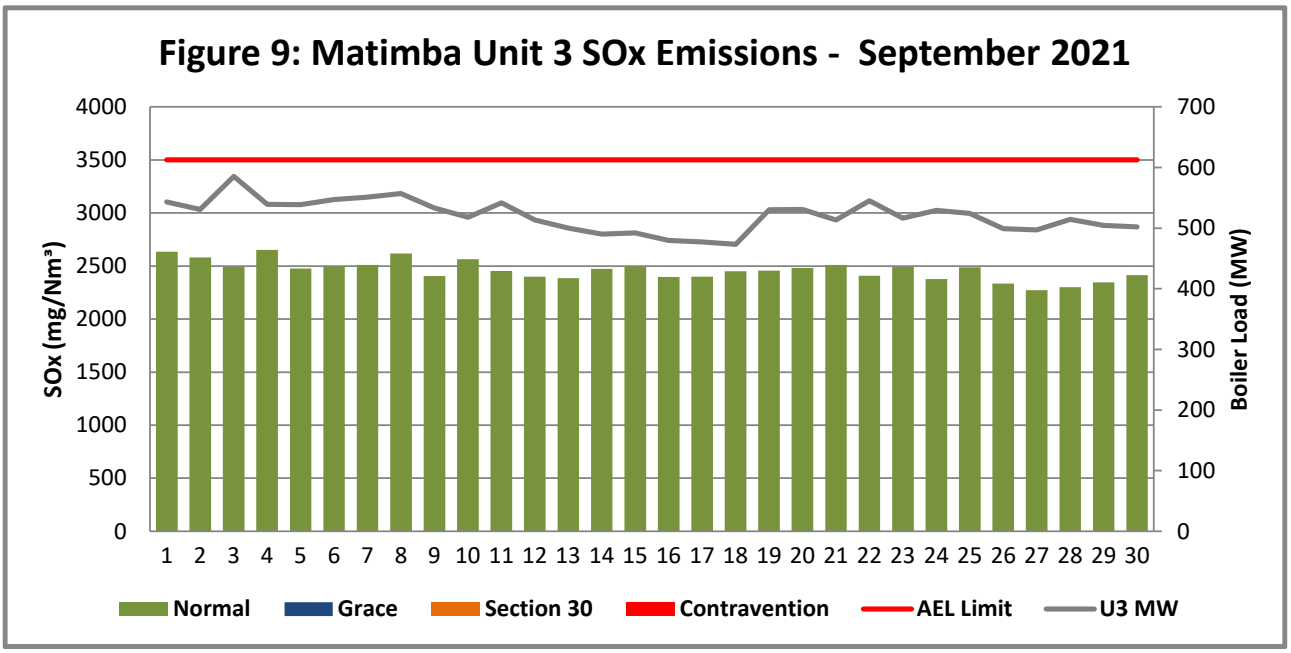

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of September 2021

Interpretation:

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

Unit 4 SO_2 Emissions

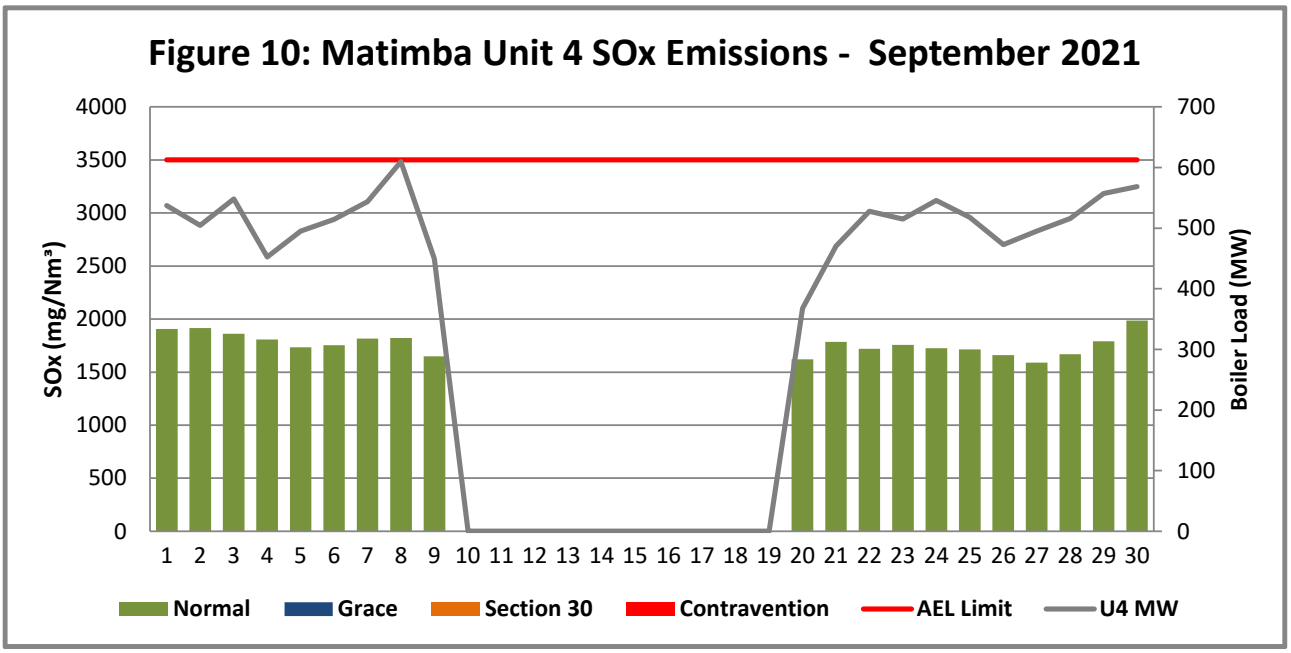

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of September 2021

Interpretation:

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

Unit 5 SO_2 Emissions

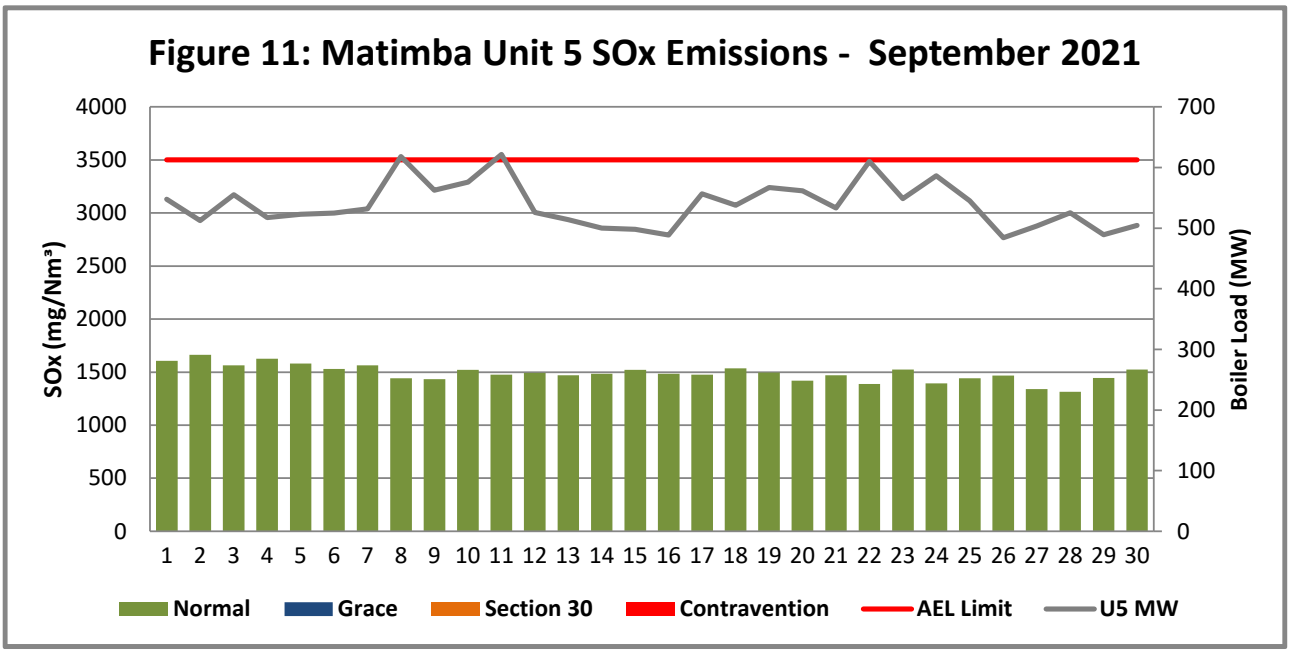

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of September 2021

Interpretation:

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

Unit 6 SO_2 Emissions

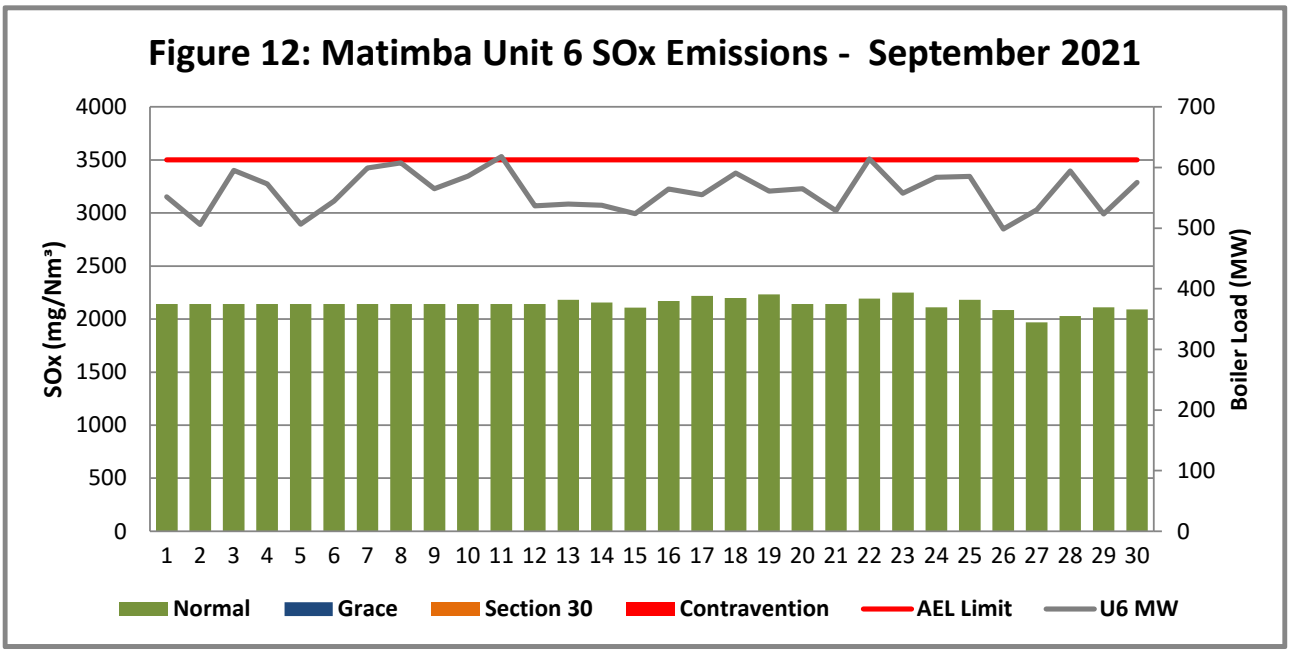

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of September 2021

Interpretation:

All daily averages remained below SO_2 emission monthly limit of 3500 mg/Nm^3. Averaged SO_2 data used for 1 September 2021 until 14 September 2021 due to a communication failure between the SO_2 monitor and the server on which the data is stored. The communication failure was corrected on 14 September 2021.

.

Unit 1 NO_x Emissions

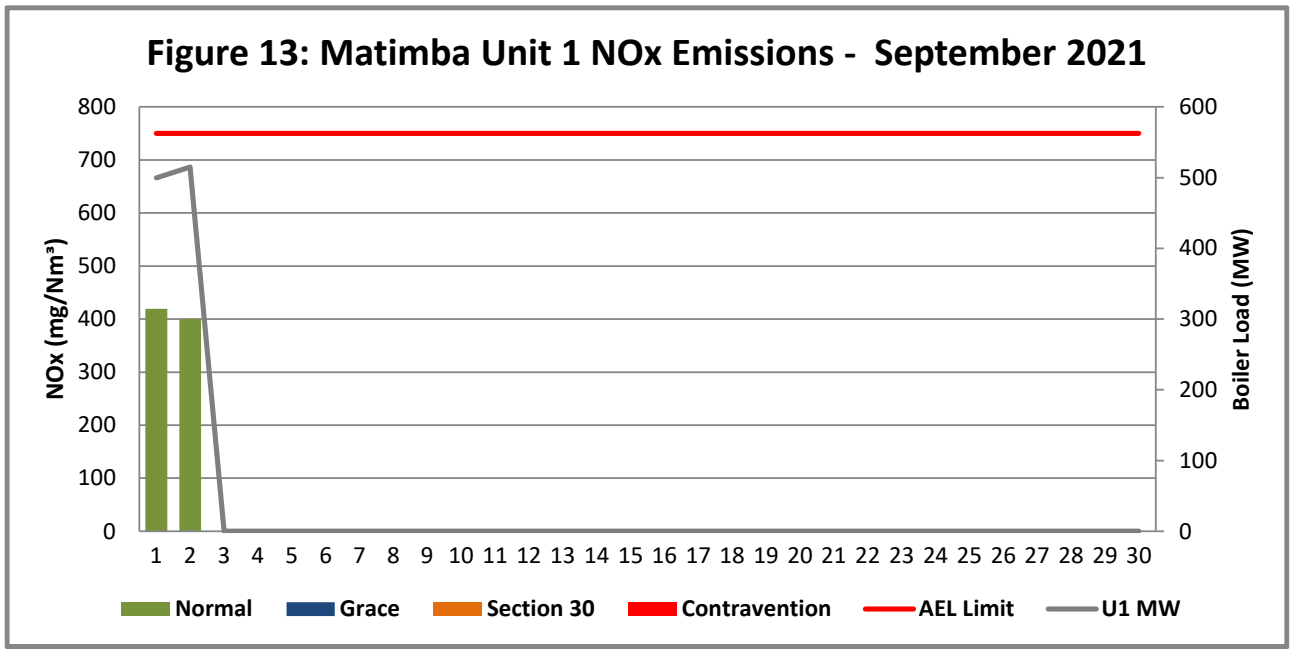

Figure 13: NOx daily average emissions against emission limit for unit 1 for the month of September 2021

Interpretation:

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

Unit 2 NO_x Emissions

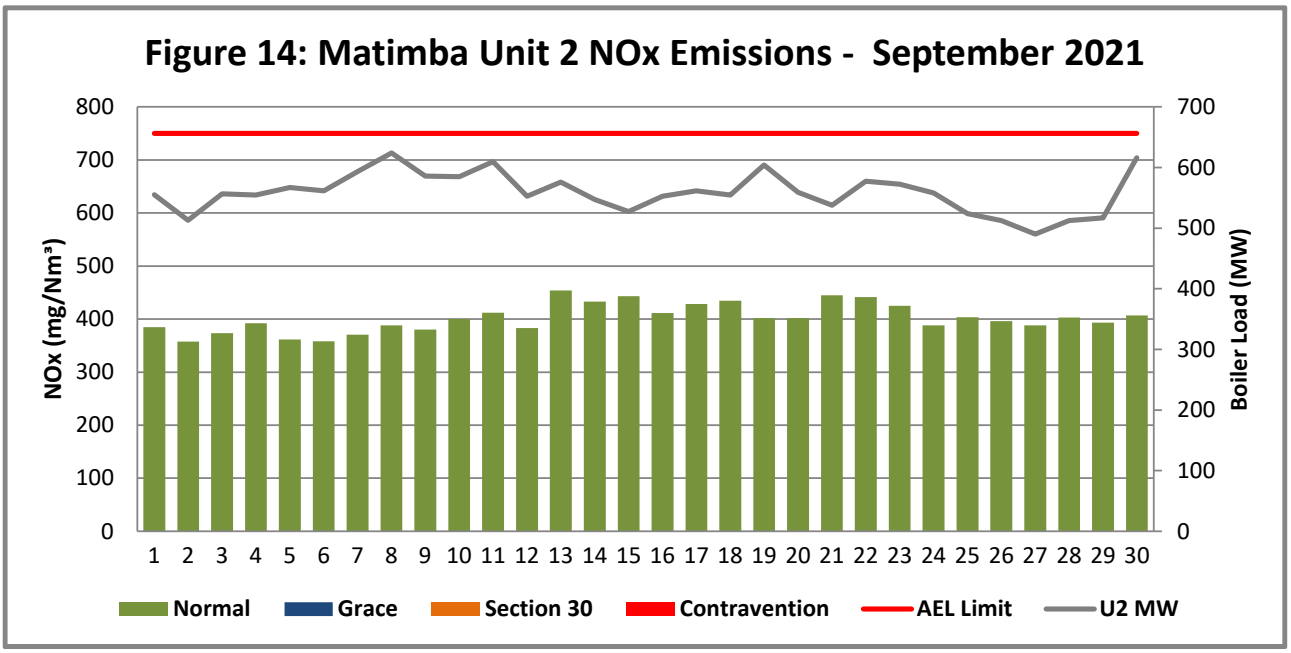

Figure 14: NOx daily average emissions against emission limit for unit 2 for the month of September 2021

Interpretation:

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

Unit 3 NO_x Emissions

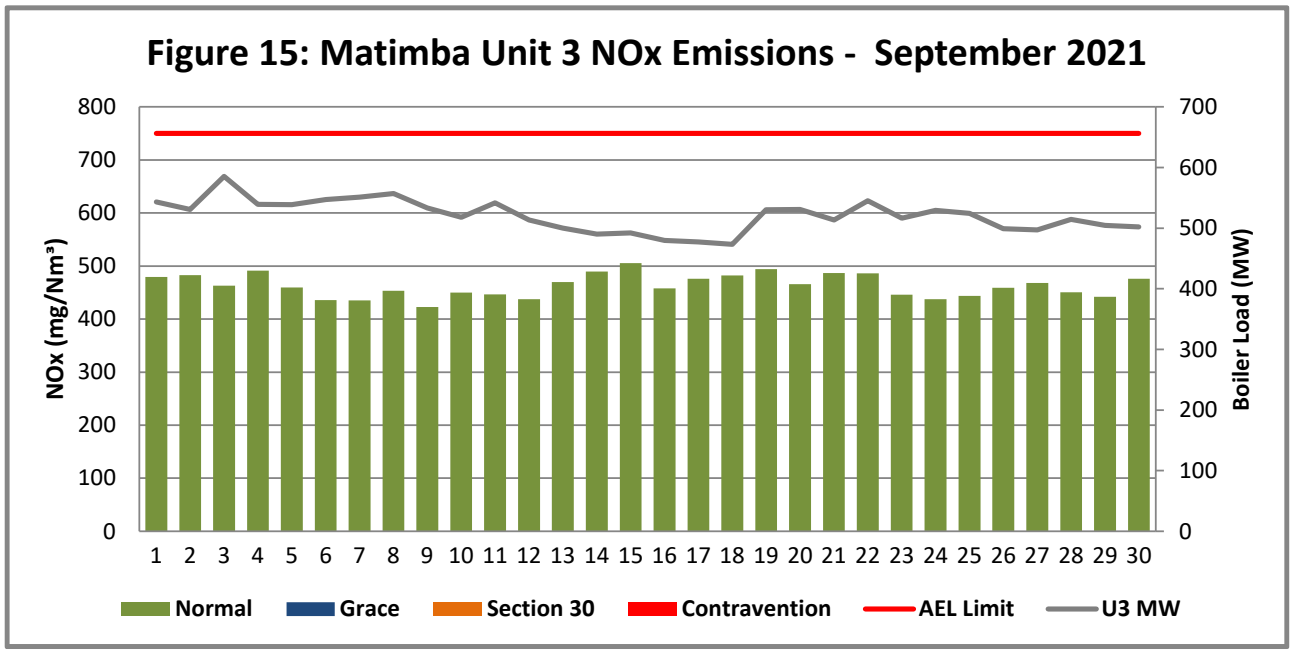

Figure 15: NOx daily average emissions against emission limit for unit 3 for the month of September 2021

Interpretation:

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

Unit 4 NO_x Emissions

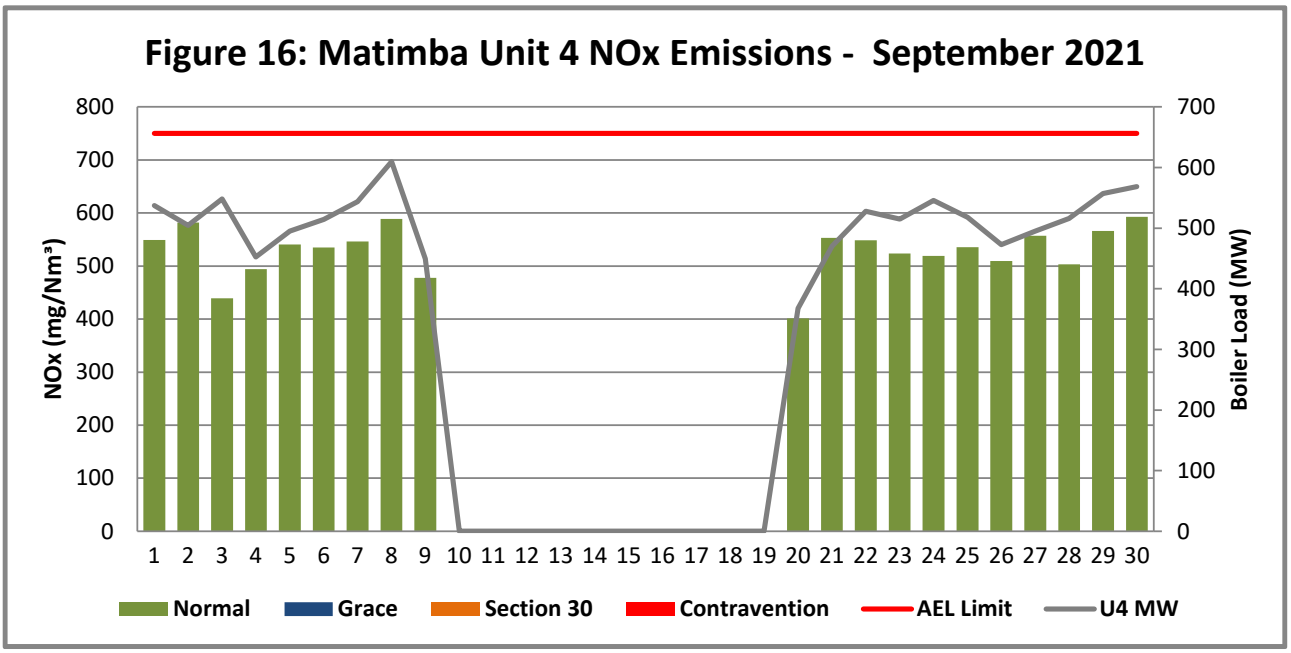

Figure 16: NOx daily average emissions against emission limit for unit 4 for the month of September 2021

Interpretation:

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

Unit 5 NO_x Emissions

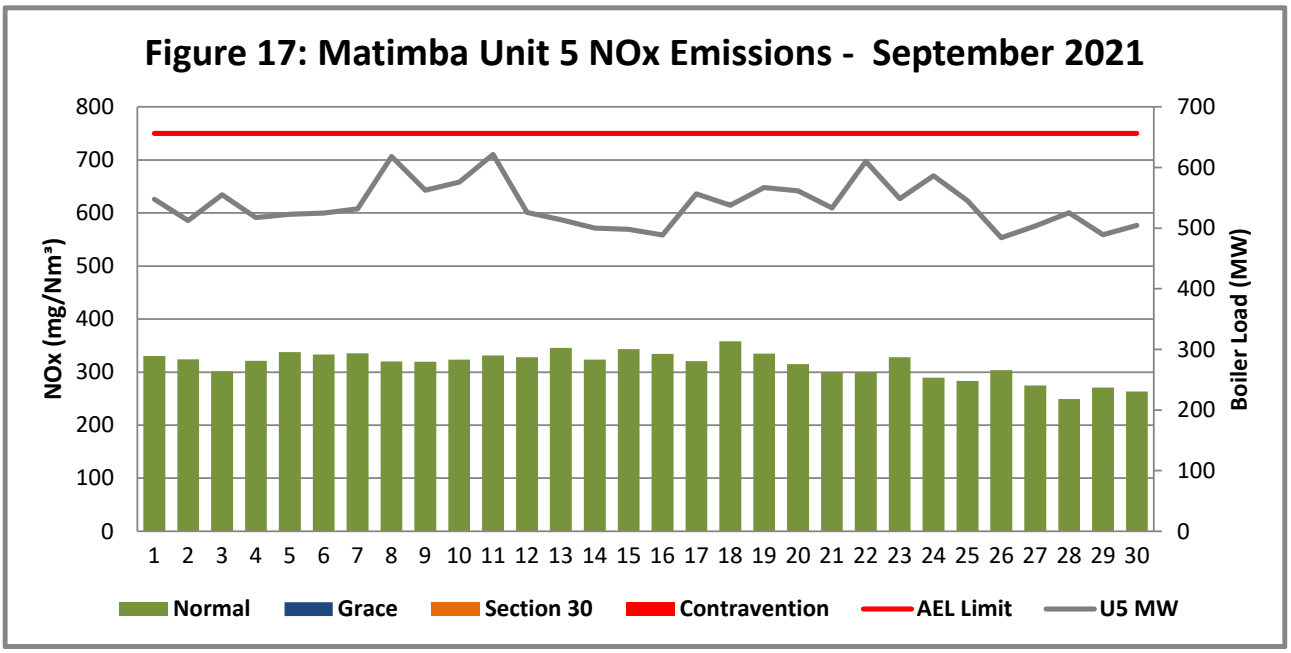

Figure 17: NOx daily average emissions against emission limit for unit 5 for the month of September 2021

Interpretation:

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

Unit 6 NO_x Emissions

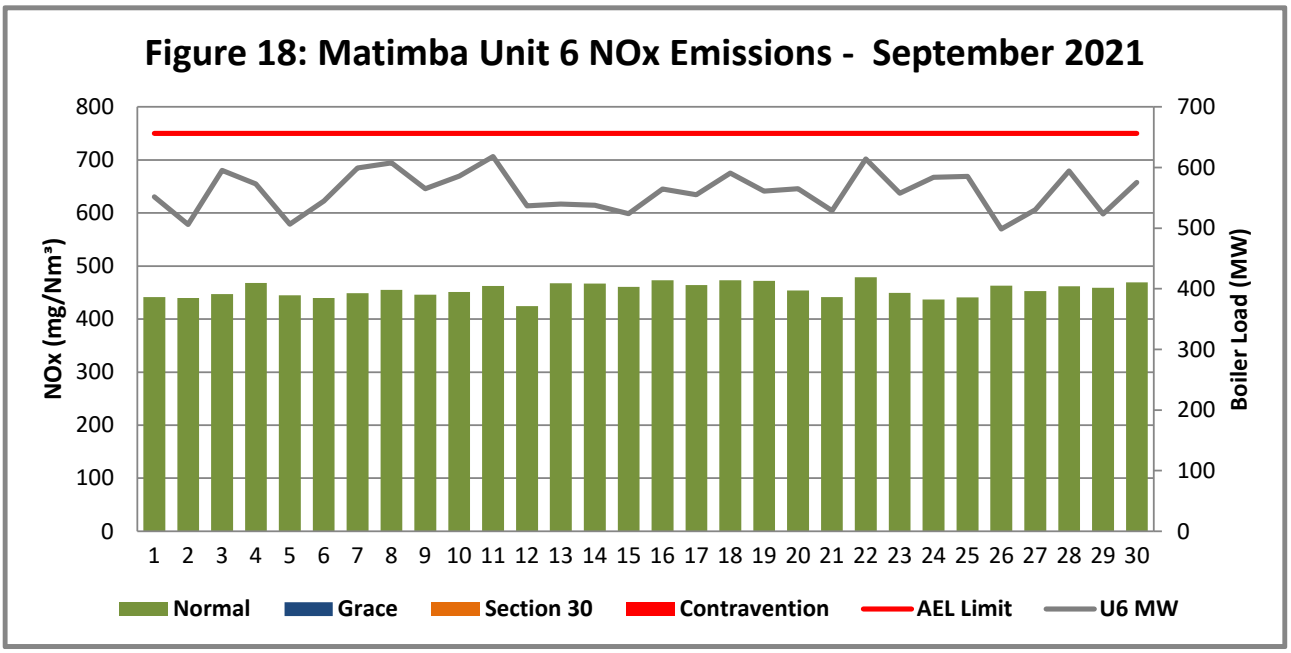

Figure 18: NOx daily average emissions against emission limit for unit 6 for the month of September 2021

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:	Thursday, 14 October 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:	**September**	
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:	***520,674***	
Molecular weight of the fuel oil:	166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	**Data**	**Unit**
Daily average ambient temperature	23,43	°C
Daily maximum ambient temperature	31,06	°C
Daily minimum ambient temperature	16,52	°C
Daily ambient temperature range	14,54	°C
Daily total insolation factor	4,41	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:	0,01	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, 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 September 2021

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2021/09/01	11987	13130	12982	12782	13026	13123
2021/09/02	11978	12151	12626	11989	12173	11985
2021/09/03	0	13105	13968	11656	13200	14137
2021/09/04	0	13124	12908	9934	12315	13655
2021/09/05	0	13419	12860	11800	12471	12059
2021/09/06	0	13251	13059	12242	12477	12947
2021/09/07	0	14003	13120	12934	12632	14235
2021/09/08	0	14782	13303	14501	14712	14445
2021/09/09	0	13842	12737	10307	13387	13432
2021/09/10	0	13795	12367	0	13669	13908
2021/09/11	0	14433	12944	0	14822	14731
2021/09/12	0	13061	12275	0	12522	12765
2021/09/13	0	13632	11935	0	12256	12856
2021/09/14	0	12906	11698	0	11886	12788
2021/09/15	0	12479	11734	0	11872	12446
2021/09/16	0	13039	11454	0	11627	13476
2021/09/17	0	13248	11391	0	13193	13151
2021/09/18	0	13131	11287	0	12845	14100
2021/09/19	0	14266	12629	0	13451	13289
2021/09/20	0	13217	12679	6081	13403	13467
2021/09/21	0	12757	12242	11211	12666	12545
2021/09/22	0	13626	13014	12626	14529	14625
2021/09/23	0	13513	12321	12271	13027	13243
2021/09/24	0	13214	12633	13056	13952	13879
2021/09/25	0	12395	12530	12397	13000	13921
2021/09/26	0	12125	11915	11313	11531	11898
2021/09/27	0	11576	11847	11803	11953	12560
2021/09/28	0	12109	12291	12322	12520	14167
2021/09/29	0	12194	12044	13327	11652	12452
2021/09/30	0	14567	11987	13557	12000	13659

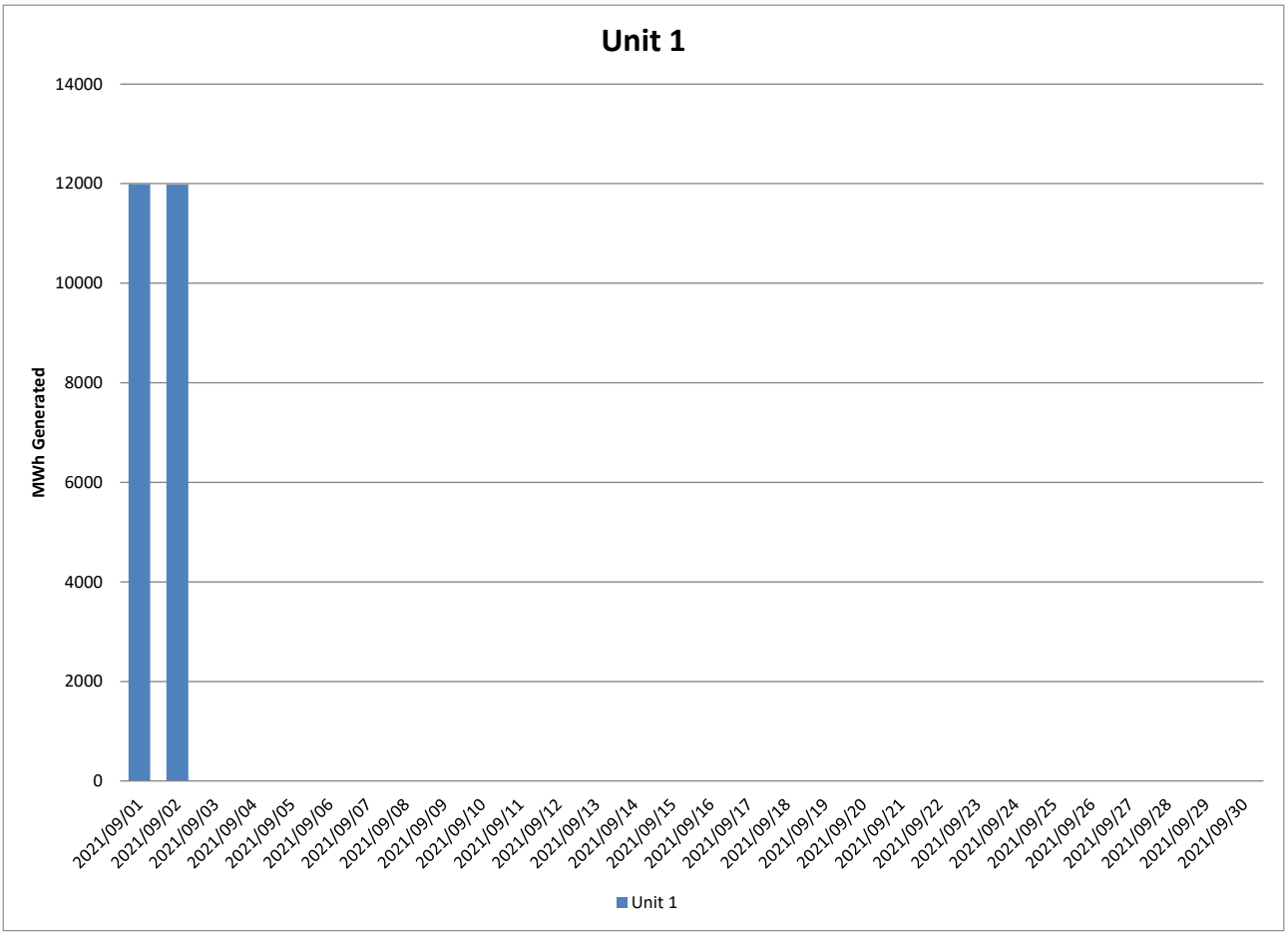

Figure 19: Unit 1 daily generated power in MWh for the month of September 2021

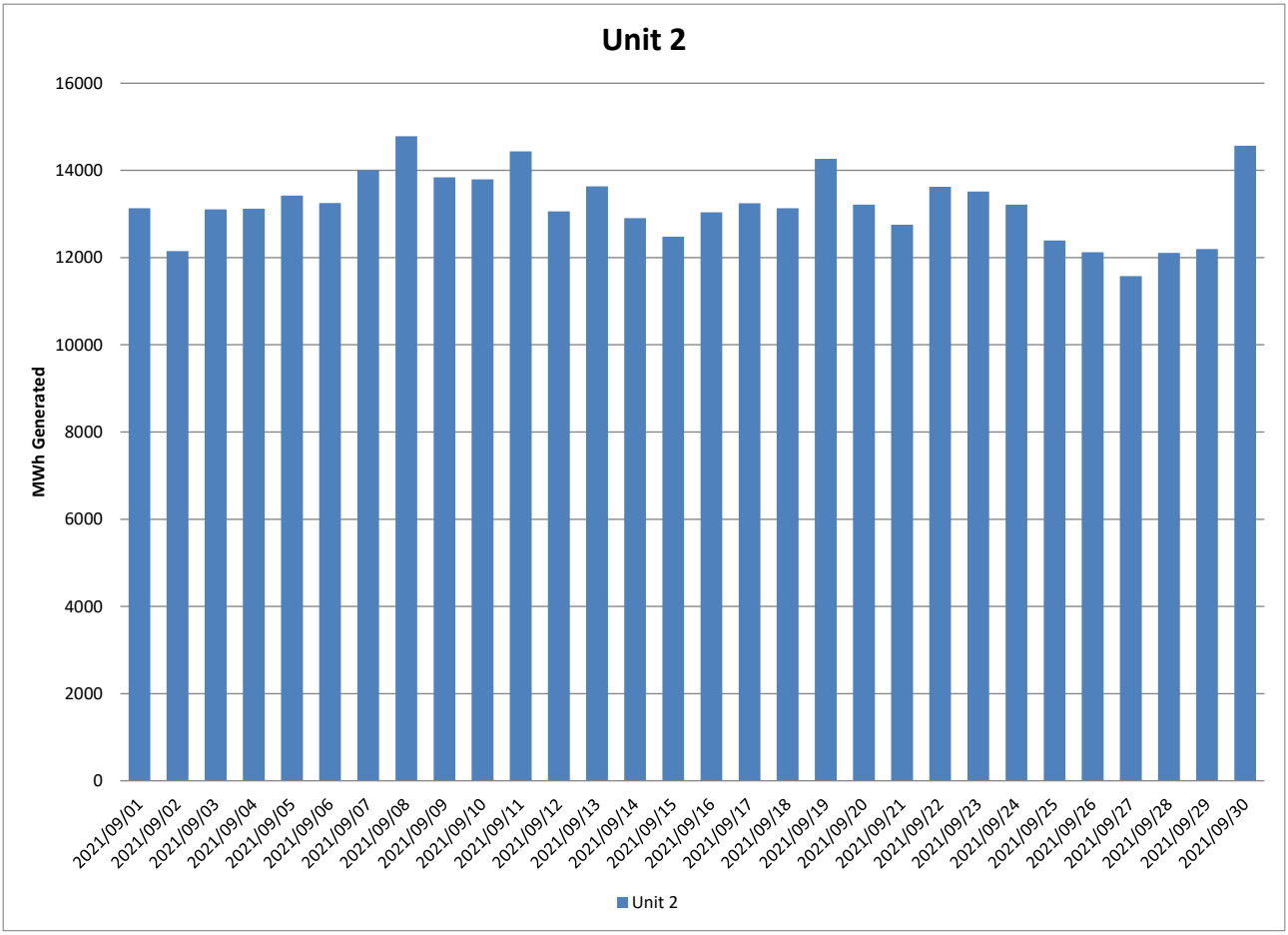

Figure 20: Unit 2 daily generated power in MWh for the month of September 2021

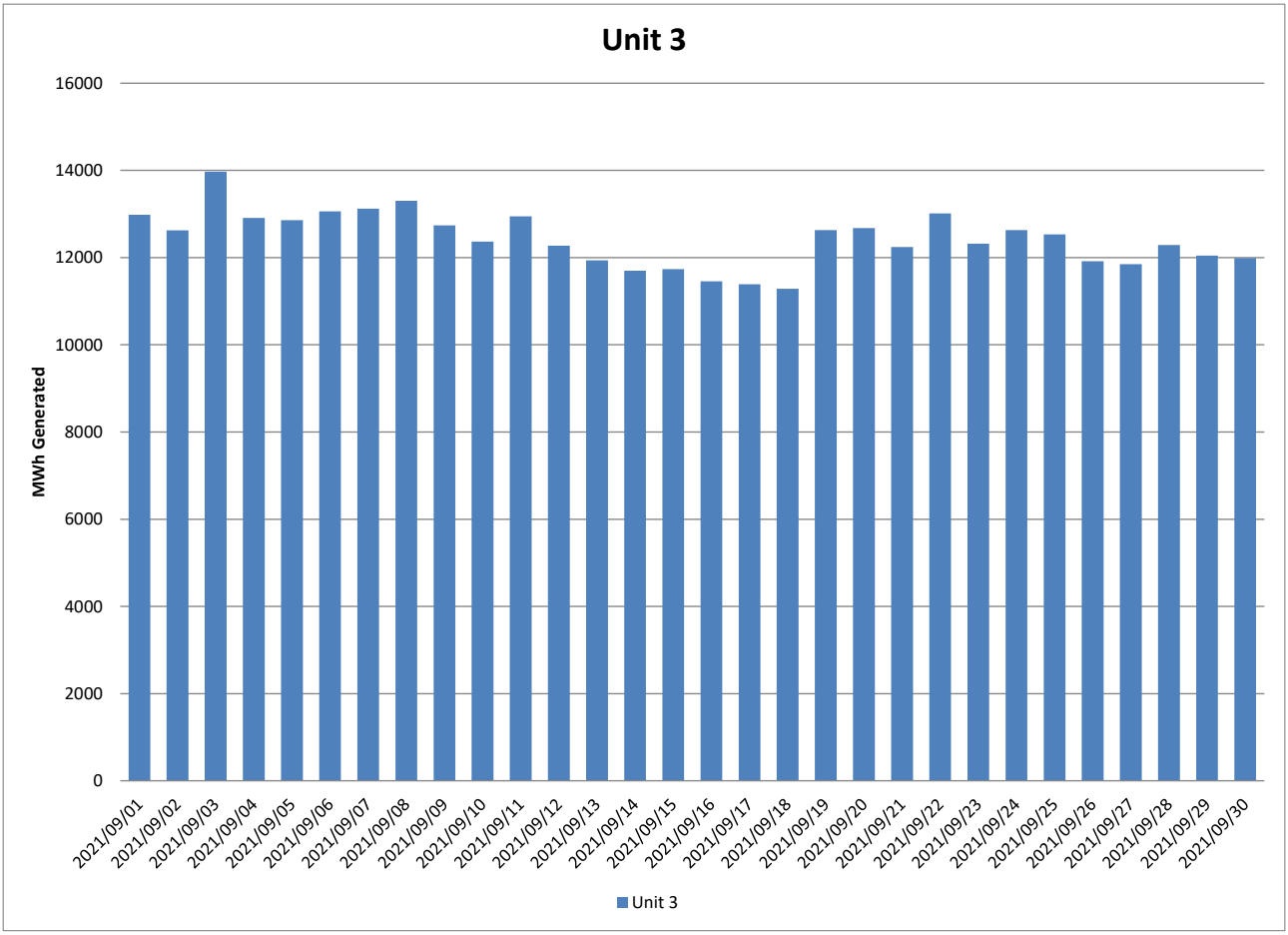

Figure 21: Unit 3 daily generated power in MWh for the month of September 2021

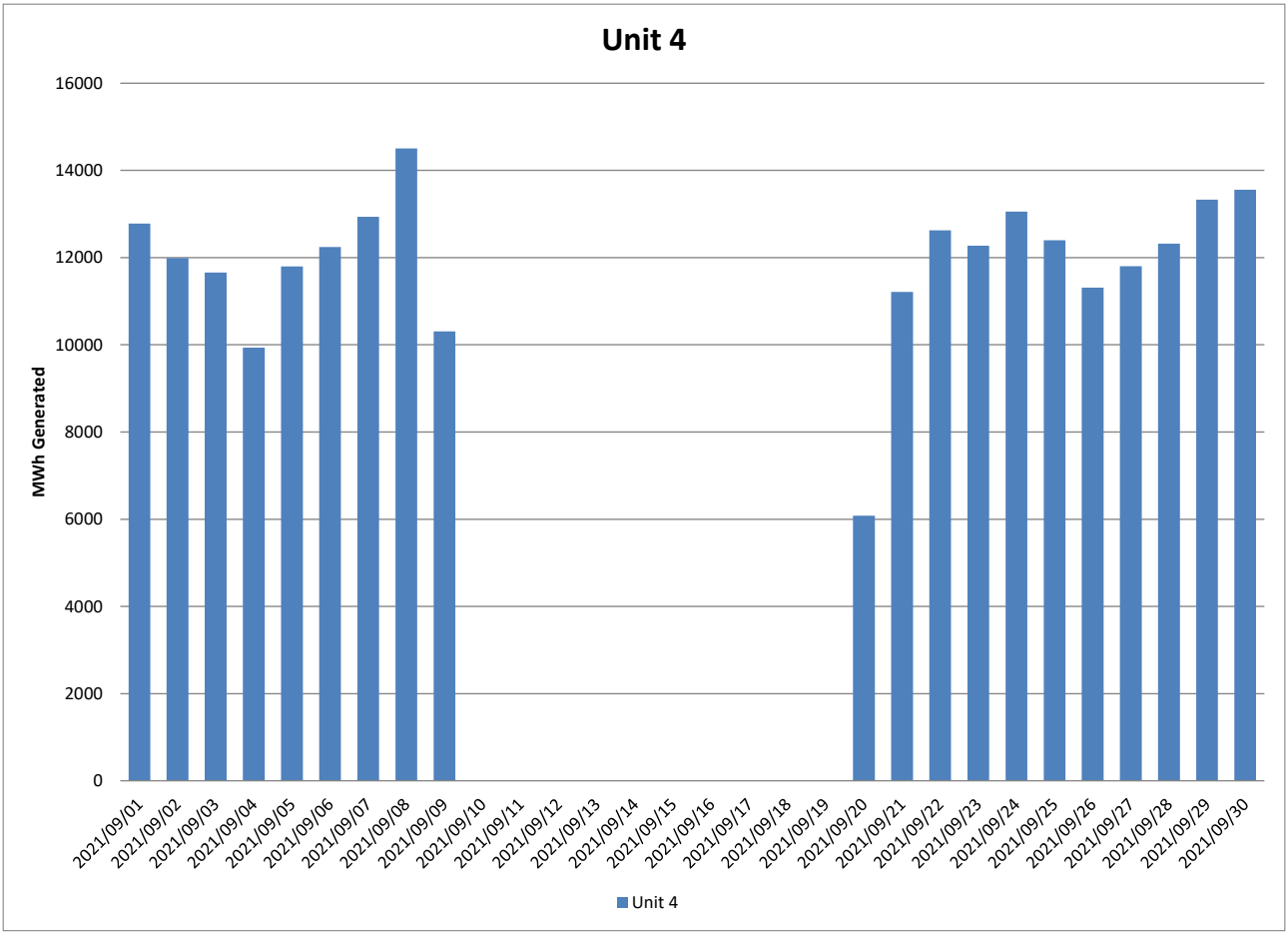

Figure 22: Unit 4 daily generated power in MWh for the month of September 2021

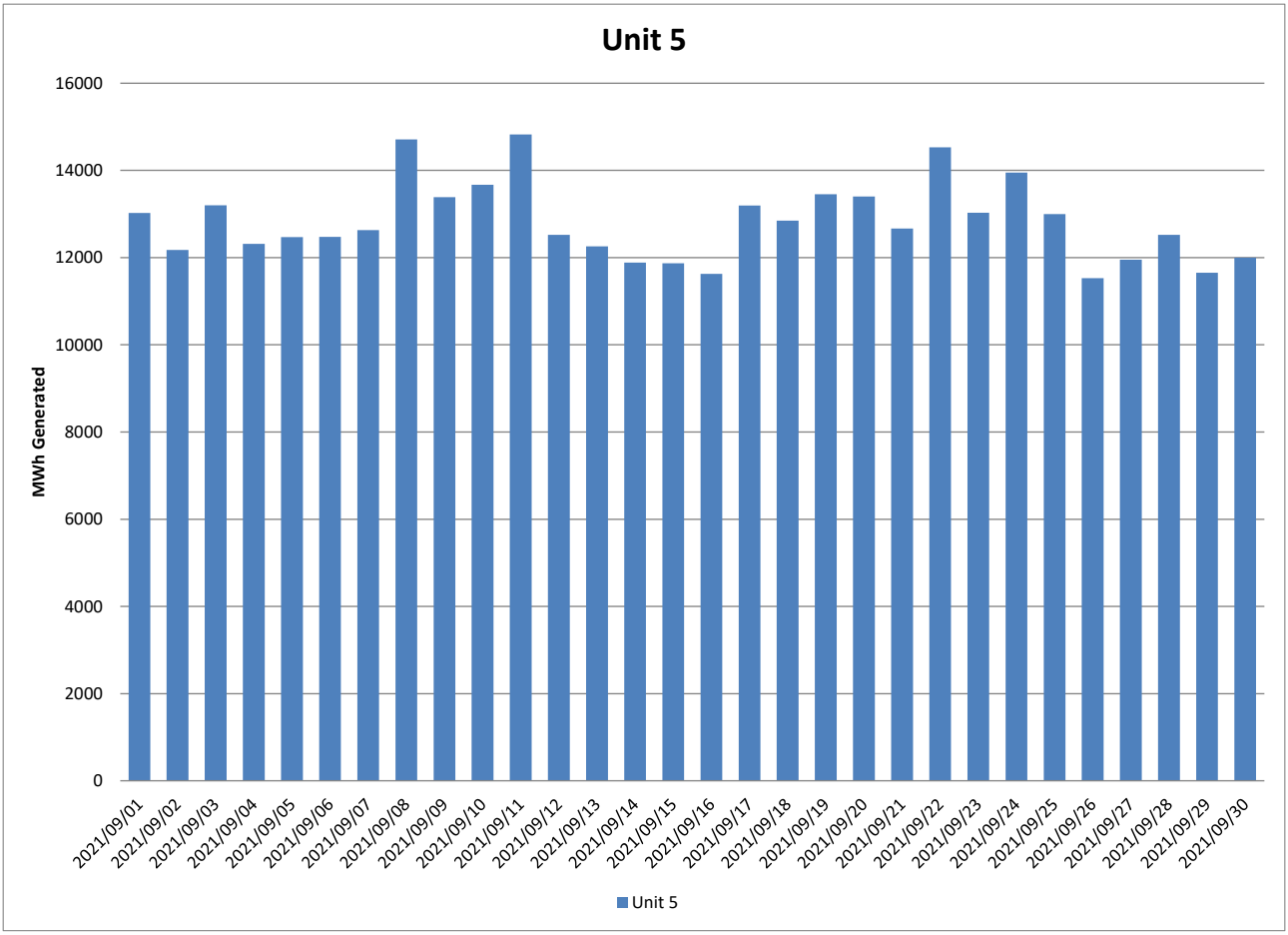

Figure 23: Unit 5 daily generated power in MWh for the month of September 2021

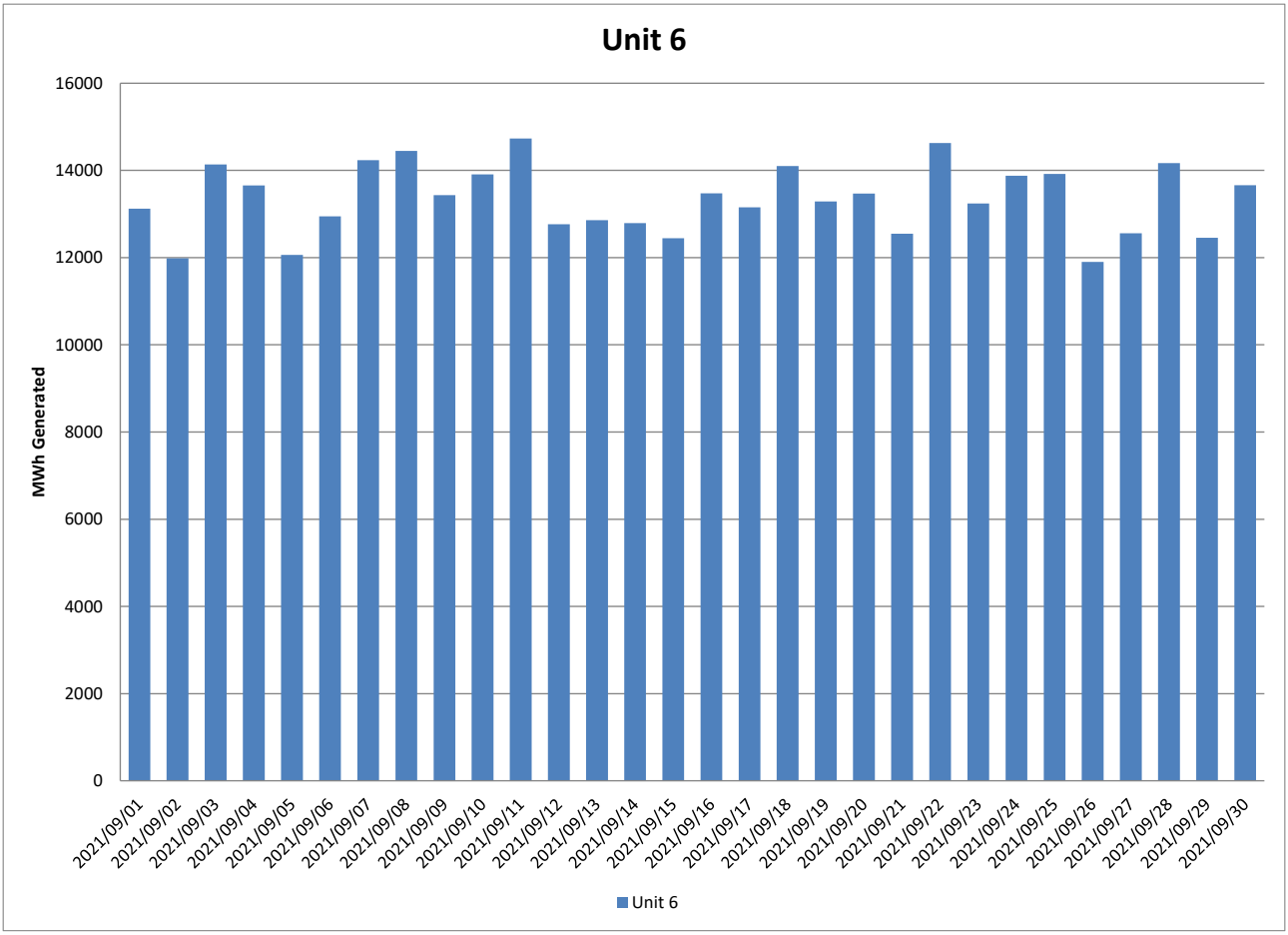

Figure 24: Unit 6 daily generated power in MWh for the month of September 2021

2.6 Pollutant Tonnages

The emitted pollutant tonnages for September 2021 are provided in table 6. Averaged SO_2 data used for 1 September 2021 until 14 September 2021 due to a communication failure between the SO_2 monitor and the server on which the data is stored. The communication failure was corrected on 14 September 2021. Averaged Quality Assurance level 2 (QAL 2) values were used for unit 2, unit 3, unit 4 and unit 5 CO_2 data due to unreliability of data received from monitor.

Table 6: Pollutant tonnages for the month of September 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	5,3	310,9	50,1
Unit 2	46,2	5 006,2	880,2
Unit 3	61,3	5 397,3	1 014,6
Unit 4	43,6	2 405,9	724,2
Unit 5	29,1	2 873,6	608,0
Unit 6	45,9	4 165,3	884,6
SUM	231,5	20 159,1	4 161,7

2.7 Reference values

Table 7: Reference values for data provided, September 2021

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	10,12	6,52	6,80	6,53	7,60	7,61
Moisture	%	4,16	4,44	3,90	2,86	4,36	3,24
Velocity	m/s	28,5	26,7	26,1	24,5	23,7	26,9
Temperature	^{o}C	138,4	130,7	133,5	136,7	123,2	173,1
Pressure	mBar	936,8	878,6	918,2	921,8	933,2	923,1

2.8 Continuous Emission Monitors

2.8.1 Reliability

SO_x emission monitor for Unit 6 did not achieve the required 90% availability due to a communication failure between the SO_2 monitor and the server on which the data is stored. The communication failure was corrected on 14 September 2021. Quality Assurance level 2 (QAL 2) values were used for unit 2, unit 3, unit 4 and unit 5 CO_2 data due to unreliability of data received from monitor. The rest of the parameters met the required percentage availability.

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

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100,0	100,0	100,0	100,0
Unit 2	100,0	91,7	91,7	0,0
Unit 3	100,0	100,0	100,0	0,0
Unit 4	100,0	94,8	94,8	0,0
Unit 5	100,0	100,0	100,0	0,0
Unit 6	100,0	55,4	100,0	16,7

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

- Unit 4 gaseous emission monitor was repaired on 21 September 2021.
- No downtime or repairs done on the particulate monitors

Unit 5

- Unit 5 gaseous emission monitor was repaired on 21 September 2021.
- No downtime or repairs done on the particulate monitors

Unit 6

- Unit 6 gaseous emission monitor was repaired on 21 September 2021.
- 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	4	
Fires in	03-09-2021	21h20
Synchronization with Grid	04-09-2021	01h52
Emissions below limit	04-09-2021	02h17
Fires in to synchronization	4,53	HOURS
Synchronization to < Emission limit	25	MINUTES

Unit	4	
Fires in	20-09-2021	02h19
Synchronization with Grid	20-09-2021	07h15
Emissions below limit	20-09-2021	07h15
Fires in to synchronization	4,93	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	5	235	235	116	235	235
Emergency Hours declared including hours after stand down	6	261	261	127	261	261
Days over the Limit during Emergency Generation	0	2	1	0	0	0

Unit 2 particulate emissions exceeded the 50mg/Nm^3 emission limit during emergency generation on 1 and 10 September 2021. Unit 3 particulate emissions exceeded the 50mg/Nm^3 emission limit during emergency generation on 30 September 2021. Detailed emission information for particulate emissions can be found on figures 1 to 6.

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

A full monthly report could not be issued for September 2021. The monitoring site experienced incoming power interruptions due to the theft of electrical cables in the municipality substation. This incident led to low data recovery at the Marapong Air Quality Monitoring site and the monthly graphs and tables could not be generated to complete the September 2021 report. Another factor that led to the low data recovery was that there was no inlet/exhaust pump installed in the new shelter hut which was commissioned on 17 September 2021. The new inlet/exhaust pump has since been installed at site.

More information can be found in Attachment 1, "*Marapong FEEDBACK Report September 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 FEEDBACK Report September 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

Obakeng Mabotja
GENERAL MANAGER: MATIMBA POWER STATION