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

Title: **Matimba Power Station April 2022 emissions report**

Document Identifier:	**RP/247/021**
Plant Location:	**Emission management**
Area of Applicability:	**Matimba Power Station**
Functional Area Applicability:	**Environment**
Revision:	**1**
Total Pages:	**38**
Report Date:	**April 2022**
Disclosure Classification:	**Controlled**

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Environmental Officer	**Environmental Manager**	**General Manager**
Date: 2022/05/31	Date: 03/06/2022	Date: 2022/06/03

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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 April 2022.

During the period under review, two exceedances of the daily particulate matter emission limit (50mg/Nm^3) occurred. No exceedances of the monthly SO_x limit (3500mg/Nm^3) or the daily NO_x emission limit (750mg/Nm^3) occurred.

The ambient air quality monitoring station has been experiencing power failures due to cable and electricity theft from the local community. This led to low availability of the monitoring station.

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	1 194 453
	Fuel Oil	Tons/month	1 200	582,998
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	2 089,159

The consumption rates for the month of April 2022 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%	99,89%
Unit 5	Electrostatic Precipitator	100%	99,93%
Unit 6	Electrostatic Precipitator	100%	99,93%
Associated Unit	**Technology Type**	**Minimum utilisation (%)**	**Actual Utilisation (%)**
Unit 1	SO_3 Plant	100%	96,45%
Unit 2	SO_3 Plant	100%	99,85%
Unit 3	SO_3 Plant	100%	99,23%
Unit 4	SO_3 Plant	100%	93,76%
Unit 5	SO_3 Plant	100%	92,78%
Unit 6	SO_3 Plant	100%	95,68%

Flue gas conditioning plant availability was below the required 100% for unit 1, unit 4, 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%	1,196
	Ash Content	40%	32,332

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

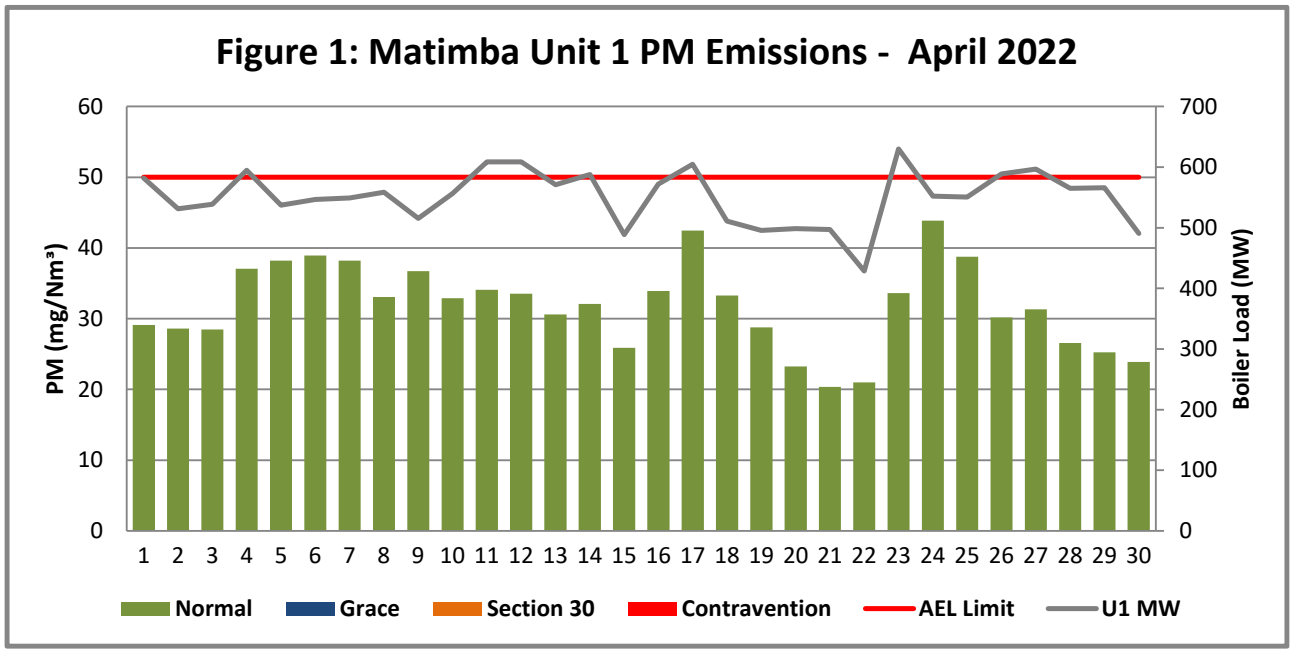

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of April 2022

Interpretation:

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

Unit 2 Particulate Emissions

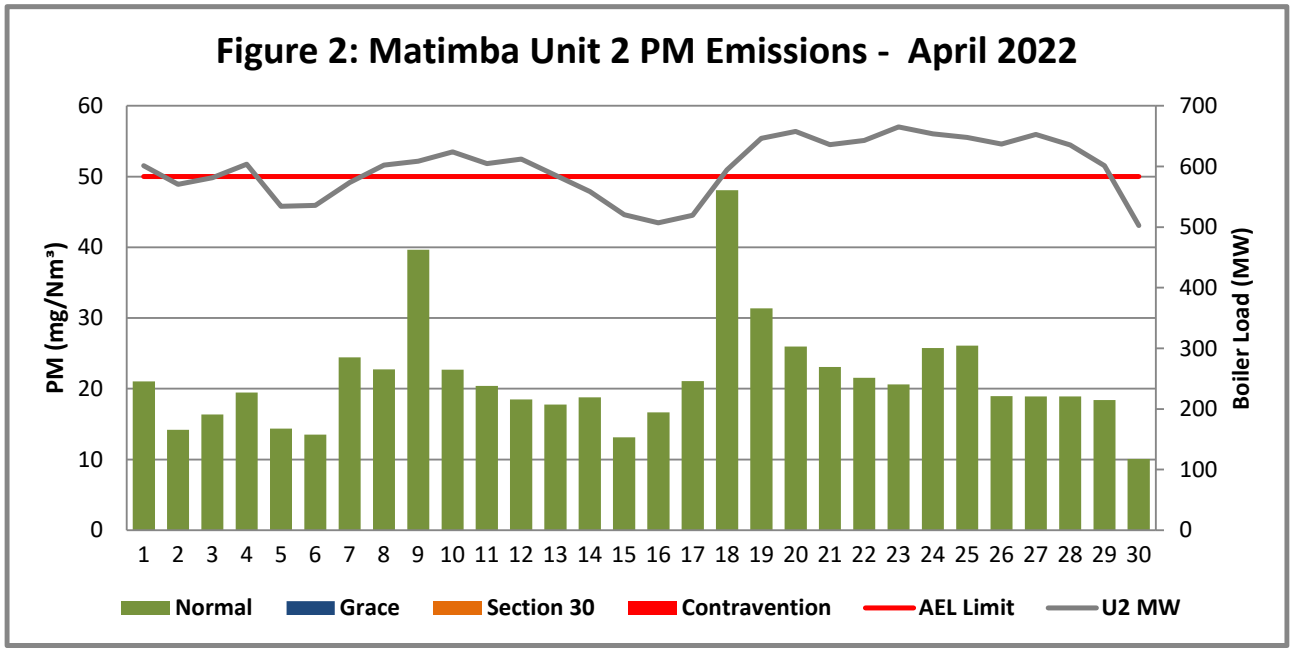

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of April 2022

Interpretation:

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

Unit 3 Particulate Emissions

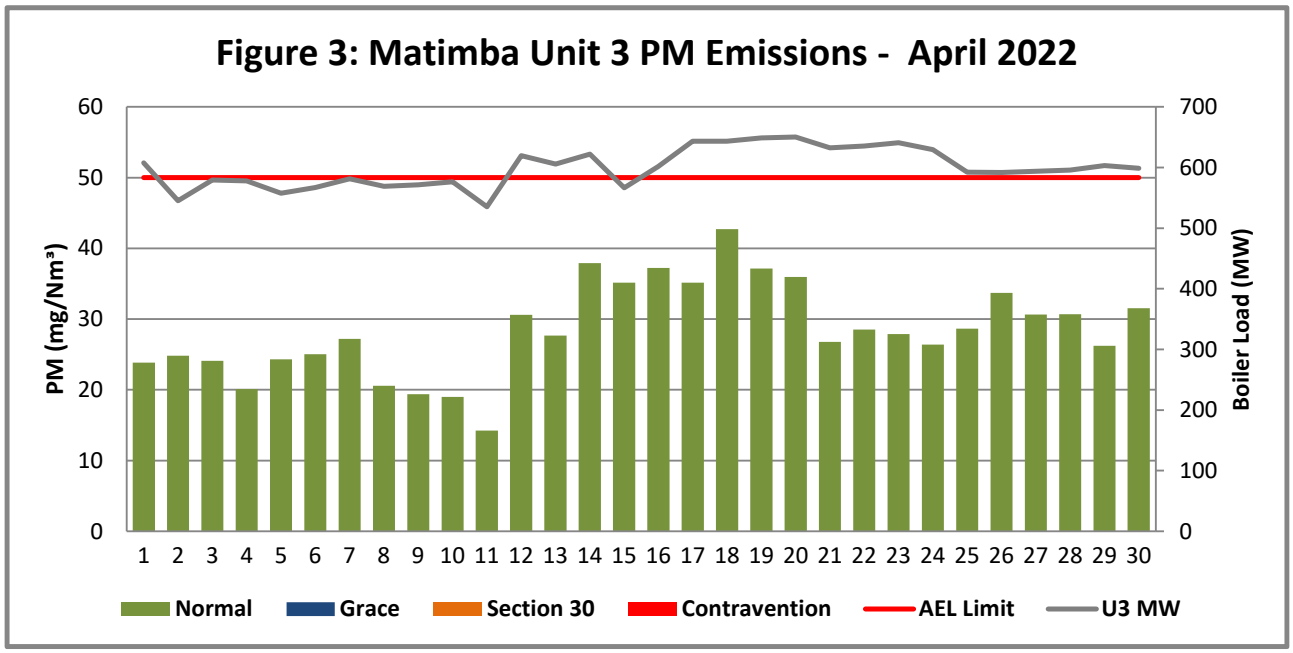

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of April 2022

Interpretation:

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

Unit 4 Particulate Emissions

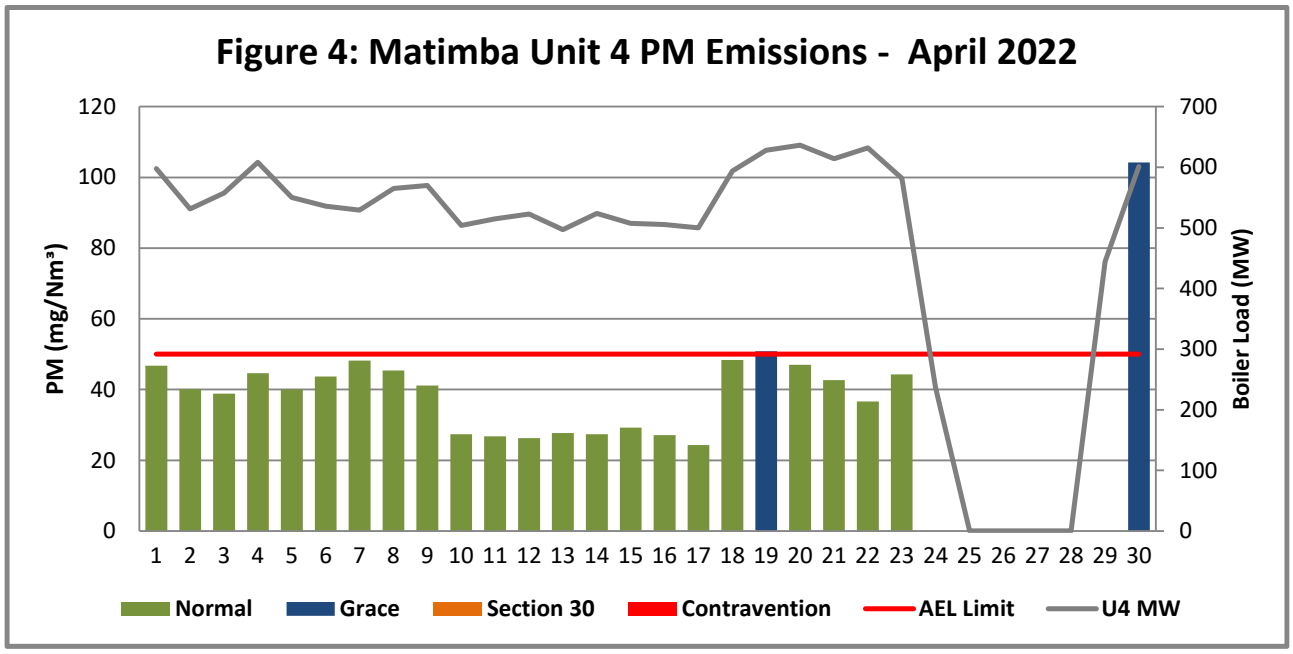

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of April 2022

Interpretation:

Unit 4 exceeded the 50 mg/Nm^3 limit on 19 April 2022 and 30 April 2022. The exceedance on 19 April 2022 was due to breakdowns on the ash handling plant causing ash backlogs within the flue gas stream, reducing the efficiency of the Electrostatic Precipitators. The exceedance on 30 April 2022 was due to extended light-up conditions that occurred during light-up after the unit tripped on 23 April 2022. Both of these exceedances remained within the 48 hour grace period.

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Unit 5 Particulate Emissions

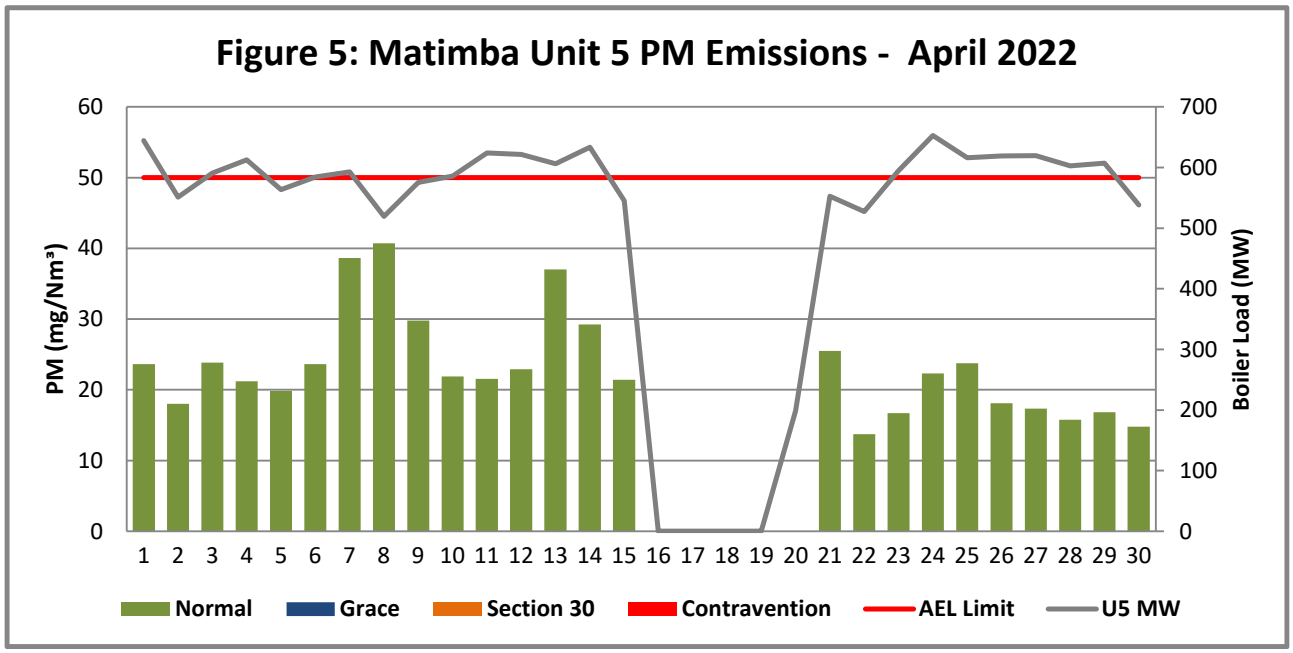

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of April 2022

Interpretation:

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

Unit 6 Particulate Emissions

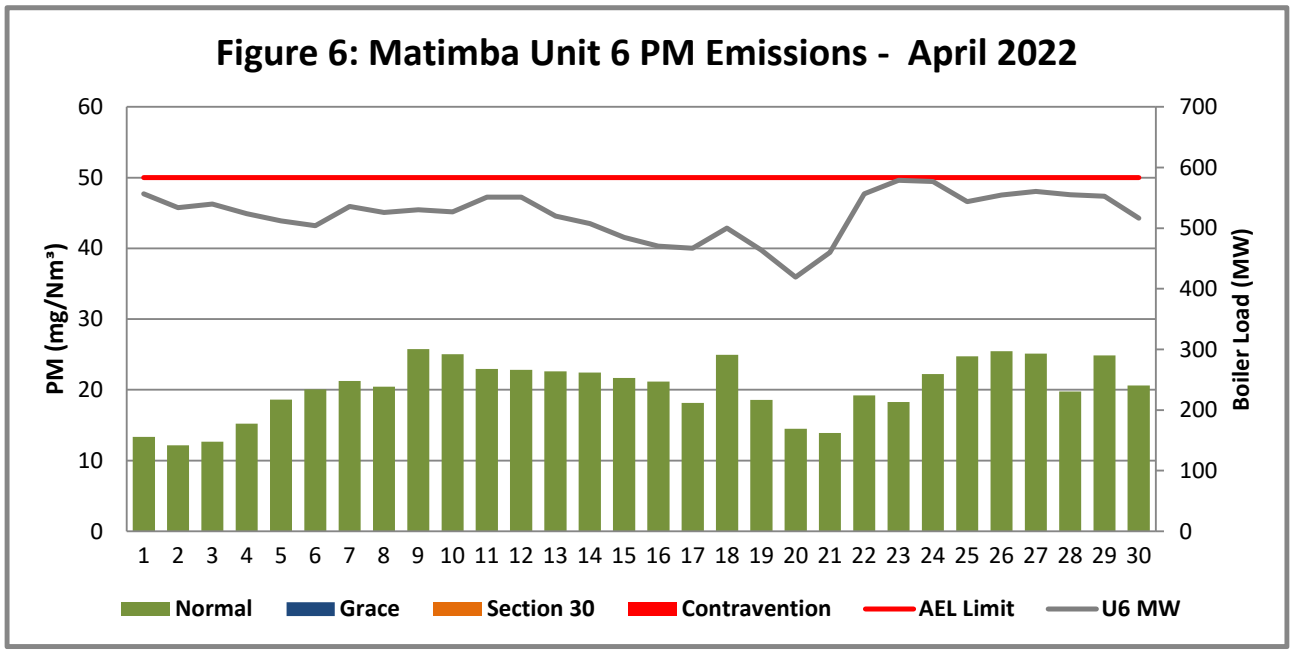

Figure 6: Particulate matter daily average emissions against emission limit for unit 6 for the month of April 2022

Interpretation:

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

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

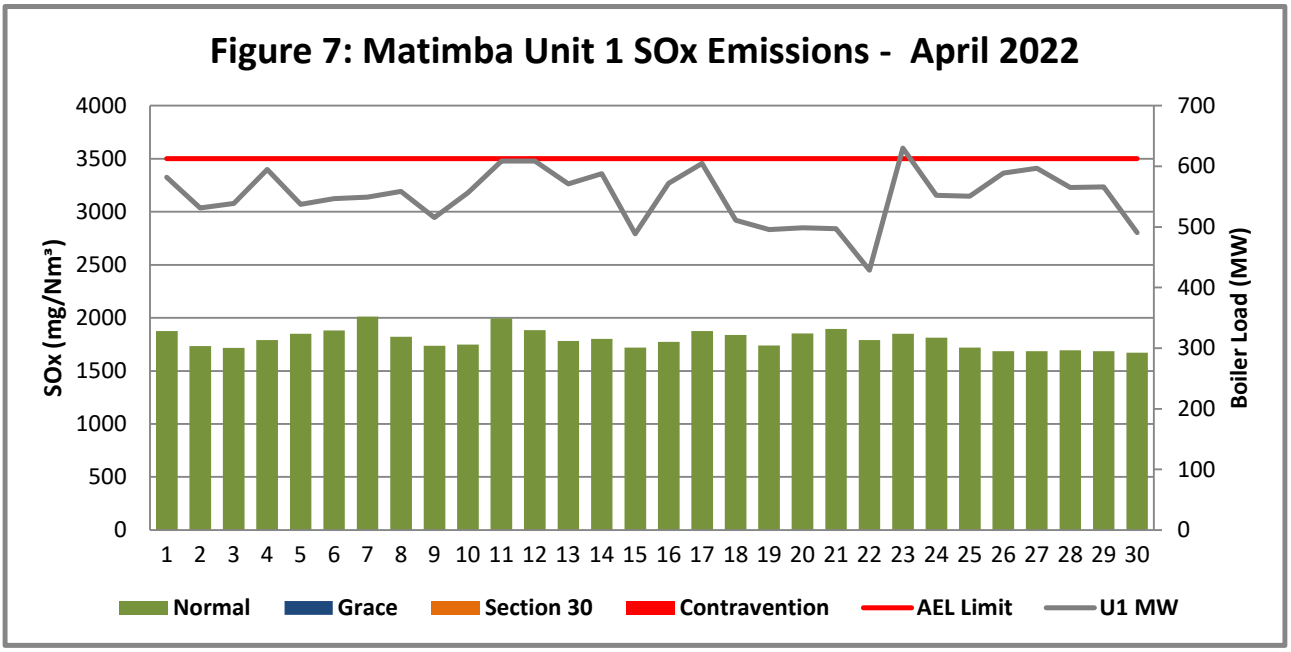

Figure 7: SO2 daily average emissions against emission limit for unit 1 for the month of April 2022

Interpretation:

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

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Unit 2 SO_2 Emissions

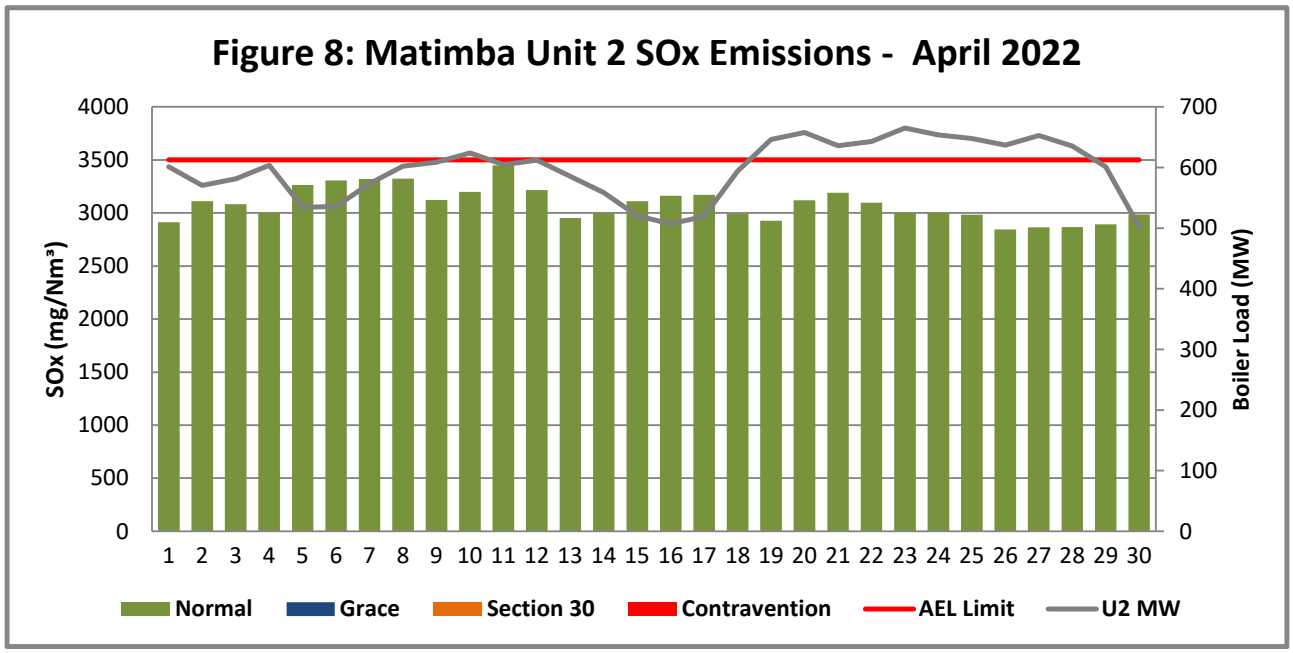

Figure 8: SO2 daily average emissions against emission limit for unit 2 for the month of April 2022

Interpretation:

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

Unit 3 SO_2 Emissions

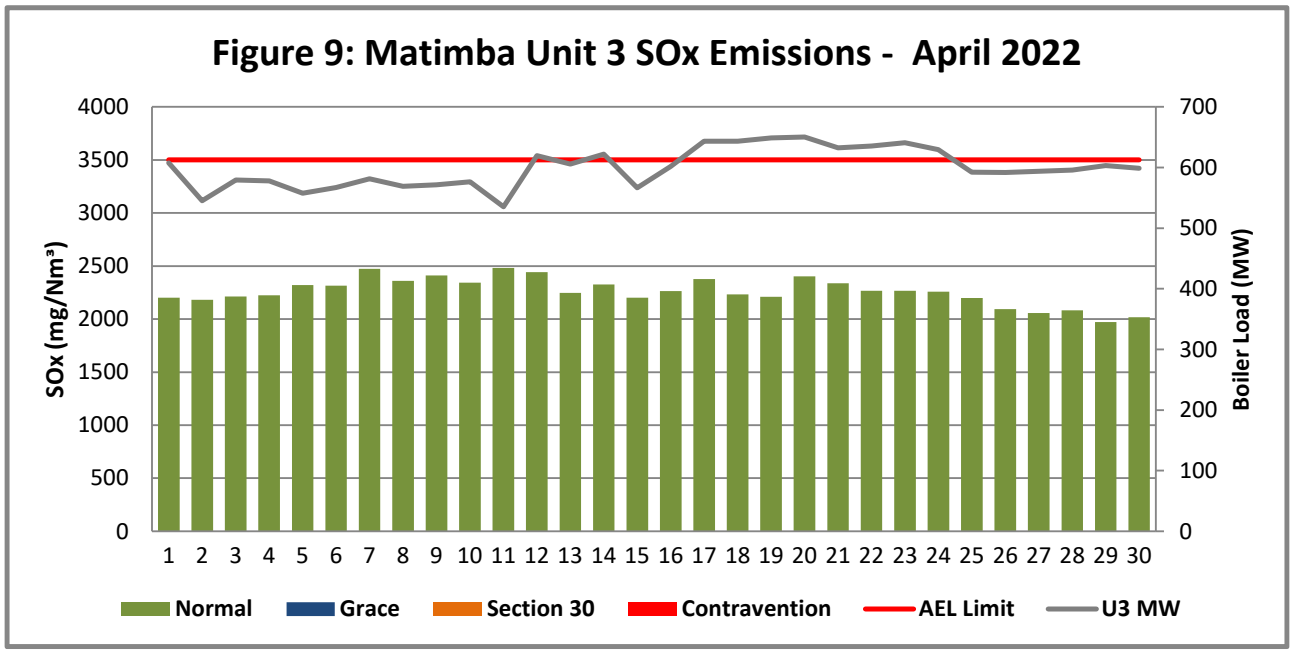

Figure 9: SO2 daily average emissions against emission limit for unit 3 for the month of April 2022

Interpretation:

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

Unit 4 SO_2 Emissions

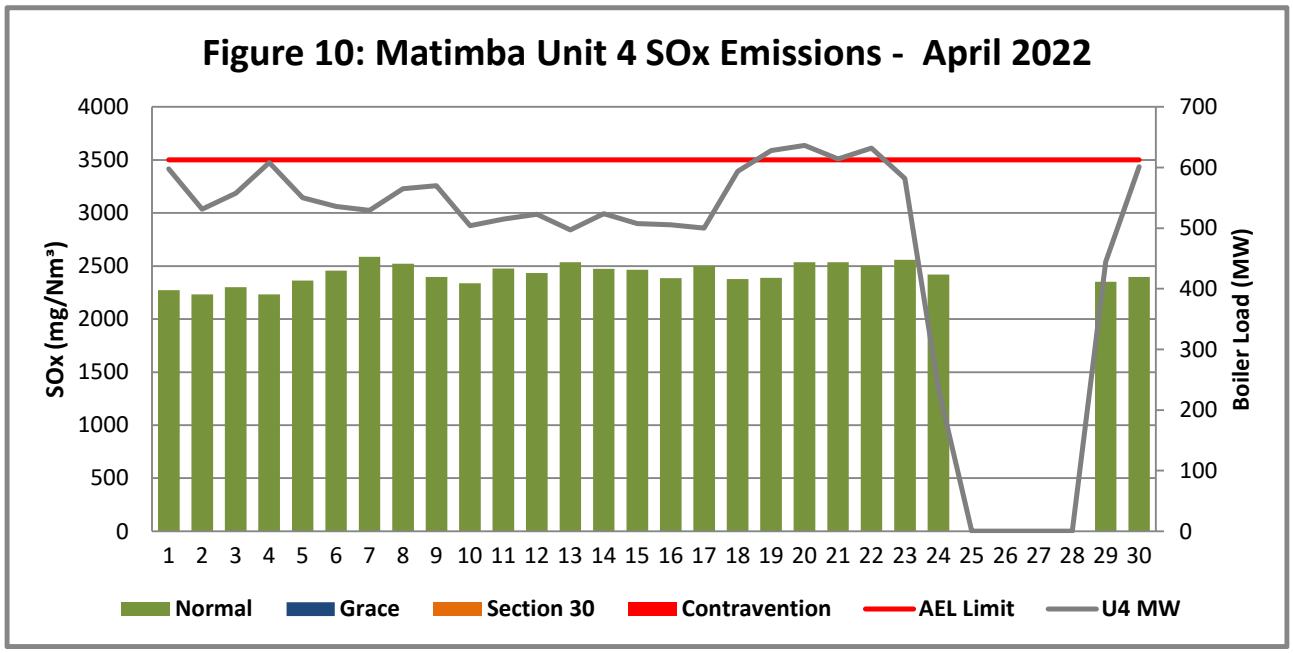

Figure 10: SO2 daily average emissions against emission limit for unit 4 for the month of April 2022

Interpretation:

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

Unit 5 SO_2 Emissions

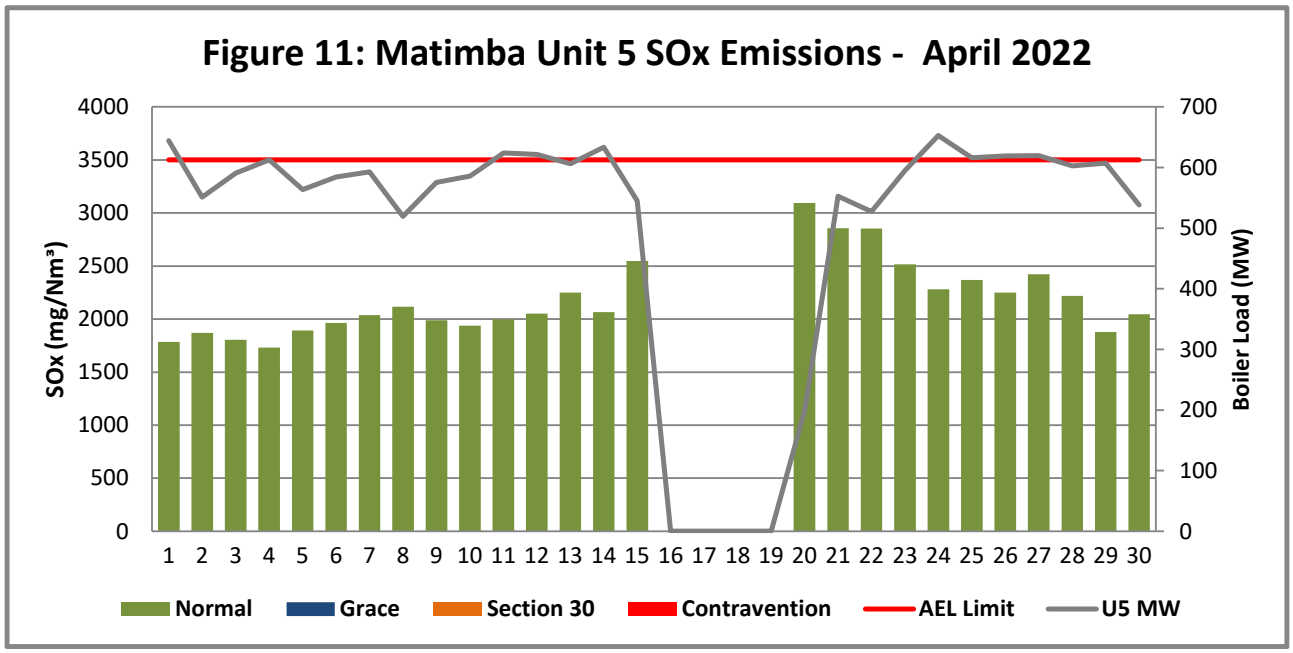

Figure 11: SO2 daily average emissions against emission limit for unit 5 for the month of April 2022

Interpretation:

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

Unit 6 SO_2 Emissions

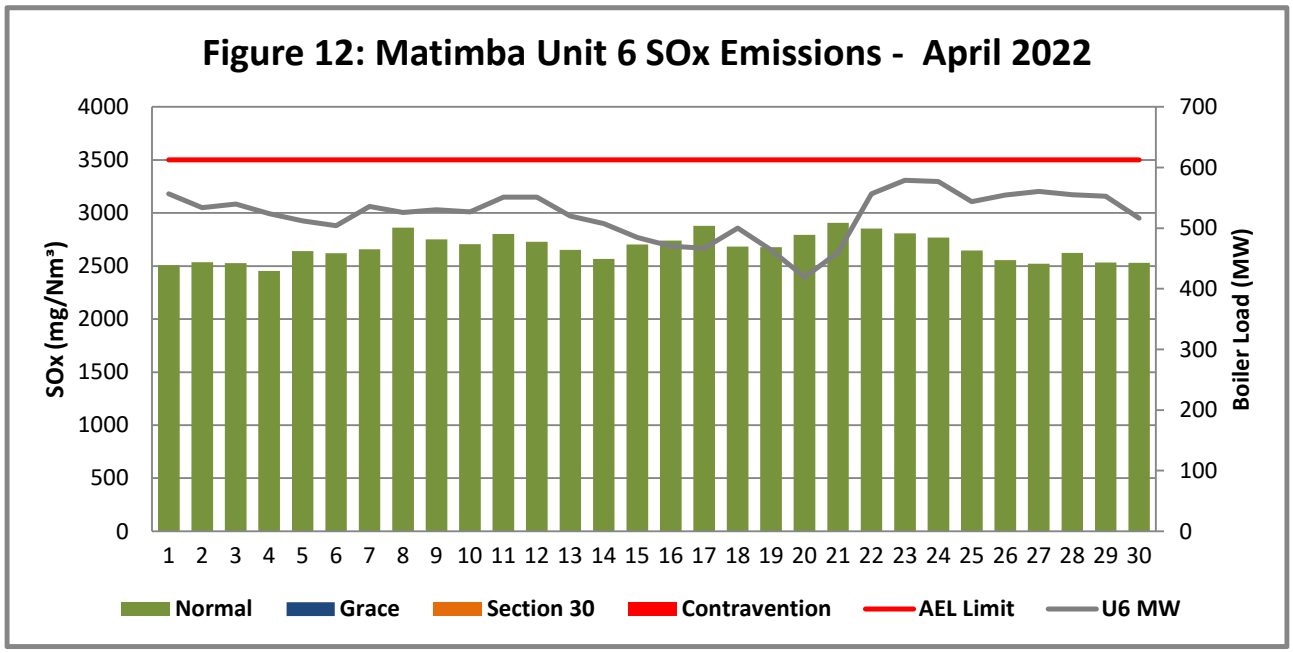

Figure 12: SO2 daily average emissions against emission limit for unit 6 for the month of April 2022

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

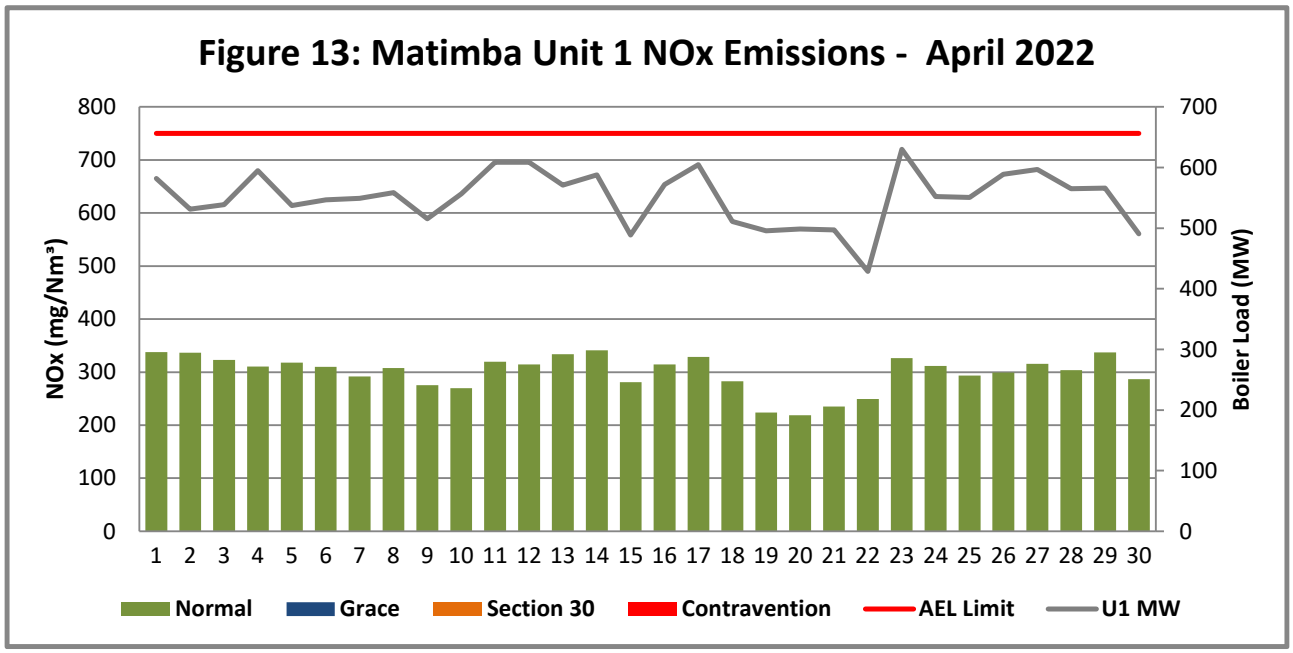


Figure 13: Figure 14: NOx daily average emissions against emission limit for unit 1 for the month of April 2022

Interpretation:

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

Unit 2 NO_x Emissions

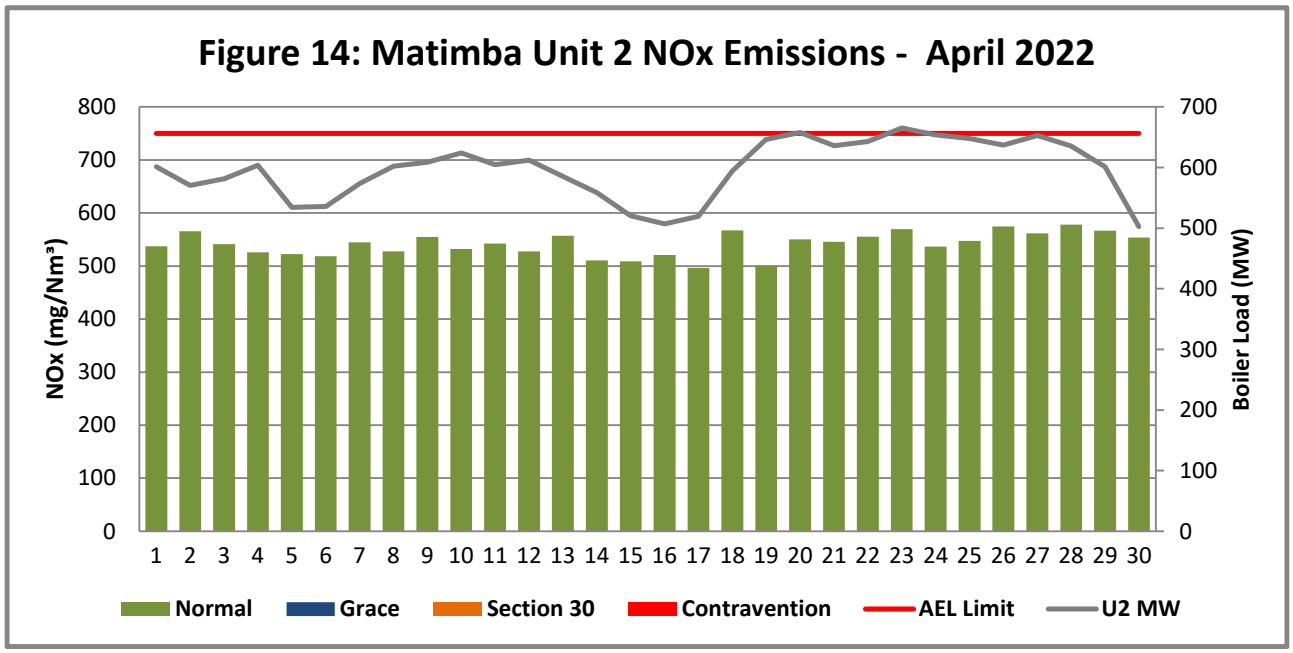


Figure 15: NOx daily average emissions against emission limit for unit 2 for the month of April 2022

Interpretation:

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

Unit 3 NO_x Emissions

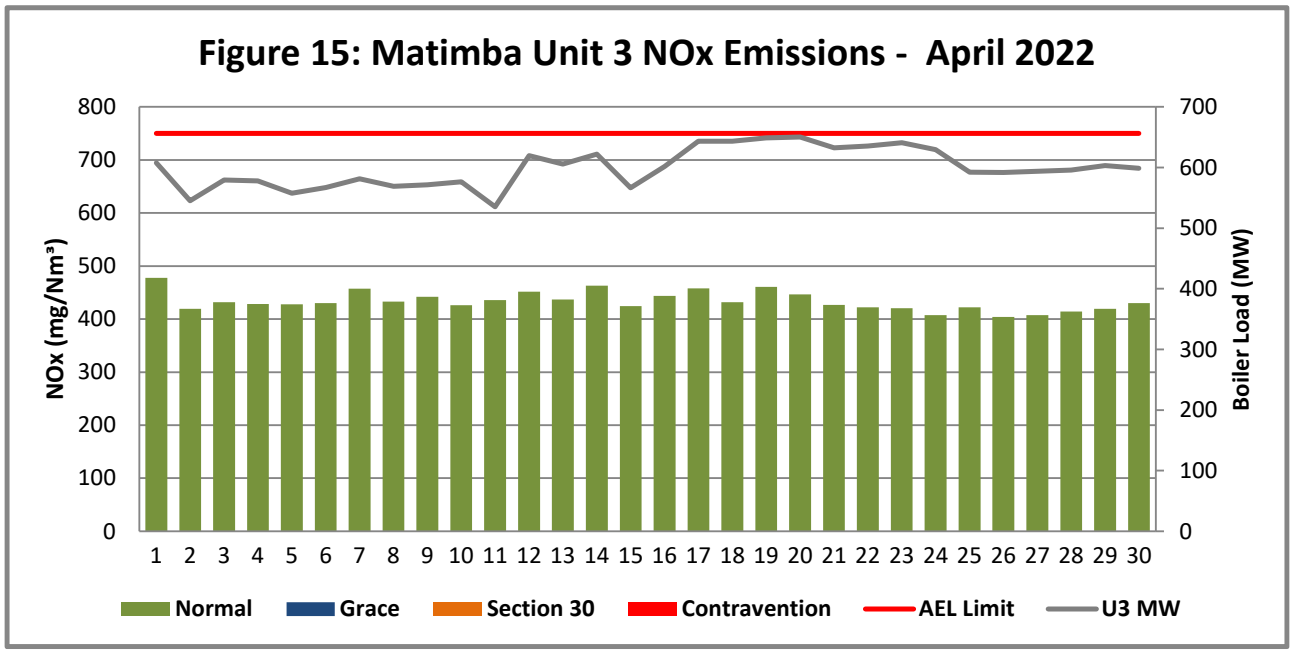


Figure 16: NOx daily average emissions against emission limit for unit 3 for the month of April 2022

Interpretation:

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

Unit 4 NO_x Emissions

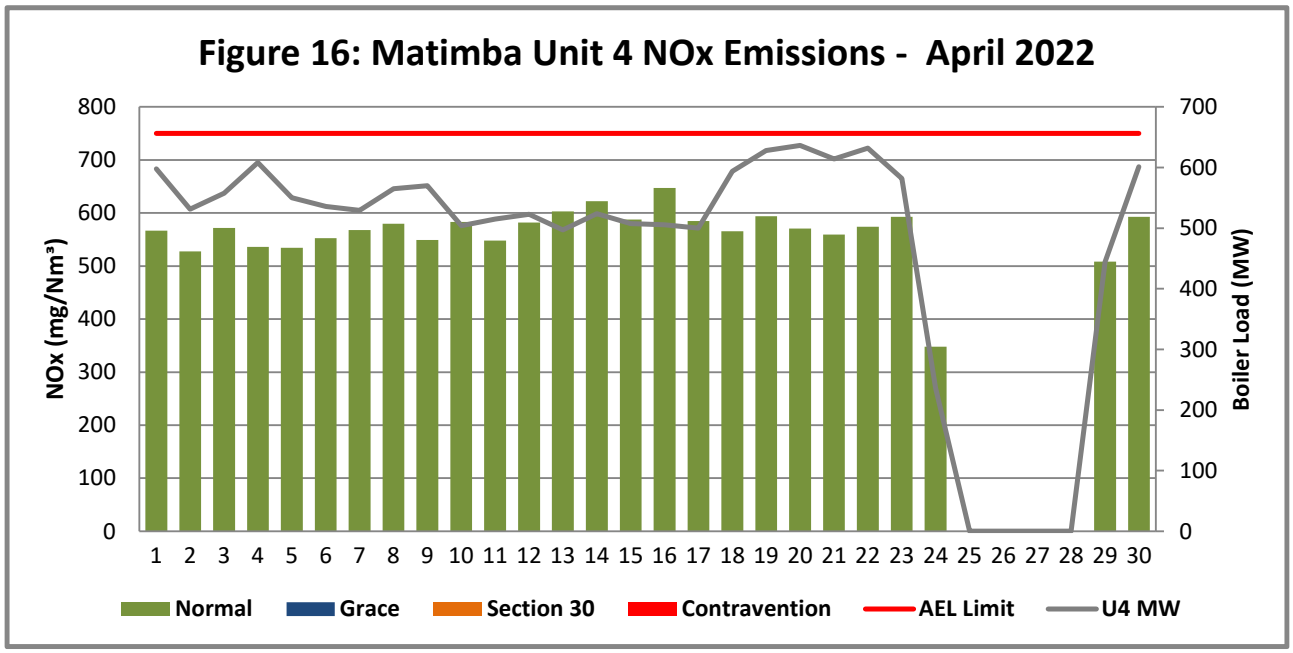


Figure 17: NOx daily average emissions against emission limit for unit 4 for the month of April 2022

Interpretation:

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

Unit 5 NO_x Emissions

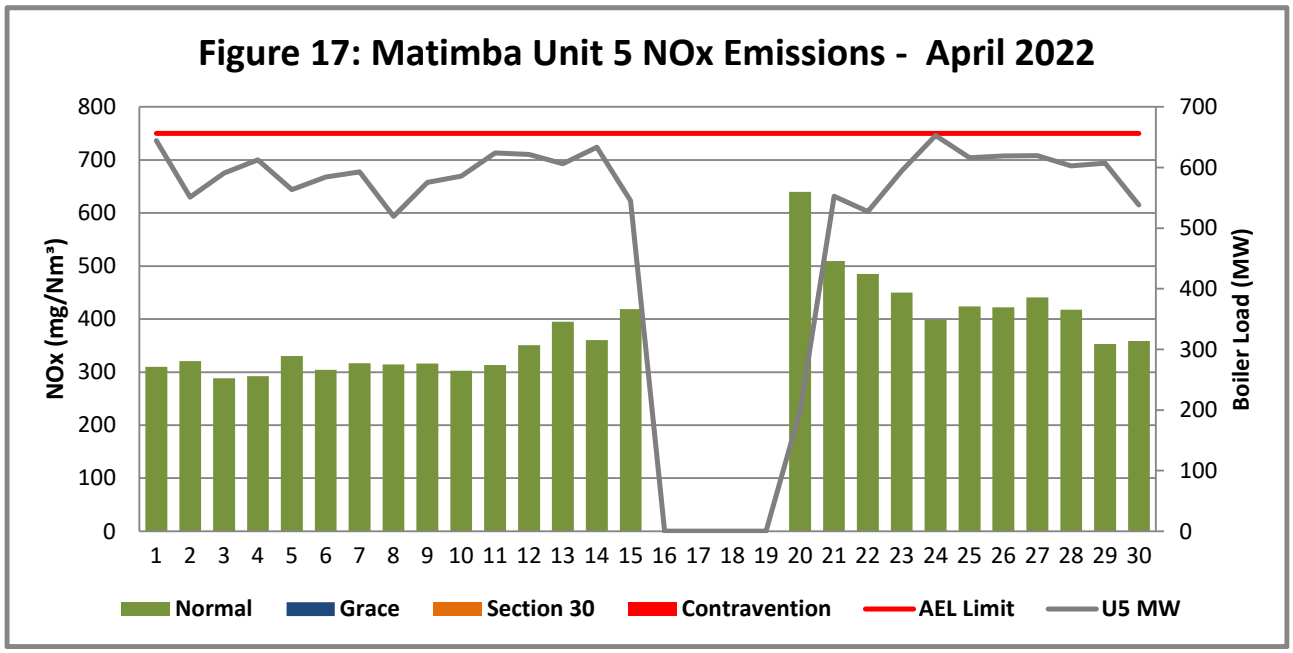


Figure 18: NOx daily average emissions against emission limit for unit 5 for the month of April 2022

Interpretation:

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

Unit 6 NO_x Emissions

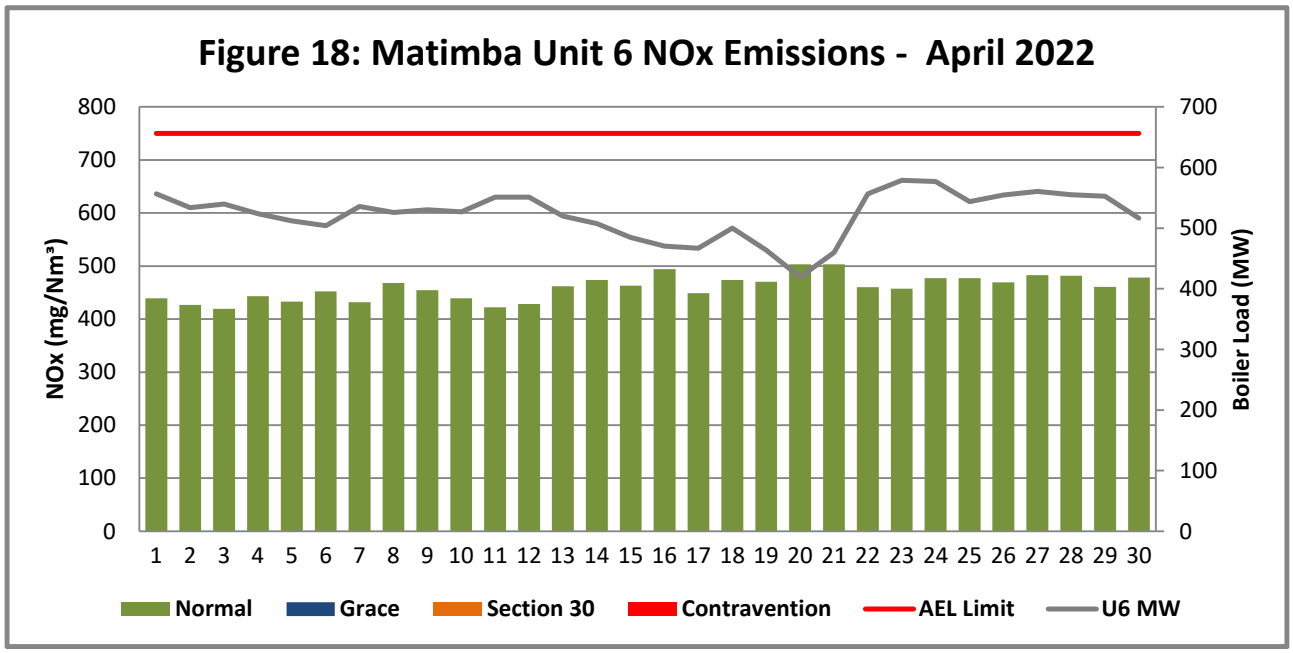


Figure 19: NOx daily average emissions against emission limit for unit 6 for the month of April 2022

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:	Wednesday, 25 May 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:	**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:	***582,998***	
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:	0,02	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	**0,50**	**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 April 2022

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2022/04/01	13957	14212	14510	14241	15327	13226
2022/04/02	12724	13453	12999	12660	13078	12660
2022/04/03	12904	13712	13842	13237	14045	12837
2022/04/04	14281	14325	13818	14517	14610	12500
2022/04/05	12878	12593	13322	13108	13404	12168
2022/04/06	13093	12669	13501	12741	13867	11938
2022/04/07	13198	13521	13932	12627	14152	12778
2022/04/08	13390	14223	13586	13455	12364	12506
2022/04/09	12358	14383	13640	13549	13682	12606
2022/04/10	13335	14741	13770	11999	13937	12532
2022/04/11	14577	14277	12760	12239	14797	13089
2022/04/12	14542	14441	14789	12438	14762	13083
2022/04/13	13682	13815	14448	11827	14419	12351
2022/04/14	14141	13216	14868	12520	15080	12084
2022/04/15	11708	12306	13529	12134	12359	11504
2022/04/16	13696	11966	14383	12076	0	11170
2022/04/17	14454	12274	15331	11992	0	11088
2022/04/18	12302	14008	15374	14096	0	11873
2022/04/19	11858	15259	15479	15013	0	11025
2022/04/20	11949	15552	15550	15217	273,6	9948
2022/04/21	11963	15000	15074	14629	13071	10873
2022/04/22	10181	15188	15177	15098	11963	13223
2022/04/23	15106	15716	15305	9594	14077	13759
2022/04/24	13293	15487	15065	295	15564	13753
2022/04/25	13165	15293	14161	0	14658	12902
2022/04/26	14087	15047	14110	0	14659	13163
2022/04/27	14323	15396	14157	0	14752	13343
2022/04/28	13571	15041	14236	0	14379	13206
2022/04/29	13563	14608	14373	2434	14392	13103
2022/04/30	11752	11867	14303	14365	12902	12295

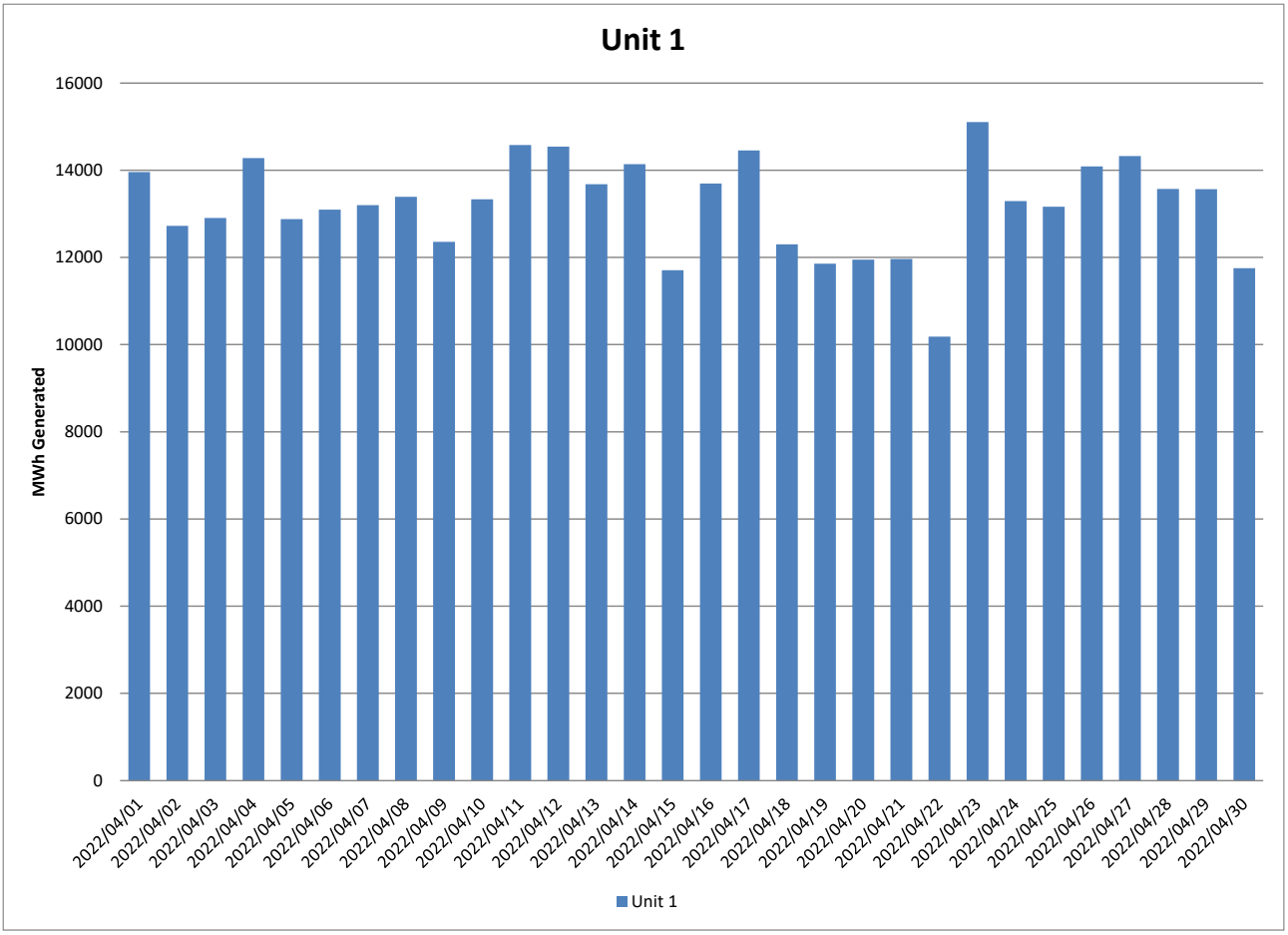


Figure 20: Unit 1 daily generated power in MWh for the month of April 2022

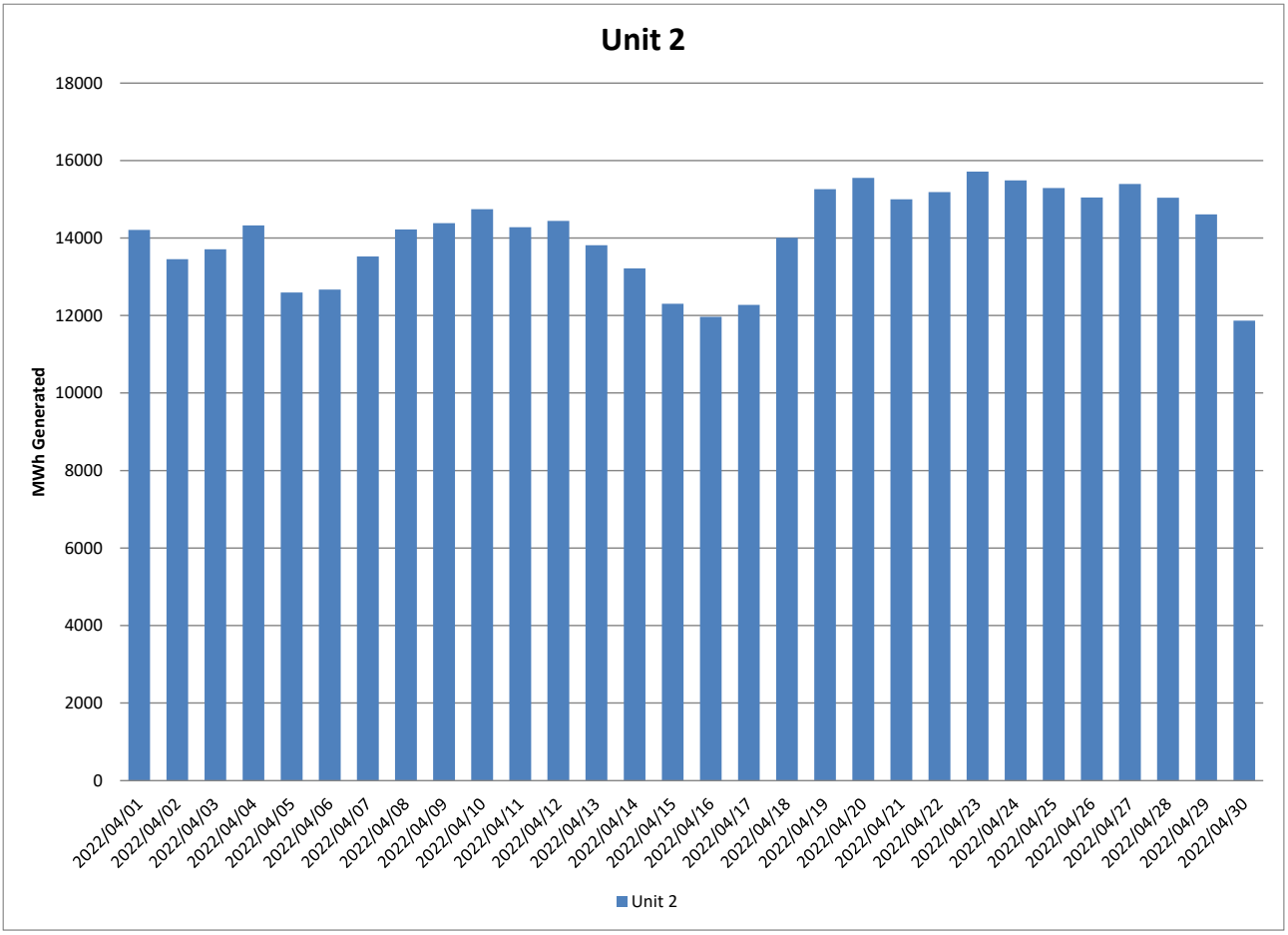


Figure 21: Unit 2 daily generated power in MWh for the month of April 2022

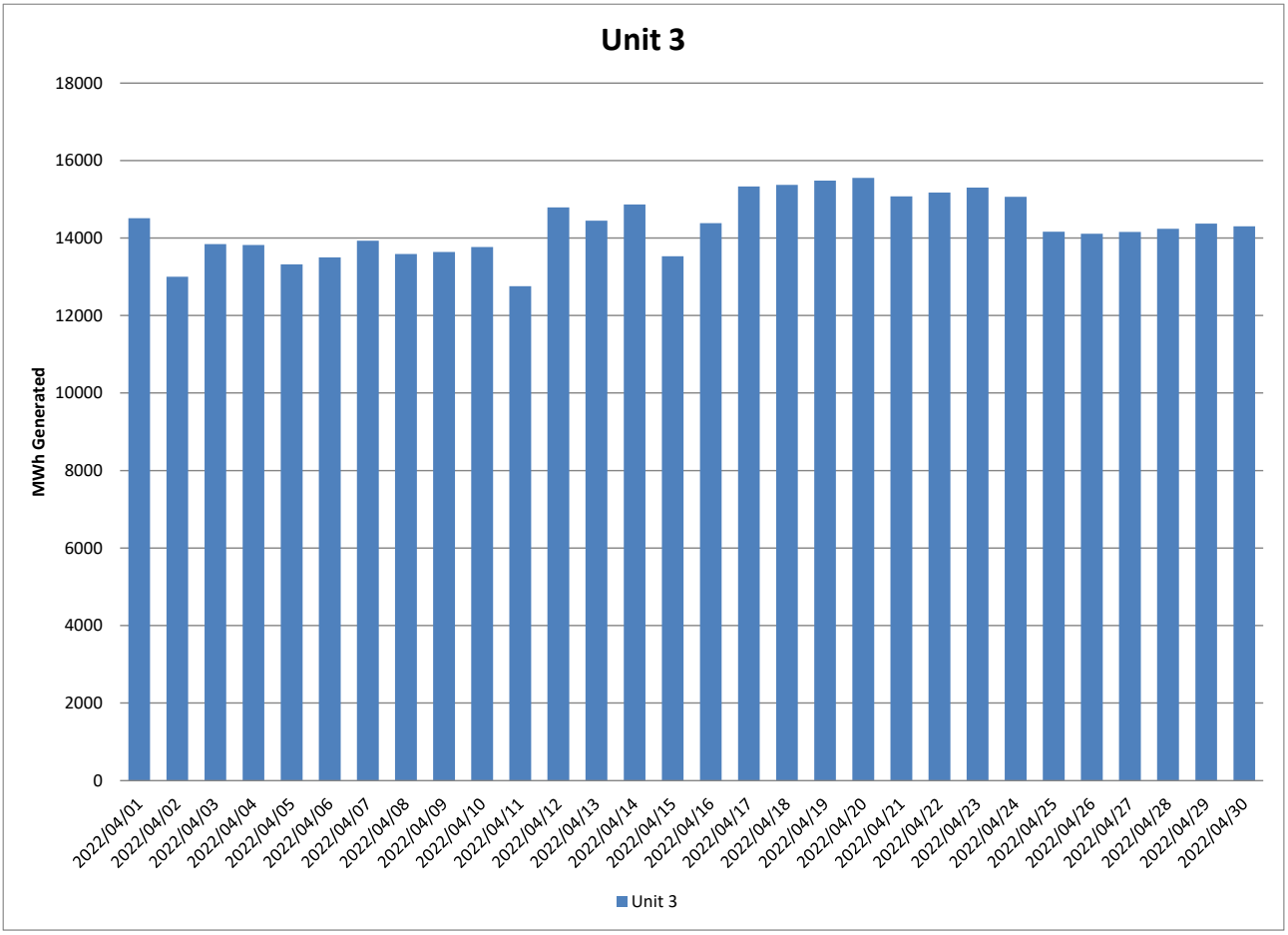


Figure 22: Unit 3 daily generated power in MWh for the month of April 2022

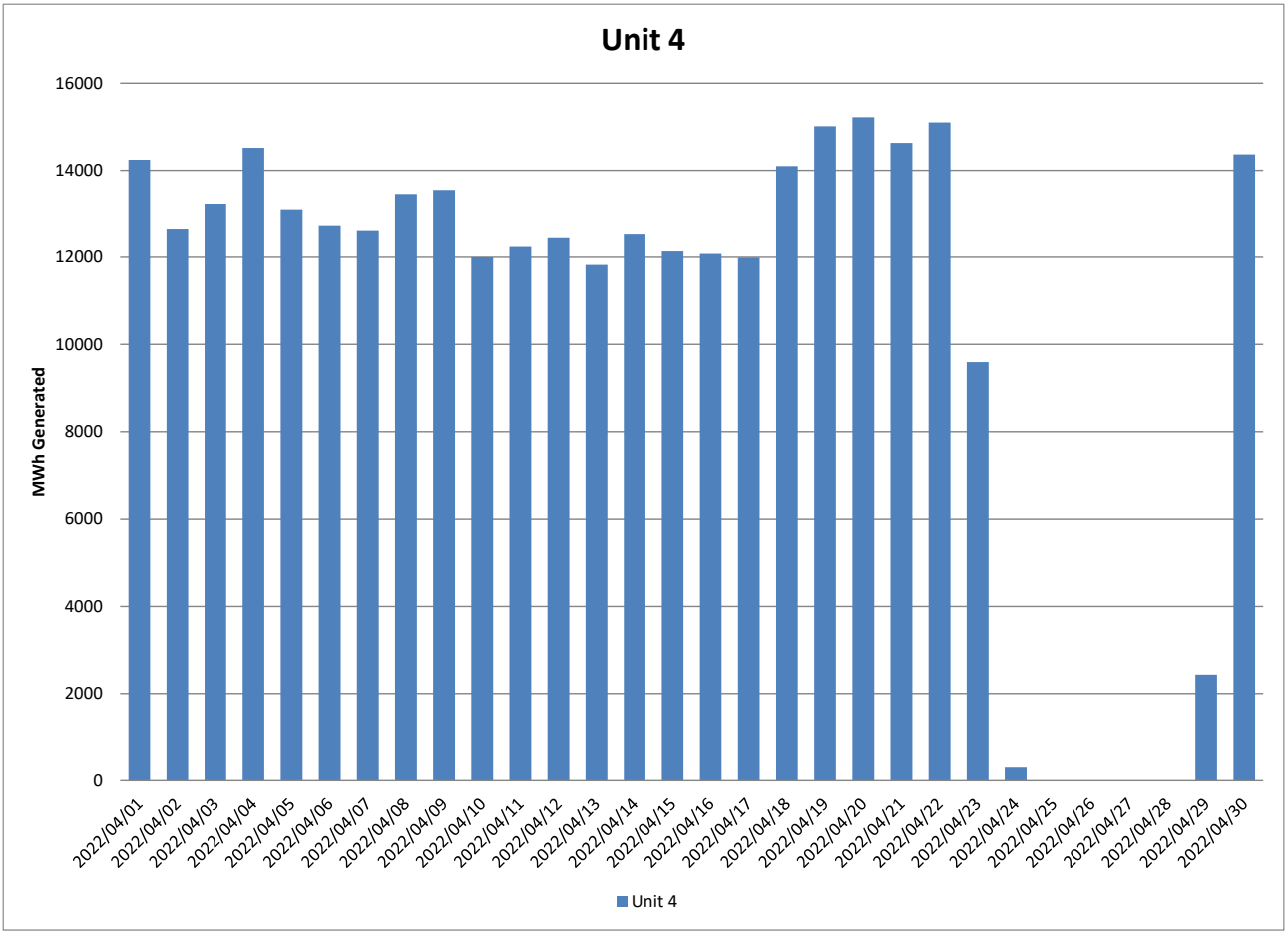


Figure 23: Unit 4 daily generated power in MWh for the month of April 2022

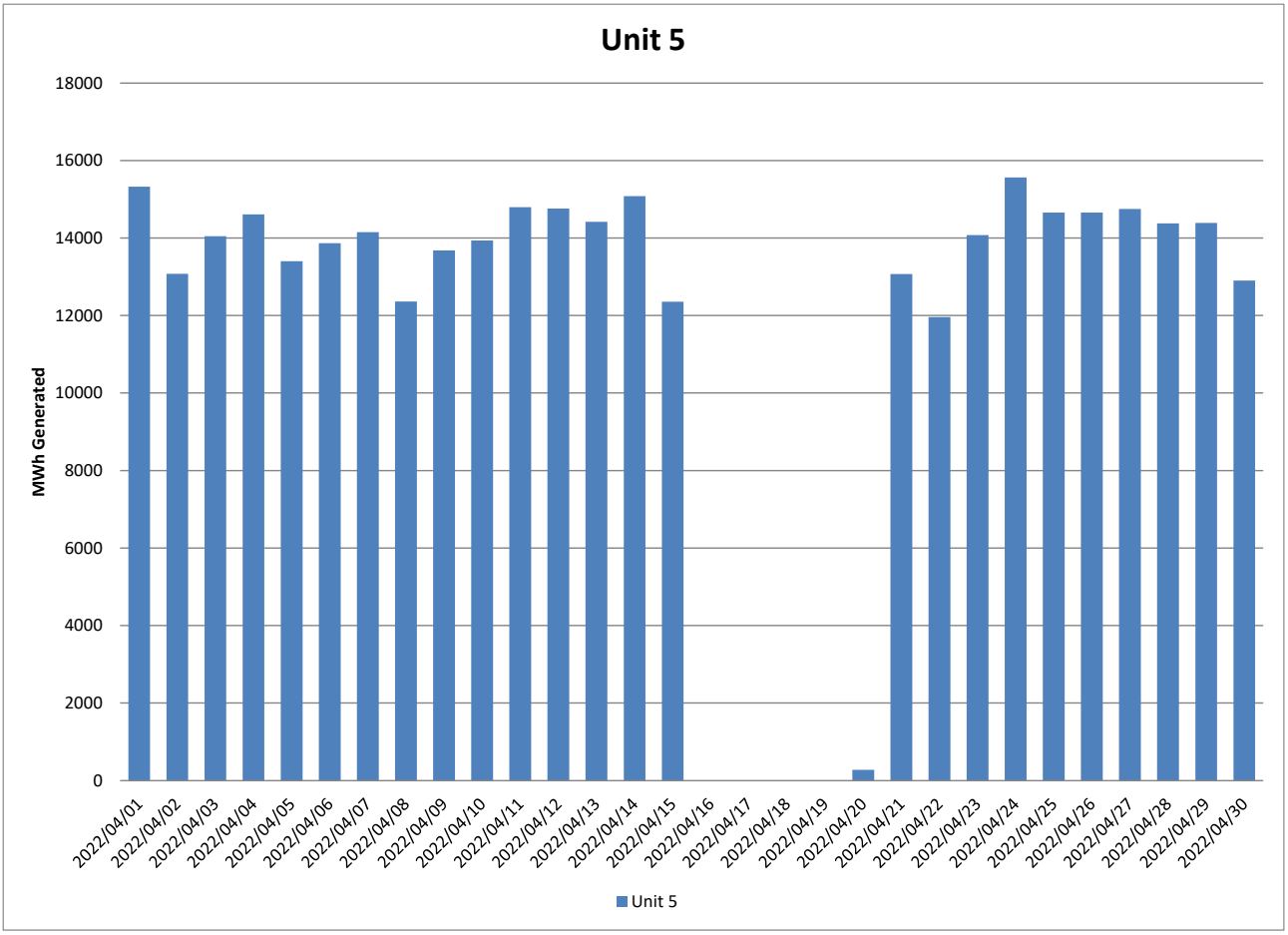


Figure 24: Unit 5 daily generated power in MWh for the month of April 2022

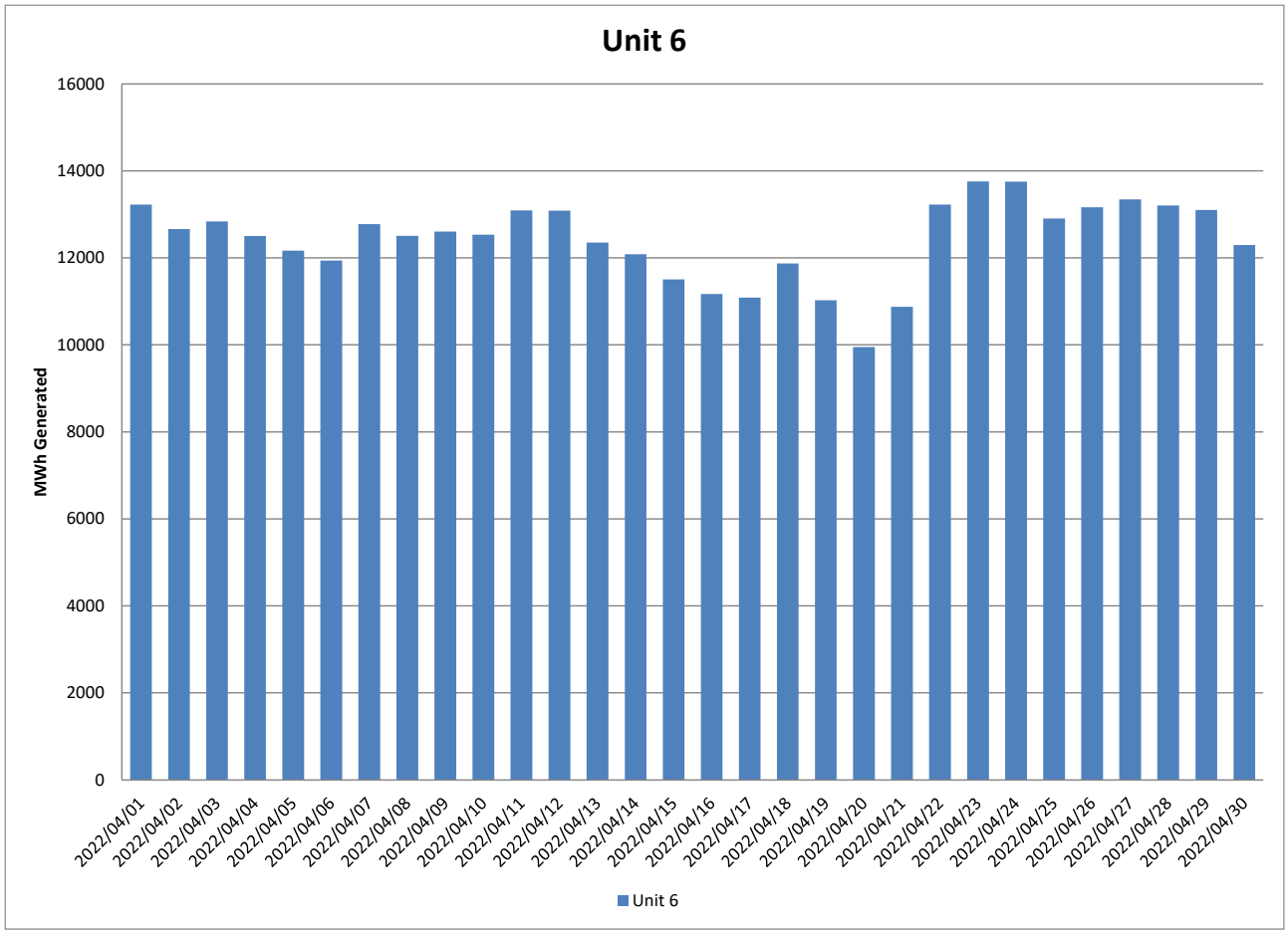


Figure 25: Unit 6 daily generated power in MWh for the month of April 2022

2.6 Pollutant Tonnages

The emitted pollutant tonnages for April 2022 are provided in table 6. Averaged values were used for O_2 data for Unit 1 from 1 to 12 April 2022 due to the oxygen monitor being defective and providing unreliable data. Averaged values were used for CO_2 data for Unit 2 from 1 to 8 April 2022, 12 to 16 April 2022 and 22 to 27 April 2022 due to unreliable data from the monitor. Averaged Quality Assurance level 2 (QAL 2) values were used for CO_2 data for Unit 3 and unit 4 due to the monitor providing unreliable values. Averaged values were used for CO_2 data for Unit 6 from 8, 9, 16, 18, 19, 20 and 21 April 2022 due to unreliable data from the monitor. Matimba is currently in the process of implementing recommended changes on this monitor to improve the reliability of the data.

Table 6: Pollutant tonnages for the month of April 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	67,2	4 099,6	688,7
Unit 2	44,4	9 609,3	1 692,8
Unit 3	60,7	5 940,1	1 140,6
Unit 4	54,3	4 007,8	946,7
Unit 5	37,2	3 483,9	595,8
Unit 6	41,0	5 405,8	929,2
SUM	304,9	32 546,6	5 993,8

2.7 Reference values

Table 7: Reference values for data provided, April 2022

Compound / Parameter	Units of Measure	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Oxygen	%	5,47	9,50	5,91	6,53	8,56	8,98
Moisture	%	5,02	4,98	5,47	3,97	5,69	3,22
Velocity	m/s	24,5	35,5	29,8	23,9	25,9	27,8
Temperature	^{o}C	134,8	131,1	130,1	133,9	120,6	124,3
Pressure	mBar	933,6	1 192,6	916,8	920,4	925,5	923,6

2.8 Continuous Emission Monitors

2.8.1 Reliability

CO_2 monitor reliability for units 1, 2, 4, 5 and 6 performed below the required 80% reliability as per the AEL. The monitors for these units were 100% available for April 2022 however the data received were removed and replaced with calculated values and averaged values due to values received from the monitors not being reliable.

Averaged Quality Assurance level 2 (QAL 2) values were used for CO_2 data for Unit 1, averaged data was used for oxygen data for 1 to 3 April 2022 due to the monitor readings being unreliable. Averaged Quality Assurance level 2 (QAL 2) values were used for CO_2 and oxygen data for Unit 2 and Oxygen data for unit 3. CO_2 Values for unit 4 and unit 5 was calculated as per balance based on the O_2 values.

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

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100,0	99,9	99,7	99,9
Unit 2	99,9	92,1	92,1	42,1
Unit 3	100,0	99,9	99,9	0,0
Unit 4	100,0	99,8	99,8	0,0
Unit 5	100,0	100,0	100,0	99,7
Unit 6	100,0	100,0	100,0	76,7

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

- 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	4	
Fires in	2022/04/23	12h45
Synchronization with Grid	2022/04/23	16h27
Emissions below limit	2022/04/23	17H00
Fires in to synchronization	3,7	HOURS
Synchronization to < Emission limit	0,55	HOURS

Unit	4	
Fires in	2022/04/24	16H20
Synchronization with Grid	2022/04/24	19H45
Emissions below limit	2022/04/24	19H45
Fires in to synchronization	3,42	HOURS
Synchronization to < Emission limit	0	HOURS

Unit	4	
Fires in	2022/04/29	04H33
Synchronization with Grid	2022/04/29	18H18
Emissions below limit	2022/04/29	18H18
Fires in to synchronization	13,75	HOURS
Synchronization to < Emission limit	0	HOURS

Unit	5	
Fires in	2022/04/20	17H16
Synchronization with Grid	2022/04/20	22H17
Emissions below limit	2022/04/21	00H00
Fires in to synchronization	5,02	HOURS
Synchronization to < Emission limit	1,72	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	460,85	460,85	460,85	430,15	230,2	460,85
Emergency Hours declared including hours after stand down	481,85	481,85	481,85	446,15	249,2	481,85
Days over the Limit during Emergency Generation	0	0	0	1	0	0

Unit 4 exceeded the 50mg/Nm^3 limit for one day during emergency generation, on 30 April 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

There were two exceedances recorded for the $PM_{2.5}$ daily limit and five exceedances for the PM_{10} daily limit during the period under review. There were no other exceedances recorded for all other parameters monitored.

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

The average data recovery for the period was 50,1% and the station availability was 58,3%. Low availability was due to cable theft that occurred during the month. The local municipal authorities have been contacted for intervention.

Detailed results can be found in Attachment 1, “Marapong Monthly Report_April 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.

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

N/A

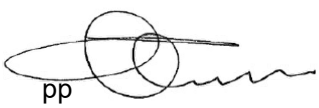
4. Report Conclusion

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



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GENERAL MANAGER: MATIMBA POWER STATION