Eskom	Matimba Power Station Emissions report	Matimba Power Station

Title: **Matimba Power Station February 2021 emissions report**

Document Identifier:	**RP/247/004**
Plant Location:	**Emission management**
Area of Applicability:	**Matimba Power Station**
Functional Area Applicability:	**Environment**
Revision:	**2**
Total Pages:	**39**
Report Date:	**October 2021**
Disclosure Classification:	**Controlled**

Compiled by	Functional Responsibility	Authorized by
WC Mocke	**MC Mamabolo**	**CO Mabotja**
Environmental Officer	**Environmental Manager**	**General Manager**
Date: 2021/10/27	Date: 29/10/2021	Date: 2021/10/29

Content

Tables

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 February 2021.

Due to recommendations received from an internal emission data review the Matimba Power Station February 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 two exceedances of the daily particulate matter emission limit (50mg/Nm^3). Both 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.

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	904 789
	Fuel Oil	Tons/month	1 200	814,407
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate**
	Energy	GWh	4 212.6	1 810,957

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

2.2 Abatement technology

Table 2: Abatement Equipment Control Technology Utilised

Associated Unit	Technology Type	Minimum utilisation (%)	Actual Utilisation (%)
Unit 1	Electrostatic Precipitator	100%	99,94
Unit 2	Electrostatic Precipitator	100%	99,92
Unit 3	Electrostatic Precipitator	100%	99,91
Unit 4	Electrostatic Precipitator	100%	99,85
Unit 5	Electrostatic Precipitator	100%	99,91
Unit 6	Electrostatic Precipitator	100%	Unit on outage
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%	85%
Unit 5	SO_3 Plant	100%	100%
Unit 6	SO_3 Plant	100%	Unit on outage

Unplanned breakdowns caused unit 4 to not achieve the required 100% availability of its sulphur plant. The plant has since been repaired.

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%	1,259
	Ash Content	30-40%	31,171

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

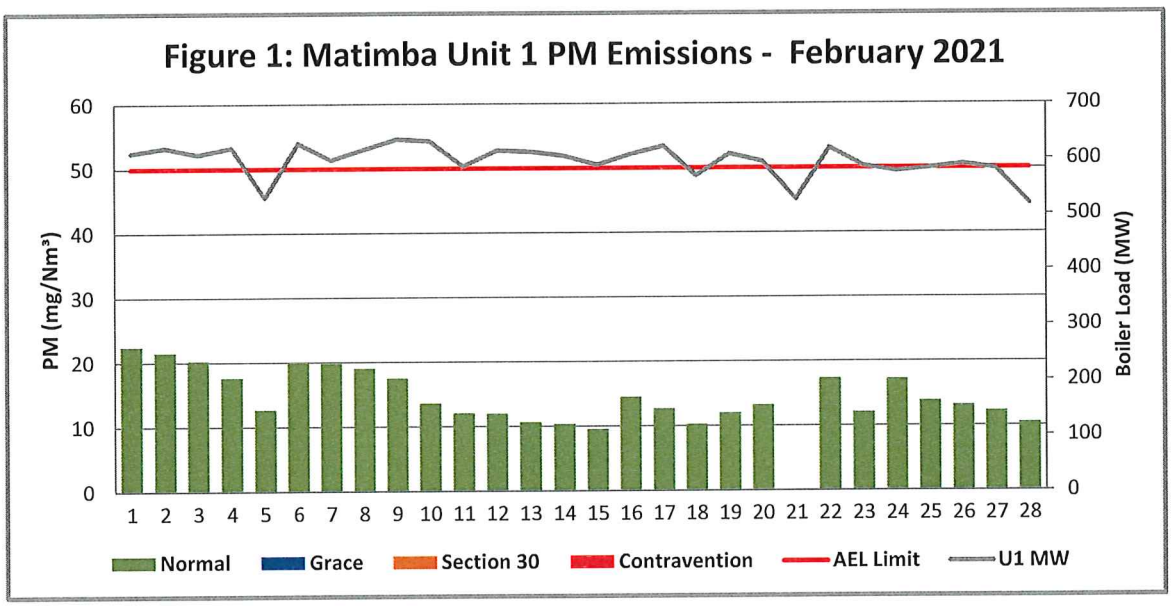

Figure 1: Particulate matter daily average emissions against emission limit for unit 1 for the month of February 2021

Interpretation:

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

Unit 2 Particulate Emissions

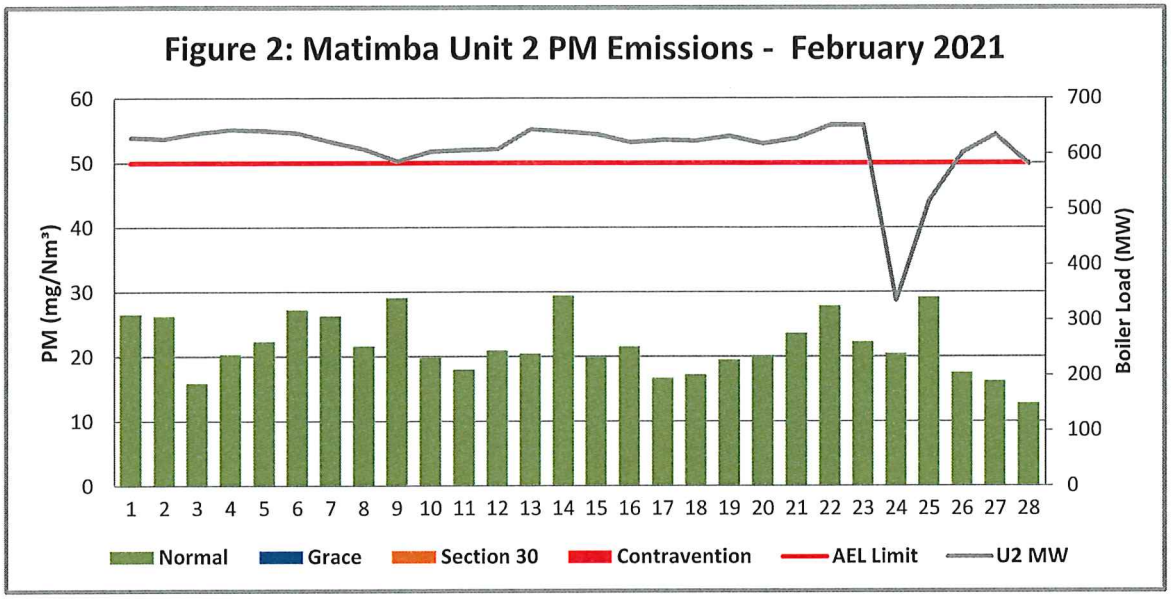

Figure 2: Particulate matter daily average emissions against emission limit for unit 2 for the month of February 2021

Interpretation:

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

Unit 3 Particulate Emissions

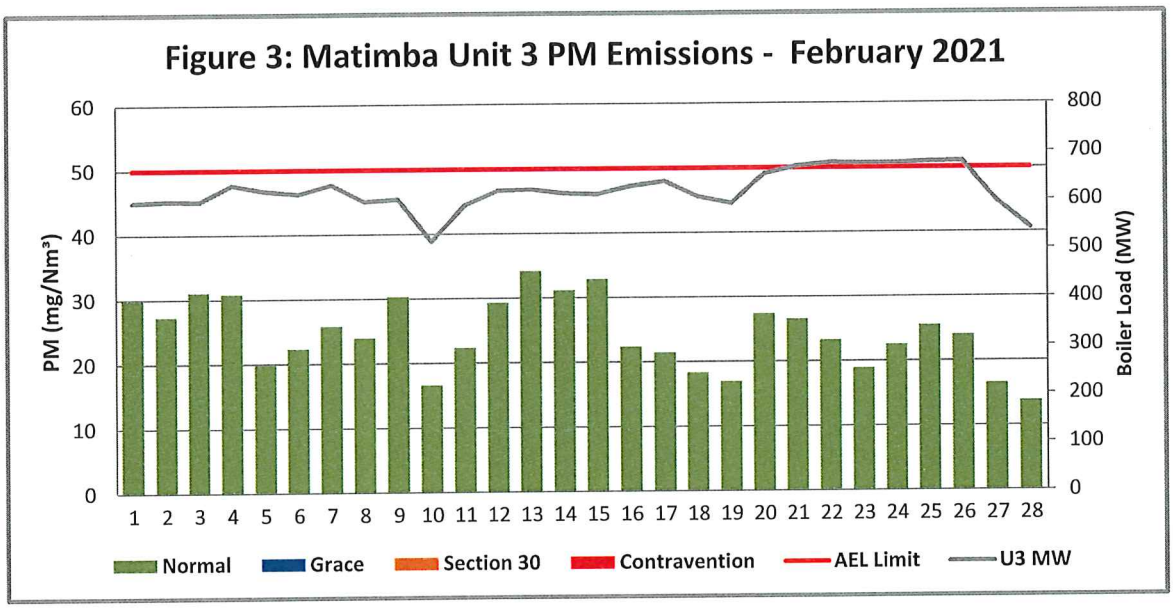

Figure 3: Particulate matter daily average emissions against emission limit for unit 3 for the month of February 2021

Interpretation:

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

Unit 4 Particulate Emissions

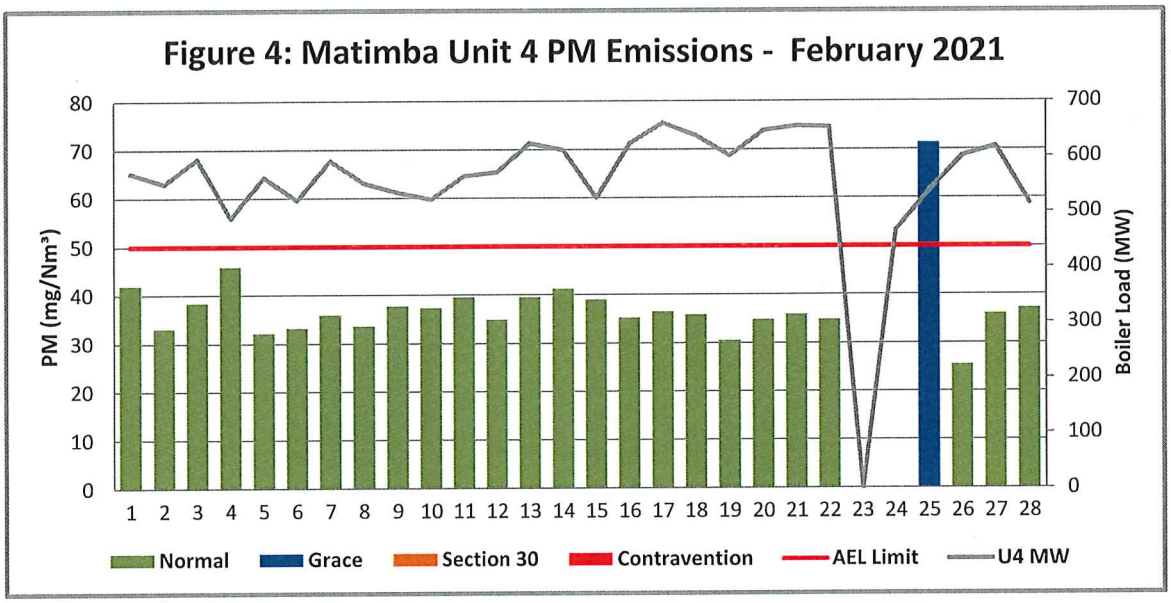

Figure 4: Particulate matter daily average emissions against emission limit for unit 4 for the month of February 2021

Interpretation:

Unit 4 exceeded the particulate emission limit of 50 mg/Nm^3 on the 25th of February 2021. The exceedance was due to breakdowns on the ash handling plant. The plant was repaired and emissions returned to normal. The exceedance did not exceed the 48-hour grace period.

Unit 5 Particulate Emissions

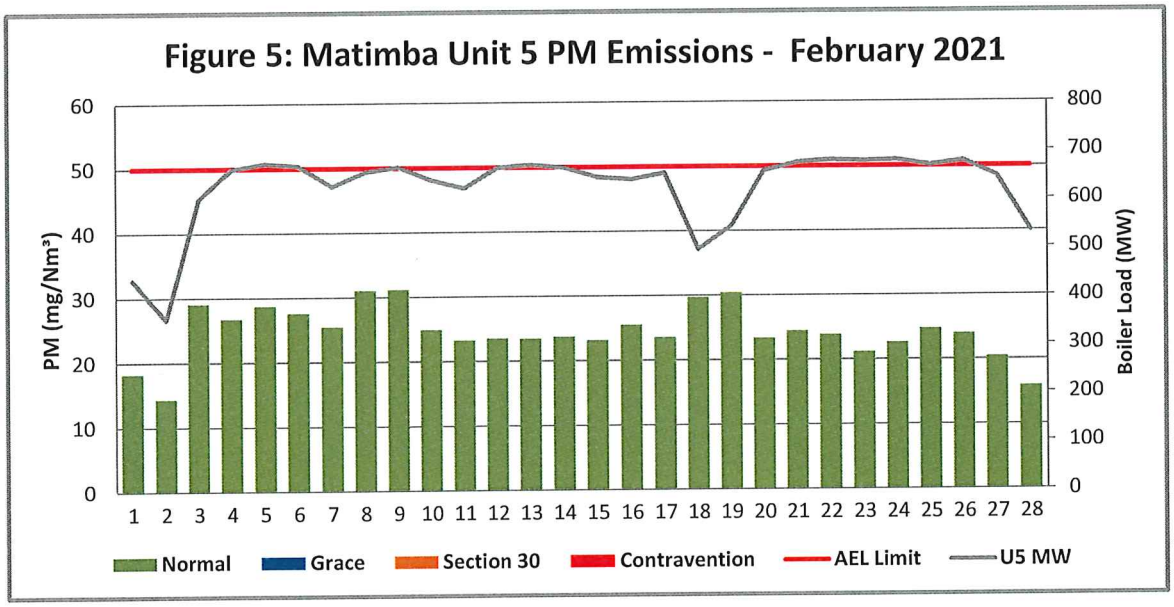

Figure 5: Particulate matter daily average emissions against emission limit for unit 5 for the month of February 2021

Interpretation:

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

Unit 6 Particulate Emissions

Interpretation:

Unit was on outage for the whole of February 2021

2.4.2 Gaseous Emissions

Unit 1 SO_2 Emissions

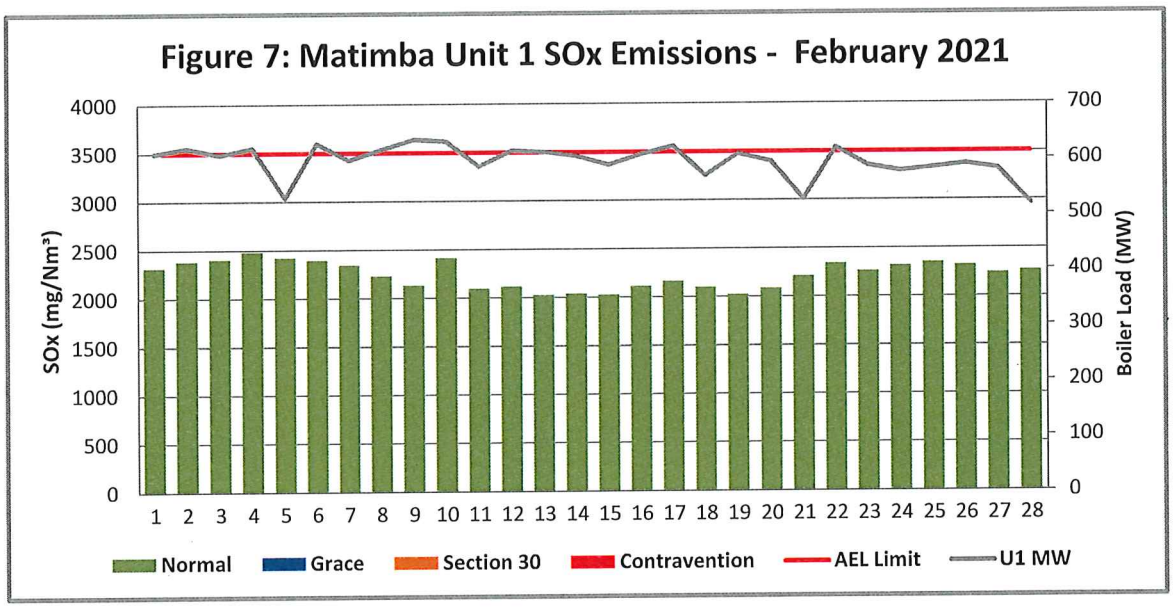

Figure 6: SO_2 daily average emissions against emission limit for unit 1 for the month of February 2021

Interpretation:

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

Unit 2 SO_2 Emissions

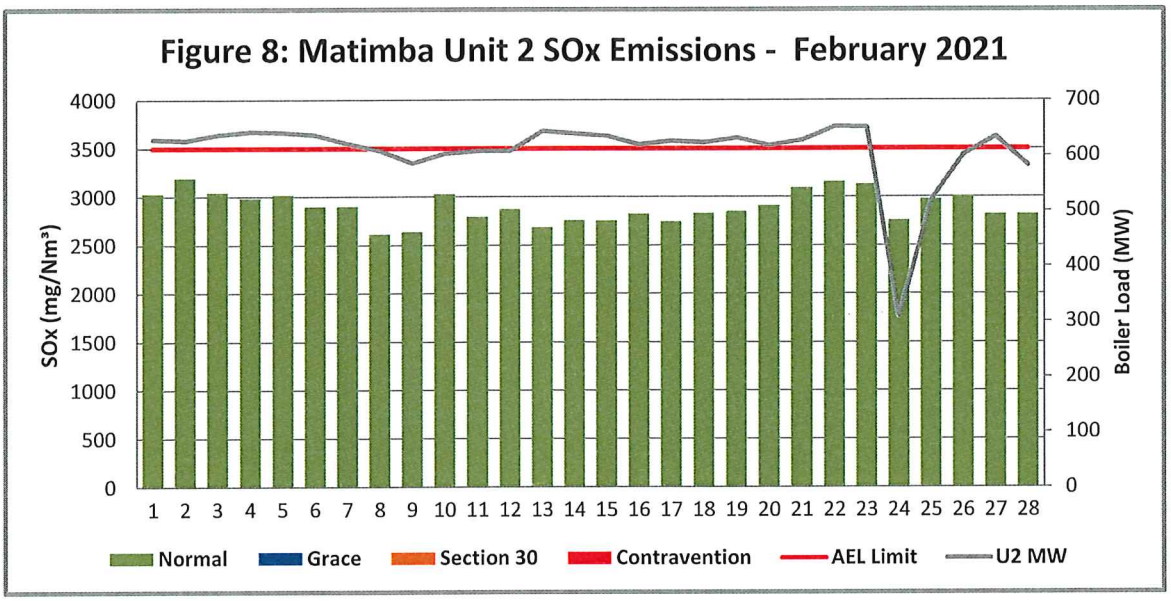

Figure 7: SO2 daily average emissions against emission limit for unit 2 for the month of February 2021

Interpretation:

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

Unit 3 SO_2 Emissions

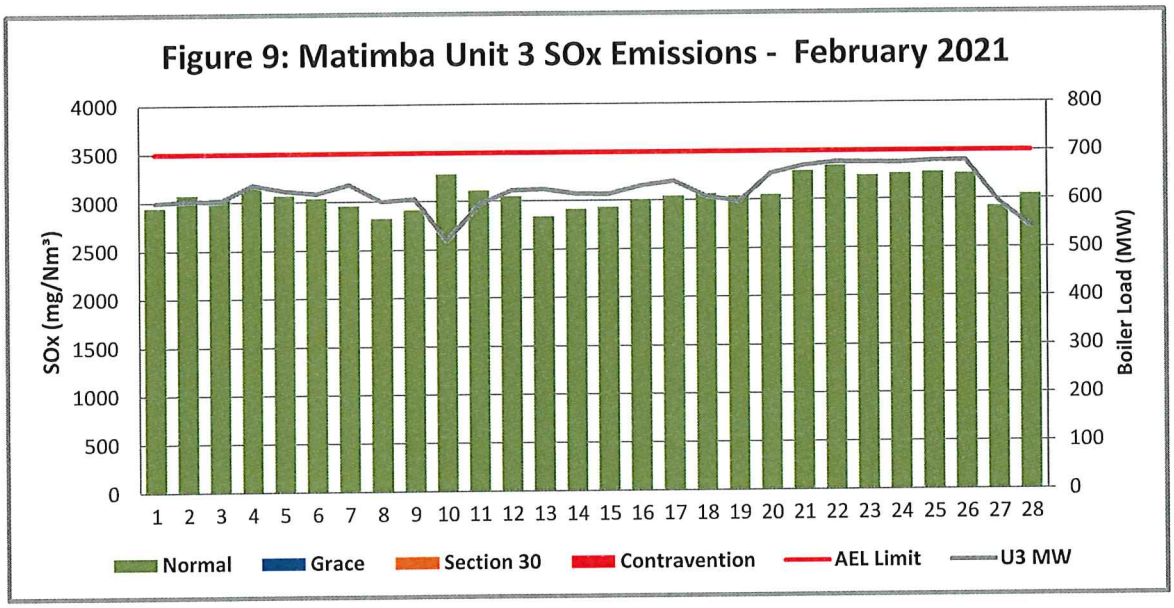

Figure 8: SO2 daily average emissions against emission limit for unit 3 for the month of February 2021

Interpretation:

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

Unit 4 SO_2 Emissions

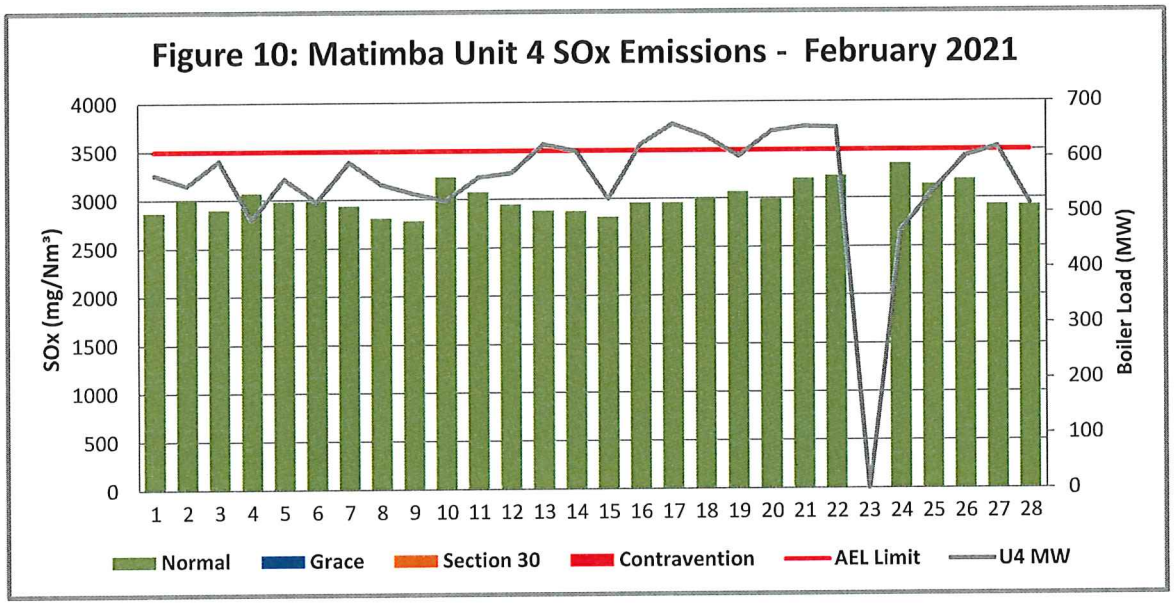

Figure 9: SO2 daily average emissions against emission limit for unit 4 for the month of February 2021

Interpretation:

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

Unit 5 SO_2 Emissions

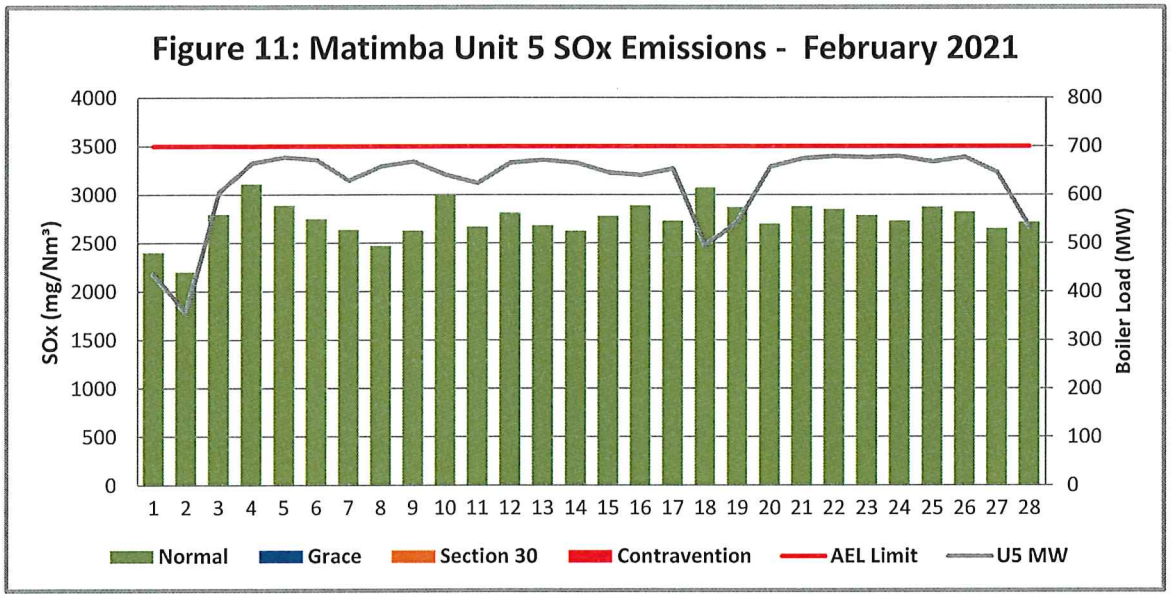

Figure 10: SO2 daily average emissions against emission limit for unit 5 for the month of February 2021

Interpretation:

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

Unit 6 SO_2 Emissions

Interpretation:

Unit was on outage for the whole of February 2021

Unit 1 NO_x Emissions

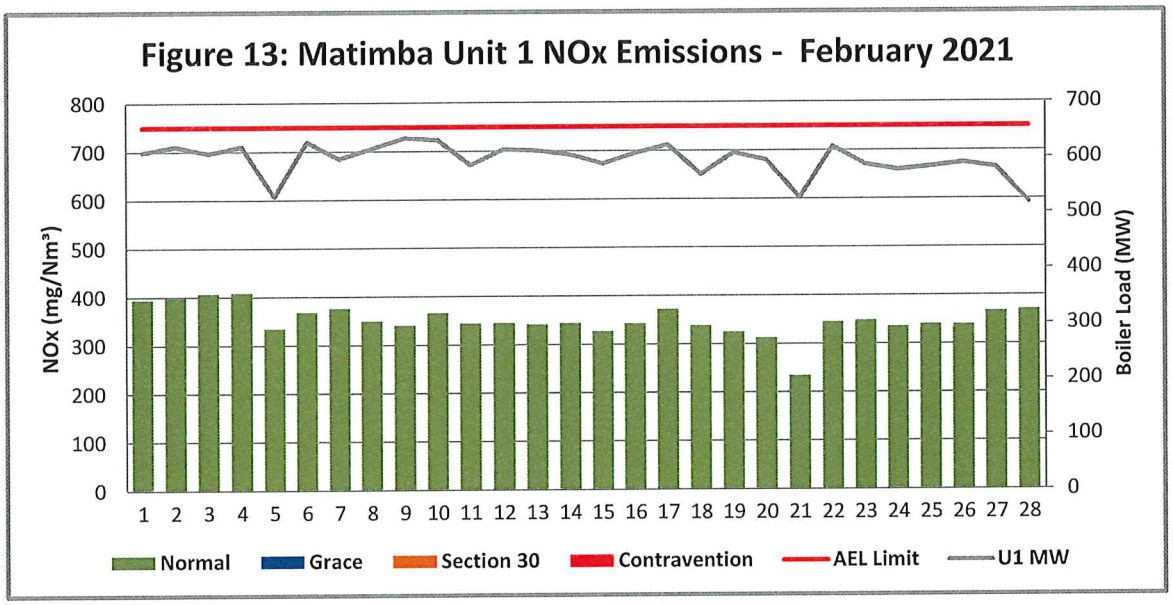

Figure 11: NOx daily average emissions against emission limit for unit 1 for the month of February 2021

Interpretation:

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

Unit 2 NO_x Emissions

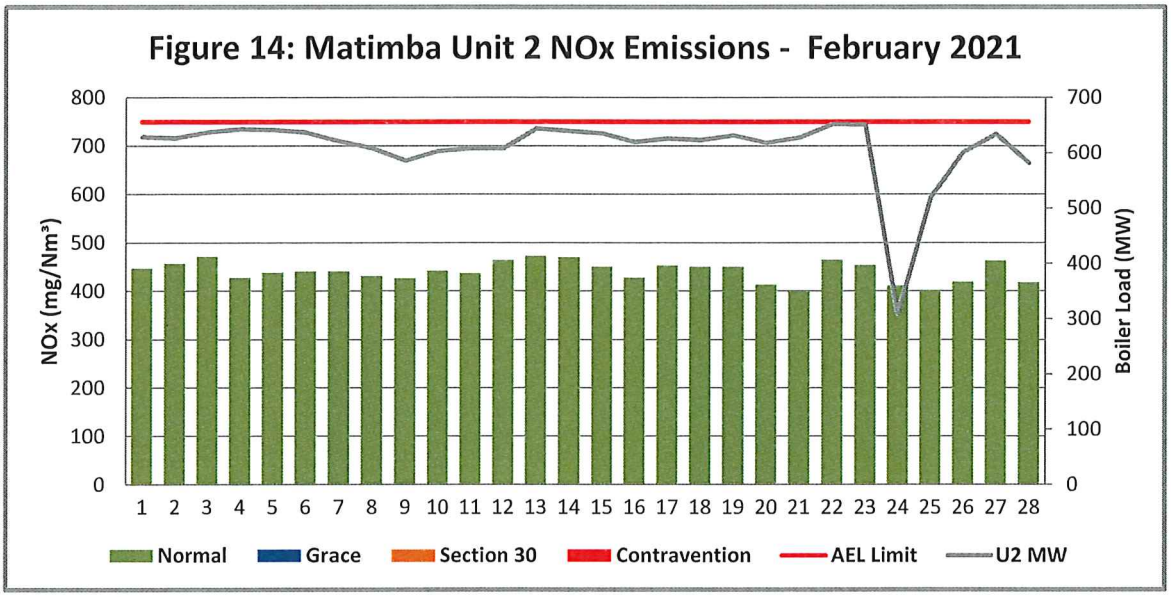

Figure 12: NOx daily average emissions against emission limit for unit 2 for the month of February 2021

Interpretation:

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

Unit 3 NO_x Emissions

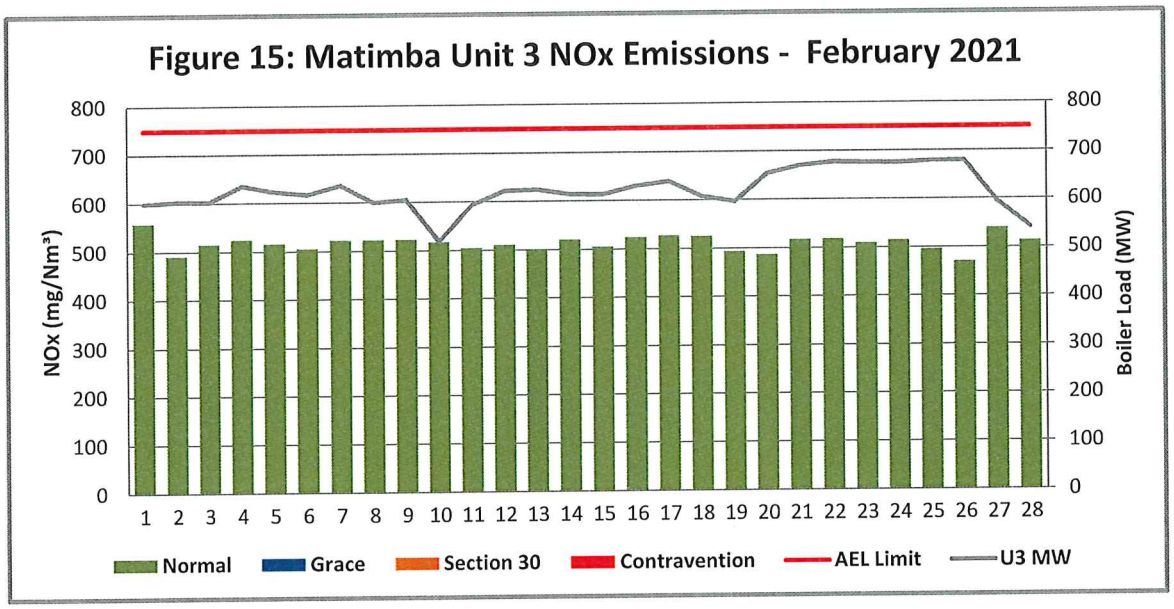

Figure 13: NOx daily average emissions against emission limit for unit 3 for the month of February 2021

Interpretation:

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

Unit 4 NO_x Emissions

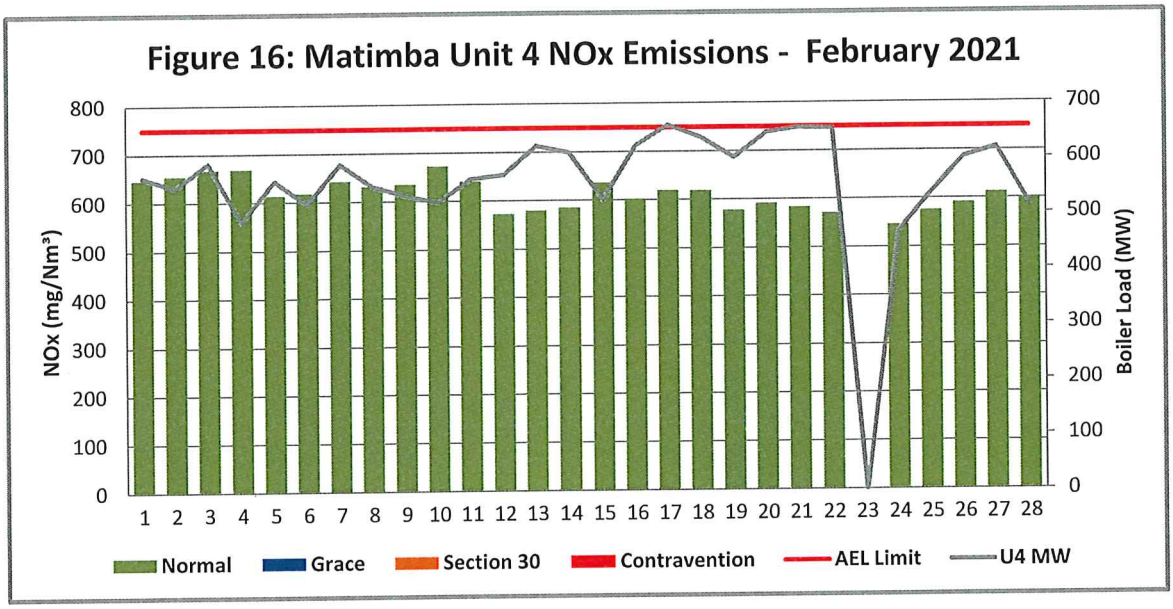

Figure 14: NOx daily average emissions against emission limit for unit 4 for the month of February 2021

Interpretation:

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

Unit 5 NO_x Emissions

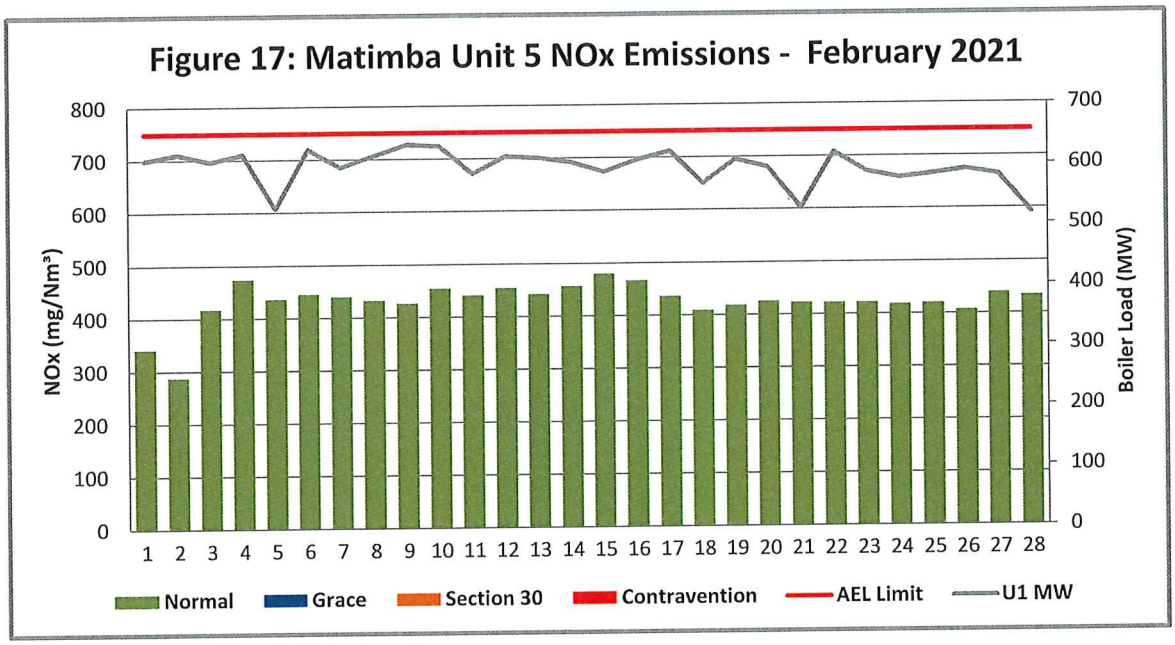

Figure 15: NOx daily average emissions against emission limit for unit 5 for the month of February 2021

Interpretation:

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

Unit 6 NO_x Emissions

Interpretation:

Unit on outage

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:	Friday, 19 March 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:	**February**	
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:	*814,407*	tons/month
Molecular weight of the fuel oil:	166,00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	**Data**	**Unit**
Daily average ambient temperature	26,20	°C
Daily maximum ambient temperature	32,94	°C
Daily minimum ambient temperature	20,71	°C
Daily ambient temperature range	12,24	°C
Daily total insolation factor	5,72	kWh/m²/day
Tank paint colour	*Grey/medium*	NA
Tank paint solar absorbtance	0,68	NA
FINAL OUTPUT:	**Result**	**Unit**
Breathing losses:	0,57	kg/month
Working losses:	0,02	kg/month
TOTAL LOSSES (Total TVOC Emissions for the month):	0,59	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.

2.5 Daily power generated

Table 5: Daily power generated per unit in MWh for the month of February 2021

Date	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
2021/02/01	14698,1	14880,7	14319,7	13655	10385,4	0
2021/02/02	14932,1	14830,3	14397,3	13142	8454,5	0
2021/02/03	14634,7	15079,3	14366,5	14219	14380	0
2021/02/04	11826,8	15224,1	15177,7	11692	15821,5	0
2021/02/05	12758,2	15182,7	14885,1	13369	16100,7	0
2021/02/06	15115,3	15079,2	14726,1	12453	15986,9	0
2021/02/07	14384,4	14706,5	15180,8	14128	14976	0
2021/02/08	14842,4	14394,3	14346,3	13080	15653,1	0
2021/02/09	15283	13865,3	14456	12764	15898,5	0
2021/02/10	15201,3	14283,8	12374,3	12432	15251,9	0
2021/02/11	14106,5	14356,3	14155,7	13414	14848,1	0
2021/02/12	14775,7	14386,3	14857,9	13577	15845,3	0
2021/02/13	14715,9	15231,5	14902,9	14860	15975,4	0
2021/02/14	14546,4	15144,1	14702,6	14622	15825,8	0
2021/02/15	14147,2	15027,1	14662	12504	15362,8	0
2021/02/16	14602,5	14685,4	15053,1	14792	15237,9	0
2021/02/17	14961,5	14778,3	15268,7	15705	15547,9	0
2021/02/18	13673,1	14738	14516,2	15161	11791,5	0
2021/02/19	14613,7	14943,6	14177,9	14328	12921,1	0
2021/02/20	14091,7	14624,5	15630,1	15418	15645,9	0
2021/02/21	5843,27	14848,5	15998,5	15593	16041,8	0
2021/02/22	14875,2	15420,4	16168,6	11129	16150,5	0
2021/02/23	14096,1	15418,5	16138,7	0	16099,7	0
2021/02/24	13855,1	1538,8	16132,3	8619	16148,8	0
2021/02/25	14001,1	12182,7	16202,5	9534	15886,1	0
2021/02/26	14162,4	14233,8	16214,3	14276	16118	0
2021/02/27	13963	15027,1	14258,5	14776	15376,8	0
2021/02/28	12452,9	13760,3	12929,1	12255	12692,2	0

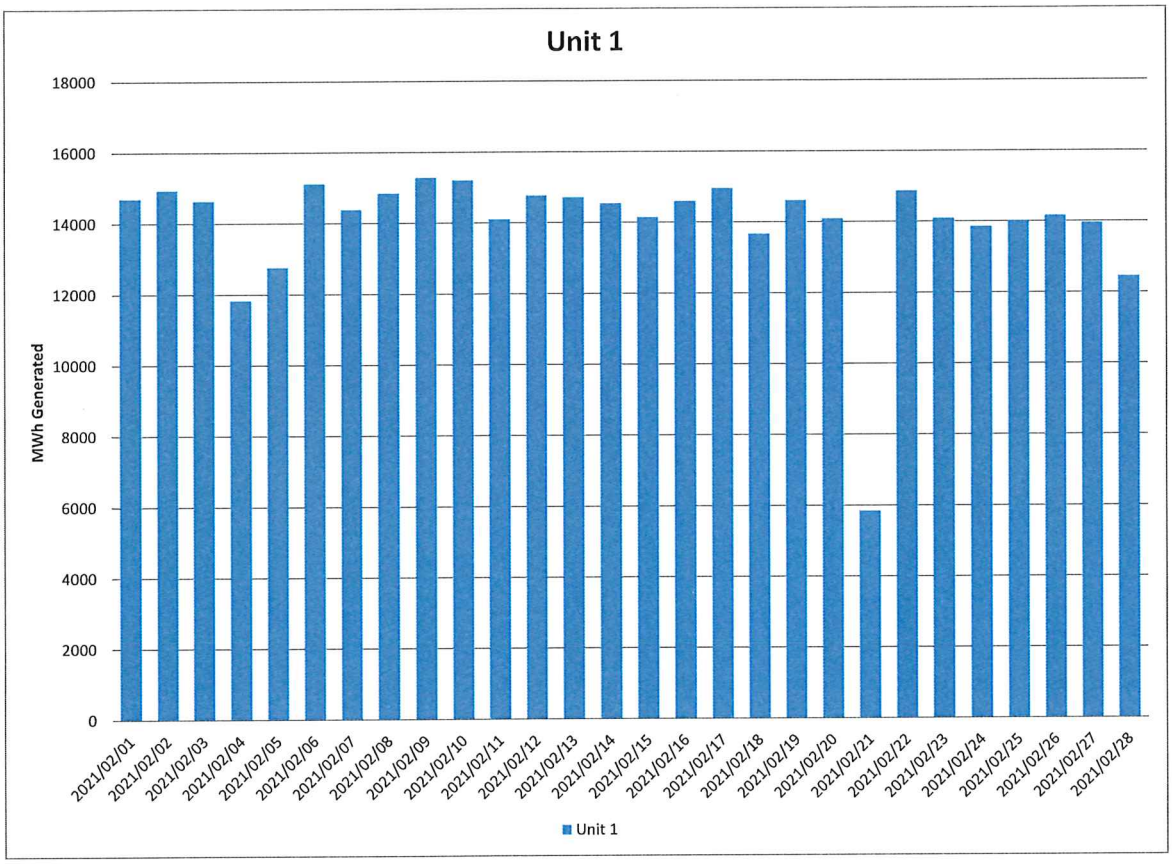

Figure 16: Unit 1 daily generated power in MWh for the month of February 2021

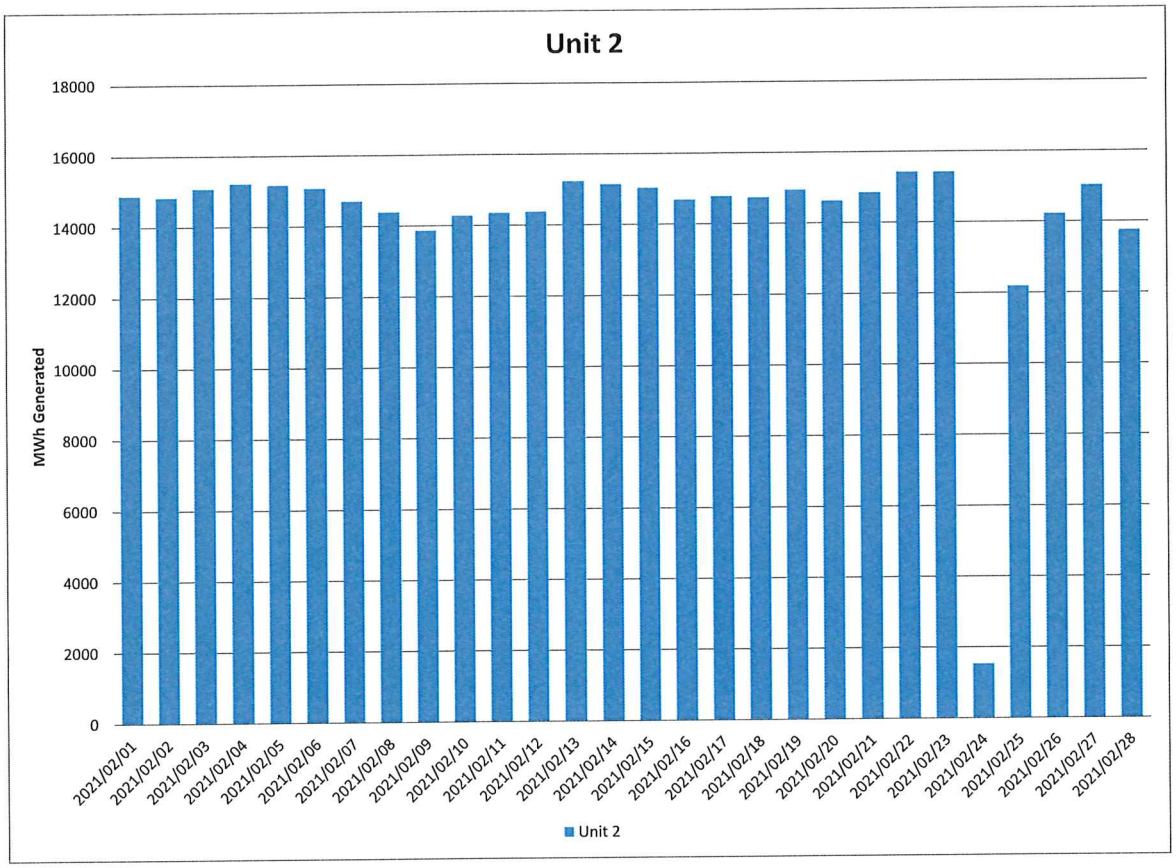

Figure 17: Unit 2 daily generated power in MWh for the month of February 2021

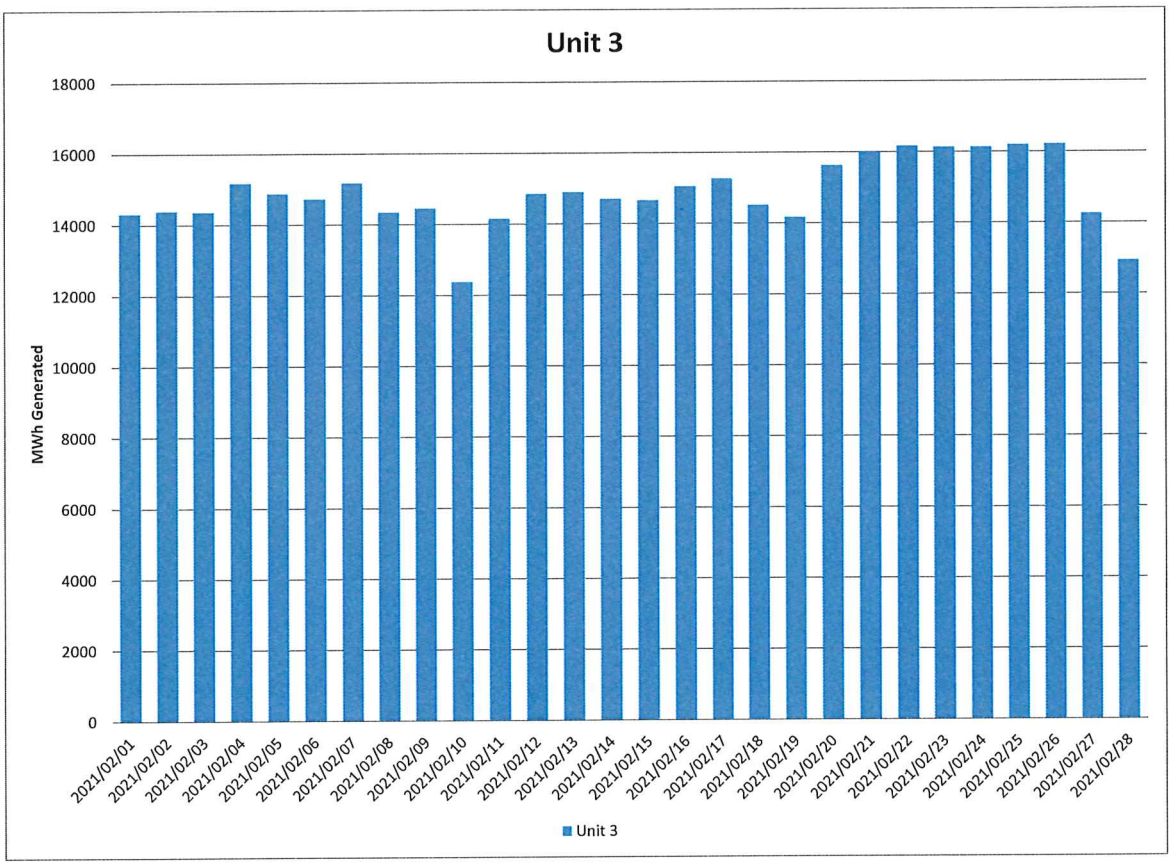

Figure 18: Unit 3 daily generated power in MWh for the month of February 2021

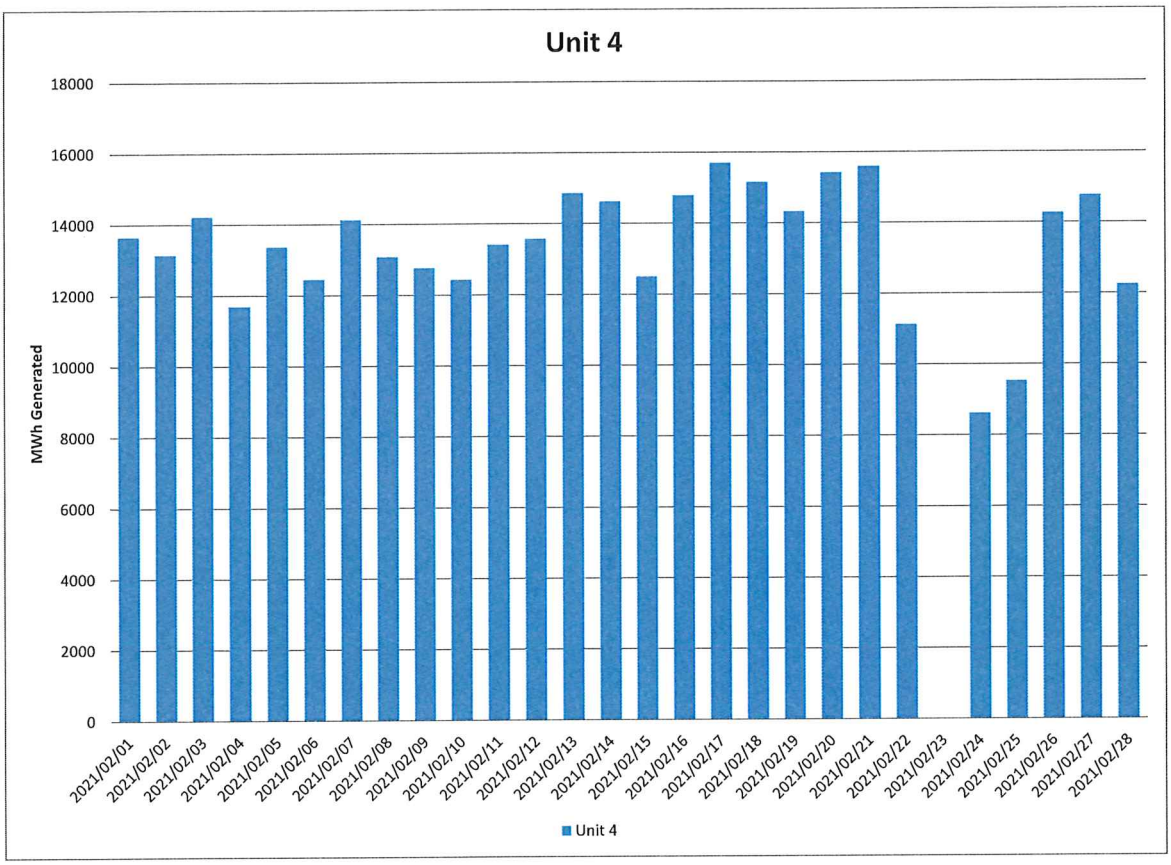

Figure 19: Unit 4 daily generated power in MWh for the month of February 2021

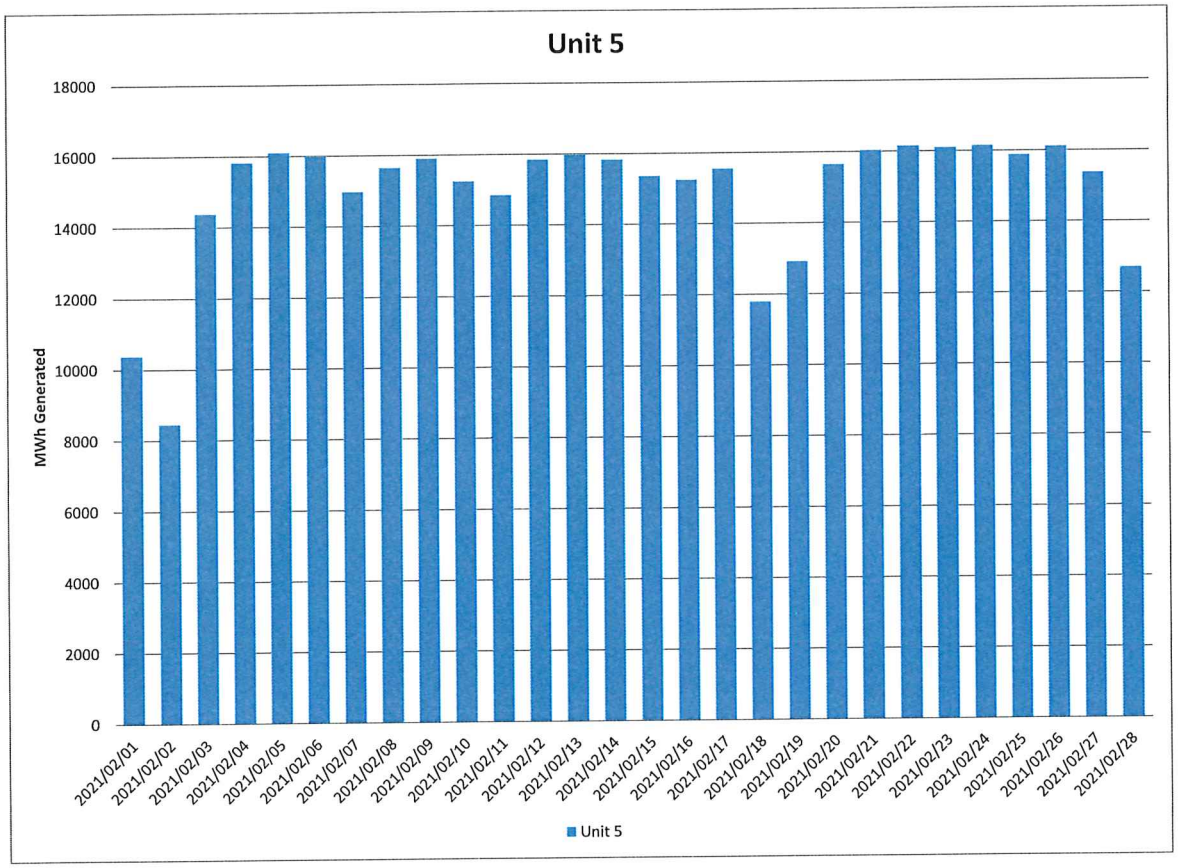

Figure 20: Unit 5 daily generated power in MWh for the month of February 2021

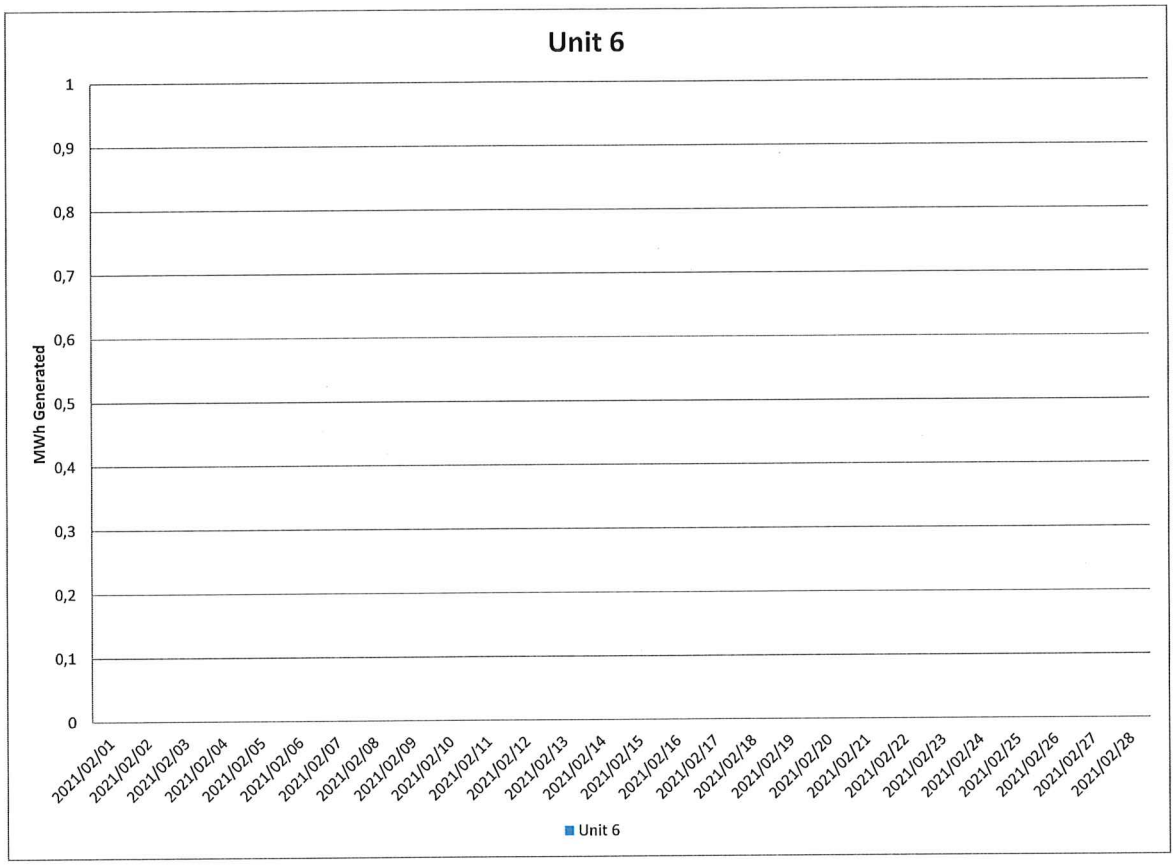

Figure 21: Unit 6 daily generated power in MWh for the month of February 2021

Note: Unit is on outage

2.6 Pollutant Tonnages

Table 6: Pollutant tonnages for the month of February 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO_2 (tons)
Unit 1	29,6	5 259,8	828,3	408 788
Unit 2	40,6	6 446,6	981,6	451 728
Unit 3	48,4	6 828,9	1 139,8	406 134
Unit 4	56,5	5 455,3	1 117,5	330 608
Unit 5	47,6	5 305,6	827,7	372 580
Unit 6	0,0	0,0	0,0	0
SUM	222,6	29 296,2	4 895,0	1 969 837

The emitted pollutant tonnages for February 2021 are provided in table 6. Unit 6 was on outage for the whole of February 2021.

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	%	6,20	6,32	7,66	6,80	7,91	
Moisture	%	5,31	5,24	4,66	3,88	5,69	
Velocity	m/s	29,9	27,6	30,5	25,0	26,8	
Temperature	°C	140,9	130,9	132,3	137,7	128,6	
Pressure	mBar	932,7	933,6	916,0	928,9	930,0	

Table 7 shows the reference values for the emission data provided for the month of February 2021. Unit 6 was on outage for the whole of February 2021.

2.8 Continuous Emission Monitors

2.8.1 Reliability

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

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100,0	100,0	99,7	25,0
Unit 2	100,0	90,0	90,0	90,0
Unit 3	100,0	100,0	100,0	0,0
Unit 4	100,0	100,0	100,0	90,7
Unit 5	100,0	100,0	100,0	93,0
Unit 6	Unit off	Unit off	Unit off	Unit off

Uni1 and 3 CO_2 monitors did not achieve the required 90% reliability. Averaged data was used for unit 1 from the 8th of February until the 28th and average QAL 2 data was used for unit 3 from the 1st until the 28th of February 2021. The monitors were available however, the raw data was replaced due to unreliability of the accuracy of the monitor.

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 has been on outage for the whole month of February 2021

2.8.3 Sampling dates and times

Continuous

2.9 Start-up information

Table 9: Start-up information

Unit	1	
Fires in	21h13	2021-02-04
Synchronization with Grid	23h28	2021-02-04
Emissions below limit	03h49	2021-02-05
Fires in to synchronization	2,25	HOURS
Synchronization to < Emission limit	4,35	HOURS

Unit	1	
Fires in	11h00	2021-02-21
Synchronization with Grid	12h52	2021-02-21
Emissions below limit	15h04	2021-02-21
Fires in to synchronization	1,87	HOURS
Synchronization to < Emission limit	2,2	HOURS

Unit	2	
Fires in	13h59	2021-02-24
Synchronization with Grid	20h14	2021-02-24
Emissions below limit	21h30	2021-02-24
Fires in to synchronization	6,25	HOURS
Synchronization to < Emission limit	1,27	HOURS

Unit	4	
Fires in	00h11	2021-02-24
Synchronization with Grid	05h16	2021-02-24
Emissions below limit	11h02	2021-02-25
Fires in to synchronization	5,08	HOURS
Synchronization to < Emission limit	29,77	HOURS

Unit	4	
Fires in	14h27	2021-02-25
Synchronization with Grid	17h38	2021-02-25
Emissions below limit	19h46	2021-02-25
Fires in to synchronization	3,18	HOURS
Synchronization to < Emission limit	2,13	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	167,28	425,76	531,36	345,36	531,36	0
Emergency Hours declared including hours after stand down	174,28	433,76	540,36	352,36	540,36	0
Days over the Limit during Emergency Generation	0	0	0	2	0	0

Unit 4 particulate emissions exceeded the 50mg/Nm^3 emission limit on the 4th and 25th of February 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 $PM_{2.5}$ daily limit and one exceedance of the PM_{10} daily limit was noted. No other parameters exceeded the set limits during the monitoring period.

Ambient CO and NO_2 concentrations at Marapong monitoring site show influence of emissions from low level sources in the area while ambient SO_2, PM_{10} 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 98,4% and the station availability was 98,2%.

Detailed results can be found in Attachment 1, "Marapong monthly Report_February 2021".

2.14 Electrostatic precipitator and Sulphur plant status

Unit 1

- 0 out of 32 precipitator fields is out of service.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 2

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

Unit 3

- 2 out of 32 precipitator fields is out of service. Repairs will be done during the next opportunity outage.
- No abnormalities on the SO3 plant. Preventative maintenance done during the month.

Unit 4

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

Unit 5

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

Unit 6

- Unit 6 has been on outage for the whole month of February 2021

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

- Attachment 1: Marapong monthly Report_February 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