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Date: 09 January 2024

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MAJUBA POWER STATION'S MONTHLY EMISSIONS REPORT FOR THE MONTH OF DECEMBER 2023

This serves as the monthly report required in terms of Majuba Power Station's Atmospheric Emission License (MPS/0014/2019/F03) under section 7 routine reporting and record keeping. The emissions are for the month of December 2023. Verified emissions of particulates are included. SO₂ and NO_x (as NO₂) emissions are included for all units. Greenhouse gasses are excluded as per the agreement reached between Eskom and the Department of Forestry, Fisheries and the Environmental in the first quarter of 2017/18 financial year's MINTEC and MINMEC management meeting.

Raw Materials and Products

Table 1. Quantity of Raw Materials and Products used/produced for the month of December 2023

| Raw Materials and Products used | Raw Material Type | Unit | Maximum Permitted Consumption/ Rate (Quantity) | Consumption/ Rate in Month of December 2023 |
|---------------------------------|--------------------------|------------|--|---|
| | Coal | Tons/month | 1 800 000 | 1 002 815 |
| | Fuel Oil | Tons/month | 6 000 | 4 473.1 |
| Production Rates | Product/ By-Product Name | Unit | Maximum Production Rate Permitted (Quantity) | Production Rate in Month of December 2023 |
| | Energy | *GWh | *3 058 | 1 602.40 |
| | Ash | Tons/month | Not stated in the license | 298 838.79 |

*Majuba AEL stipulates a maximum production capacity of 4110 MW. This equates to a production rate of 3058 GWh per month when converted, as indicated above. This is to align to the monthly production rates reported.

Abatement Technology

Table 2. Abatement Equipment Control Technology for the month of December 2023

| Associated Unit | Technology Type | Actual Utilisation (%) for the month of December 2023 | *Minimum Control Efficiency (%) |
|-----------------|---------------------|---|---------------------------------|
| Unit 1 | Fabric Filter Plant | 100 | 99.93 |
| Unit 2 | Fabric Filter Plant | 100 | 99.90 |
| Unit 3 | Fabric Filter Plant | 100 | 99.91 |
| Unit 4 | Fabric Filter Plant | 100 | 99.97 |
| Unit 5 | Fabric Filter Plant | 100 | 99.85 |

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| | | | |
|--------|---------------------|-----|-------|
| Unit 6 | Fabric Filter Plant | 100 | 99.87 |
|--------|---------------------|-----|-------|

*Calculated from the assumption of 90% fly ash to 10% bottom ash and percentage ash as measured in coal.

Energy Source Characteristics

Table 3. Energy Source Material Characteristics for the month of December 2023

| Characteristic | Stipulated Limit (Unit) | Monthly Average Content |
|-----------------|-------------------------|-------------------------|
| Sulphur Content | 0.94% | 0.65 |
| Ash Content | 30% | 29.8 |

Emissions Reporting

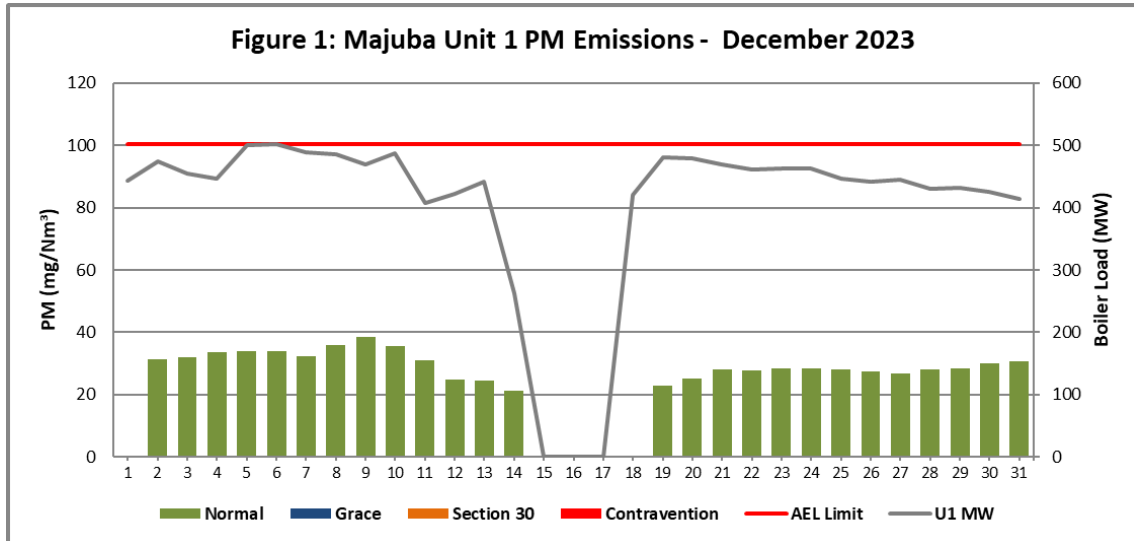


Figure 1. Particulate Matter emissions (daily averages) for the month of December 2023 against emission limit for Unit 1.

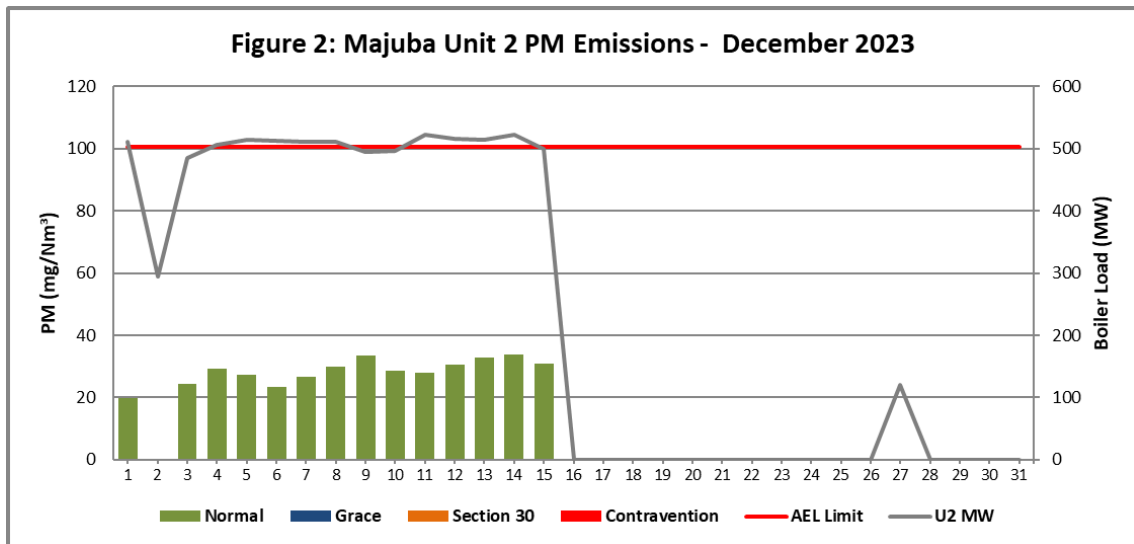


Figure 2. Particulate Matter emissions (daily averages) for the month of December 2023 against emission limit for Unit 2.

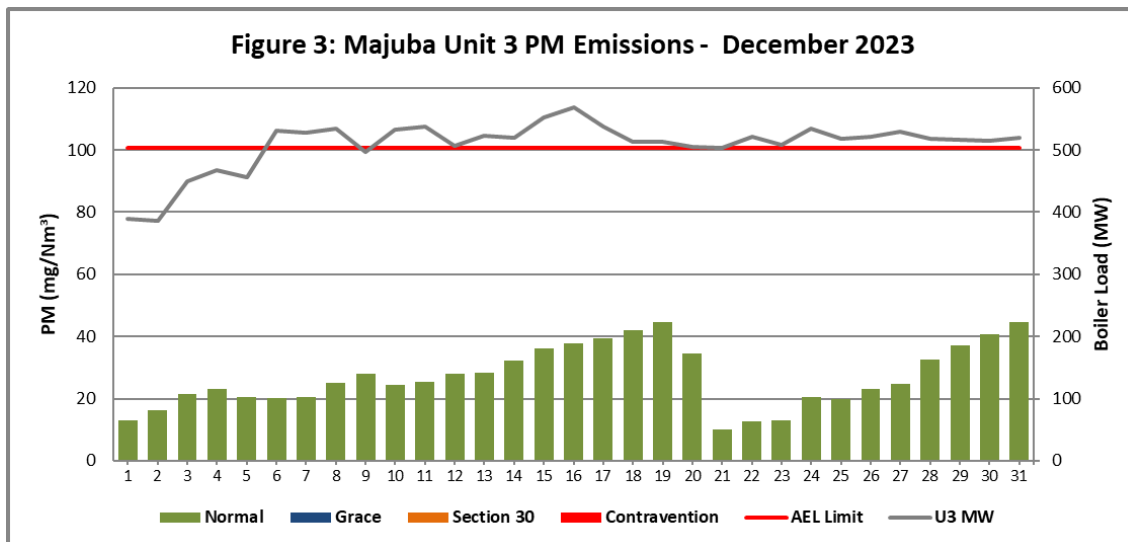


Figure 3. Particulate Matter emissions (daily averages) for the month of December 2023 against emission limit for Unit 3.

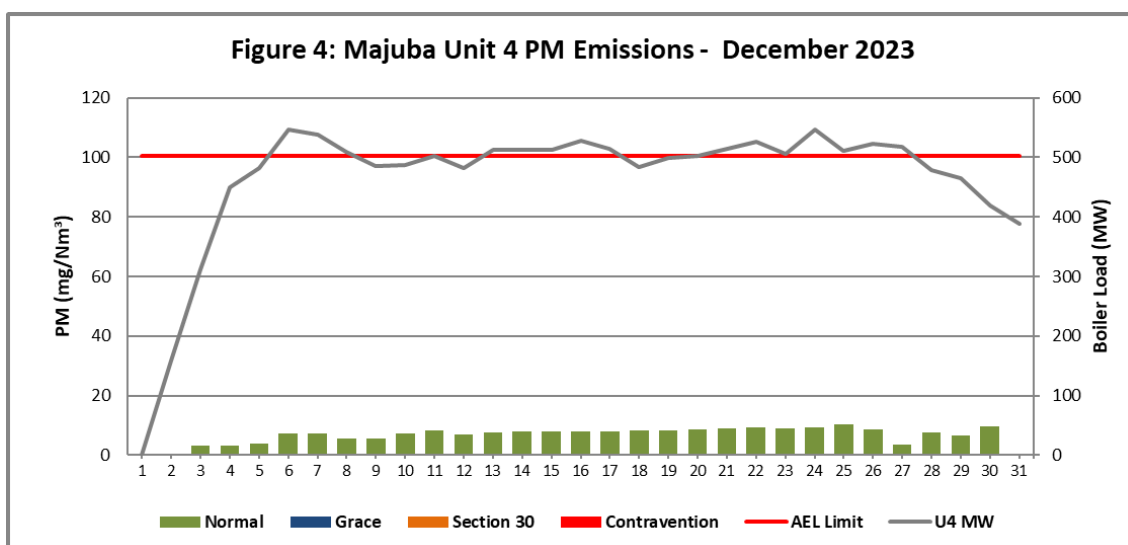


Figure 4. Particulate Matter emissions (daily averages) for the month of December 2023 against emission limit for Unit 4.

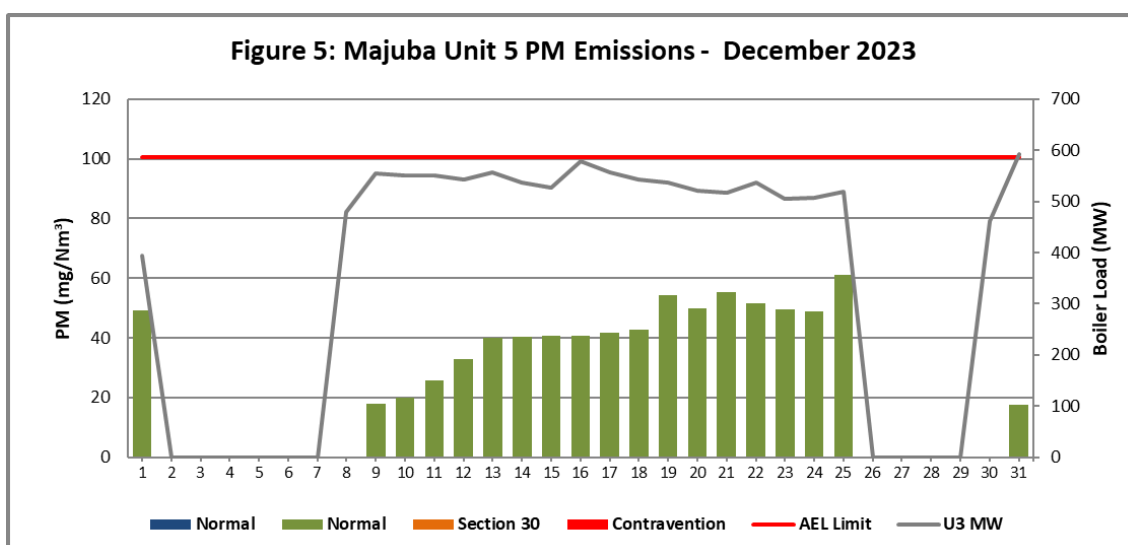


Figure 5. Particulate Matter emissions (daily averages) for the month of December 2023 against emission limit for Unit 5.

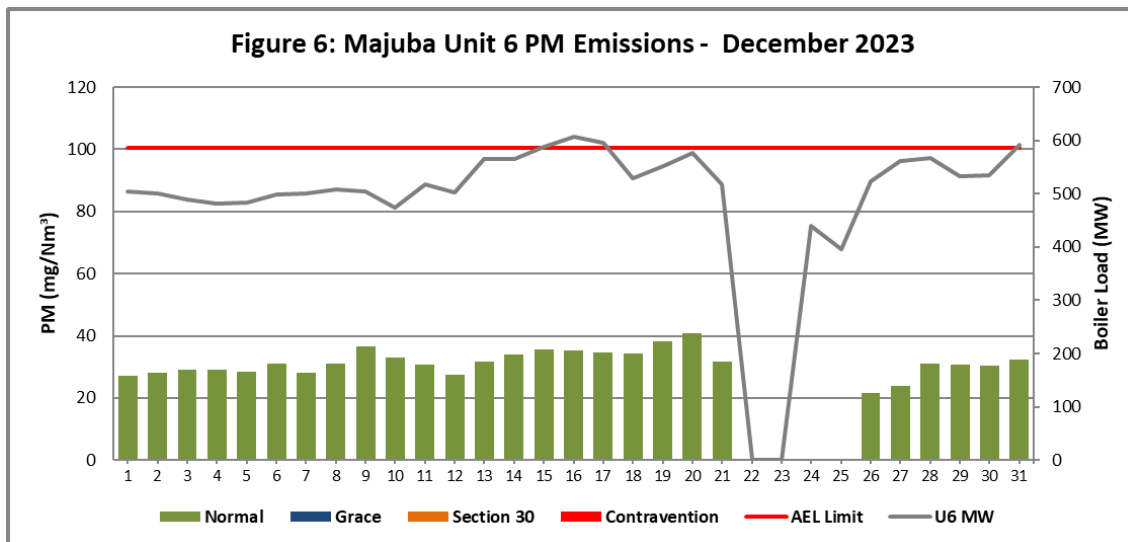


Figure 6. Particulate Matter emissions (daily averages) for the month of December 2023 against emission limit for Unit 6.

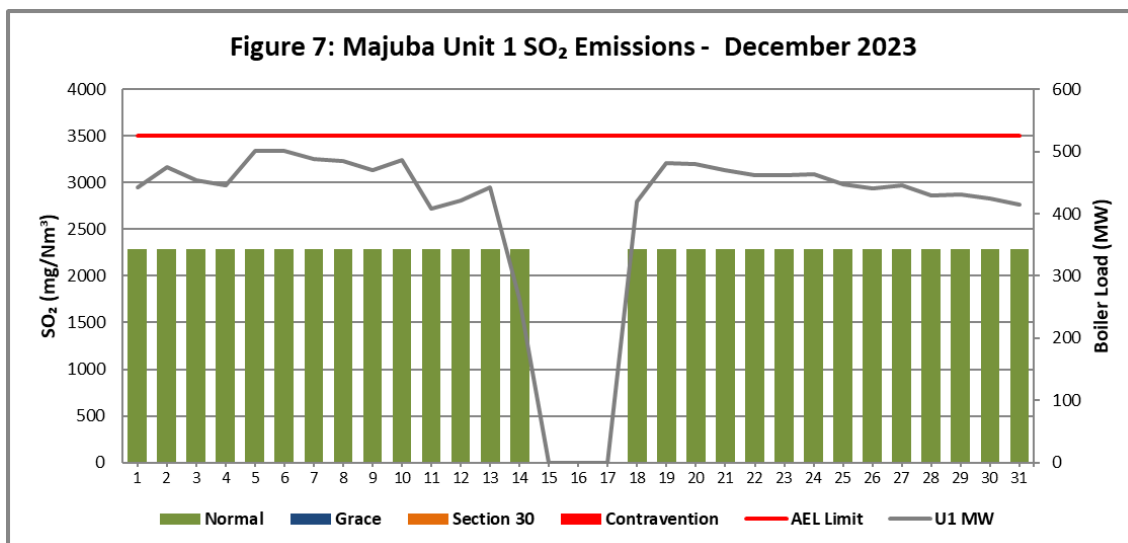


Figure 7. SO₂ emissions (daily averages) for the month of December 2023 against emission limit for Unit 1.

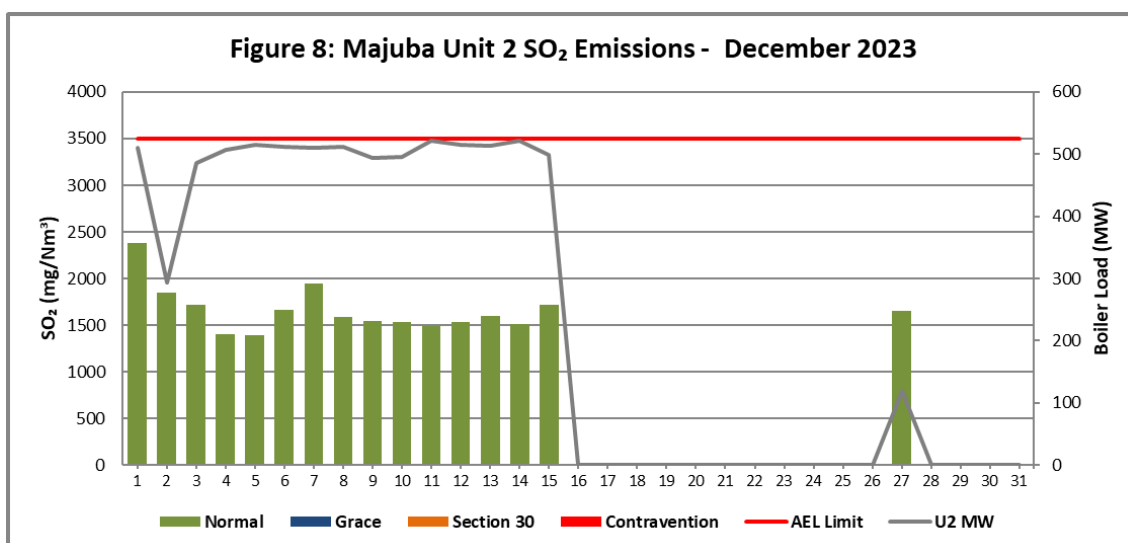


Figure 8. SO₂ emissions (daily averages) for the month of December 2023 against emission limit for Unit 2.

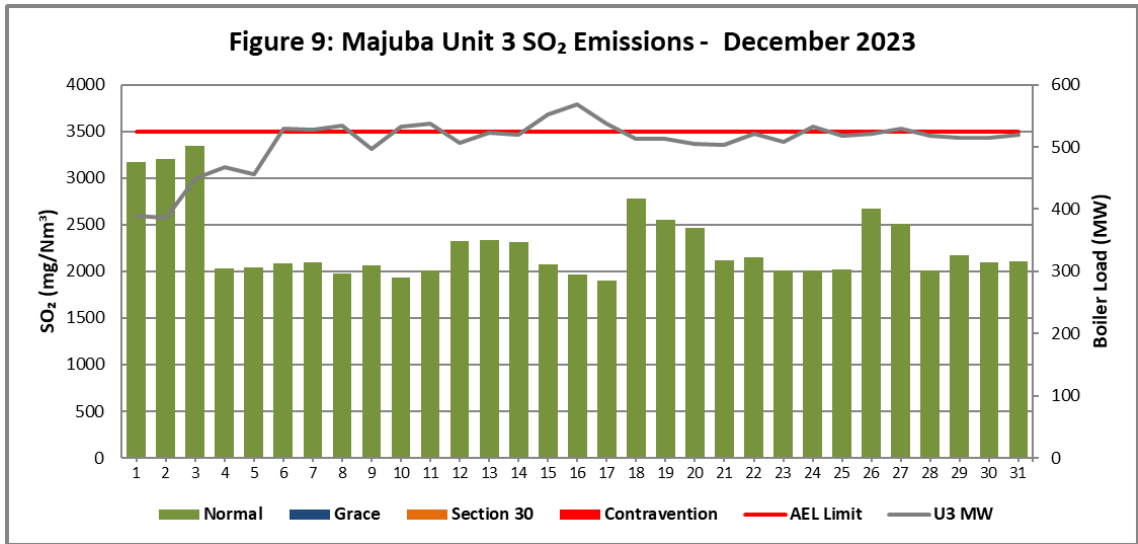


Figure 9. SO₂ emissions (daily averages) for the month of December 2023 against emission limit for Unit 3.

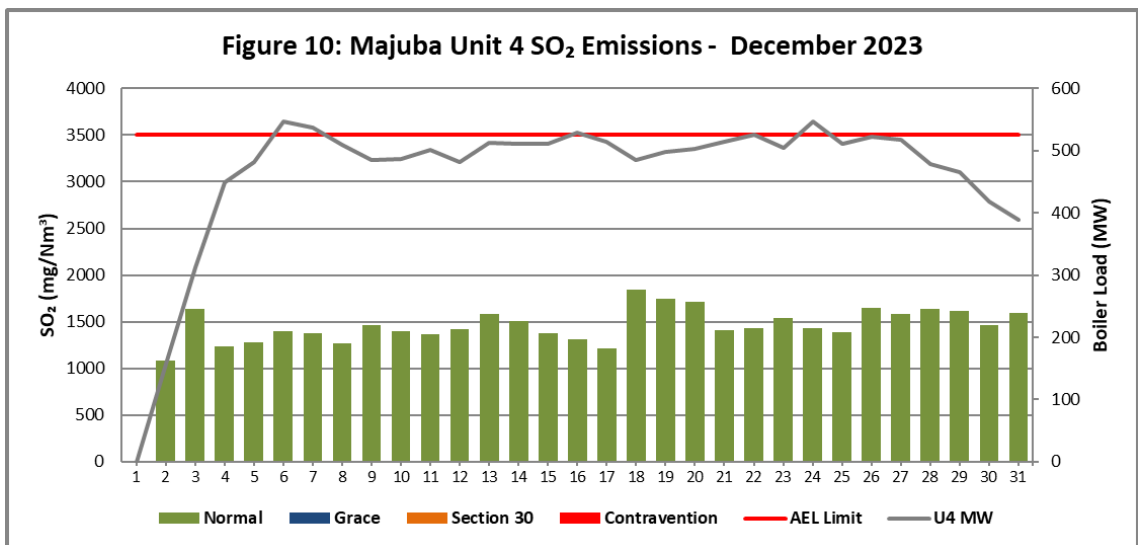


Figure 10. SO₂ emissions (daily averages) for the month of December 2023 against emission limit for Unit 4.

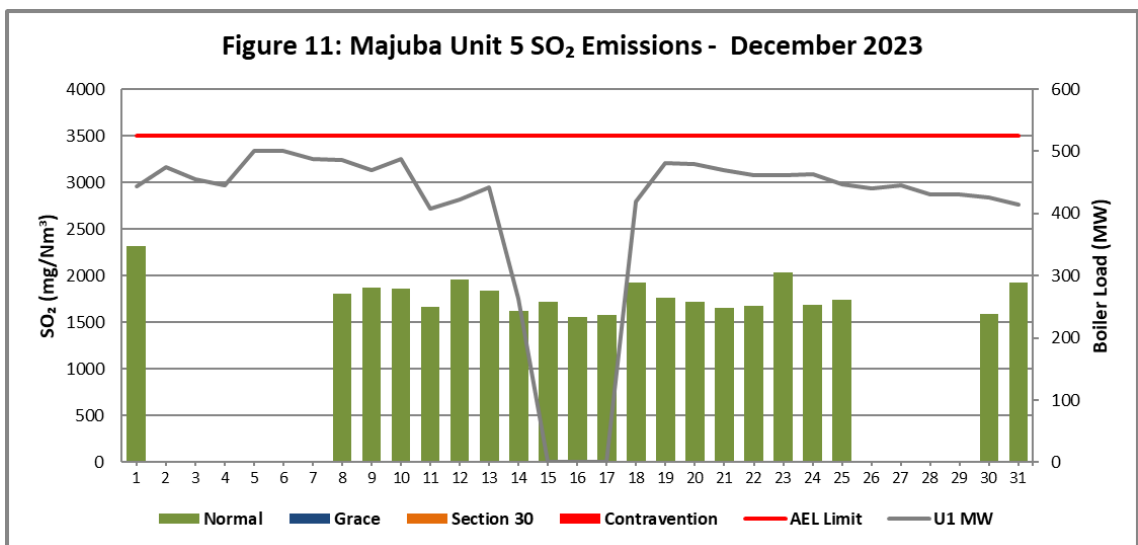


Figure 11. SO₂ emissions (daily averages) for the month of December 2023 against emission limit for Unit 5

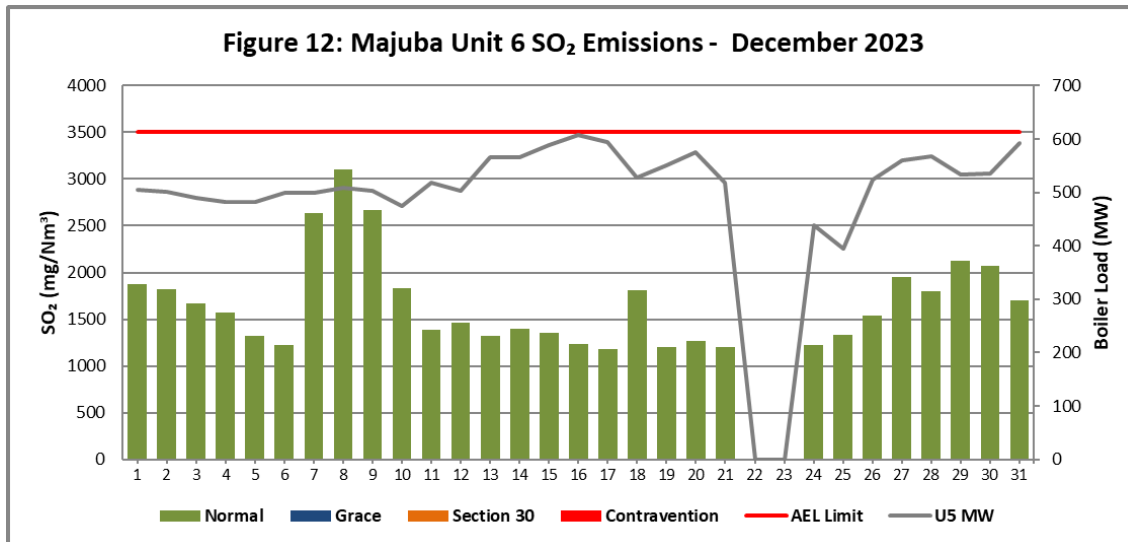


Figure 12. SO₂ emissions (daily averages) for the month of December 2023 against emission limit for Unit 6.

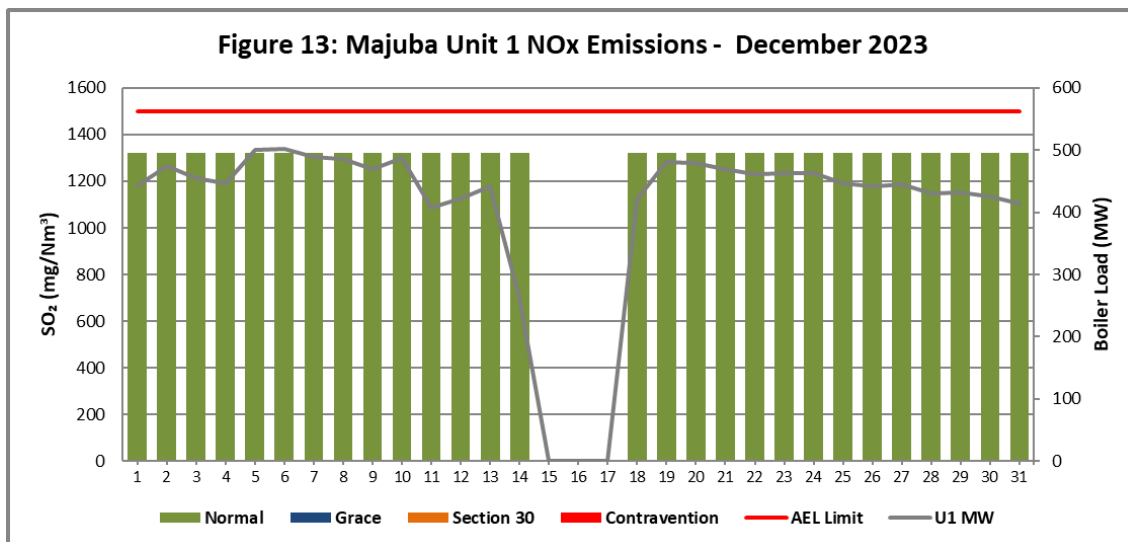


Figure 13. NO_x emissions (daily averages) for the month of December 2023 against emission limit for Unit 1.

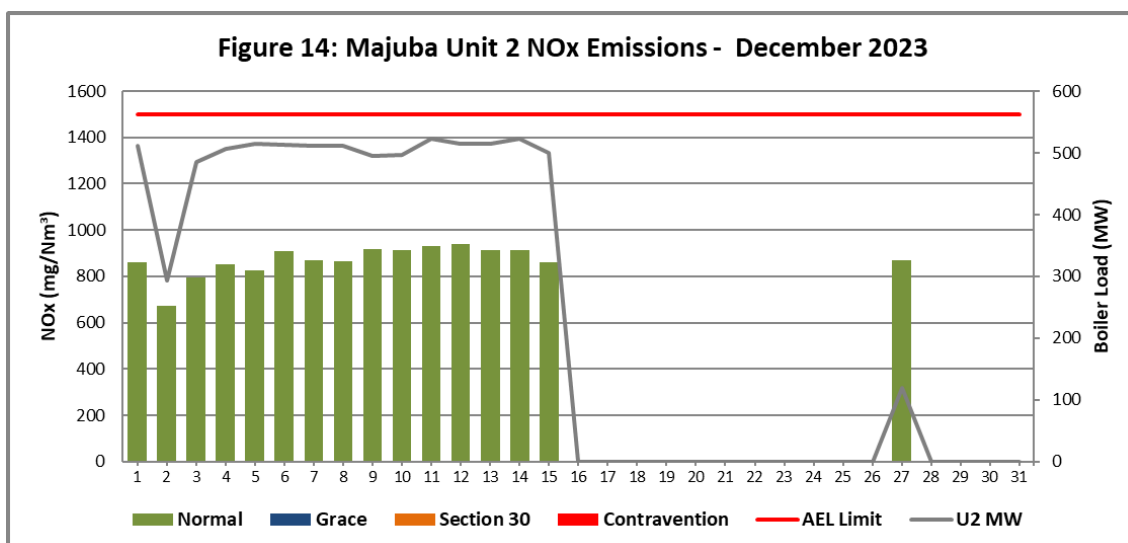


Figure 14. NO_x emissions (daily averages) for the month of December 2023 against emission limit for Unit 2.

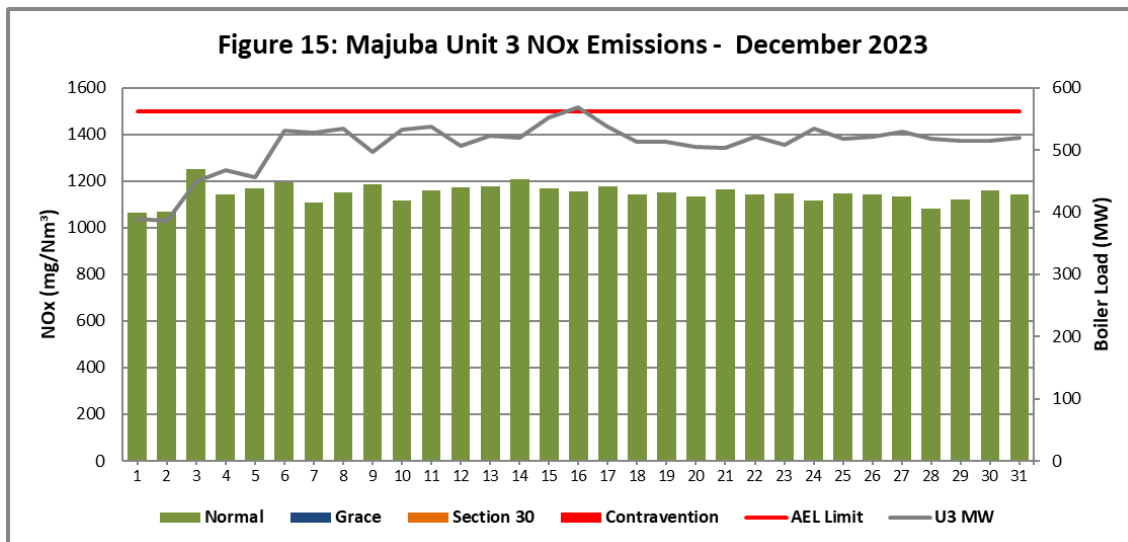


Figure 15. NOx emissions (daily averages) for the month of December 2023 against emission limit for Unit 3.

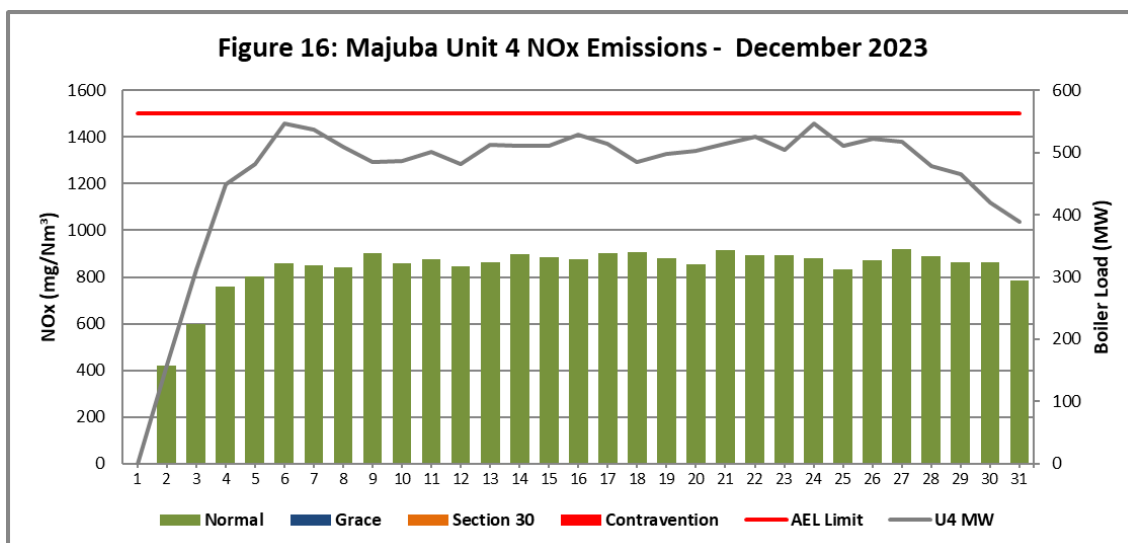


Figure 16. NOx emissions (daily averages) for the month of December 2023 against emission limit for Unit 4

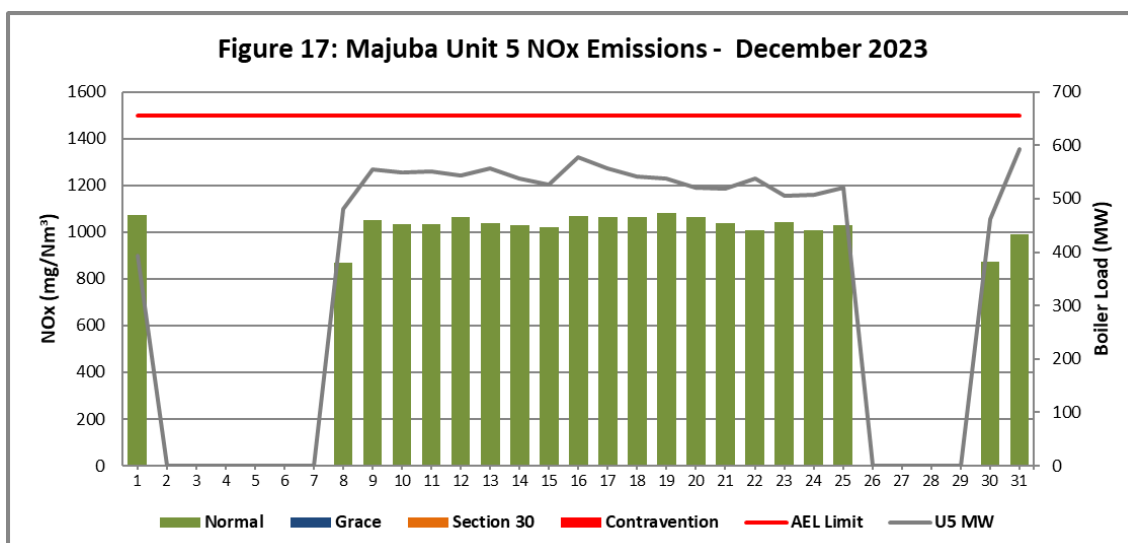


Figure 17. NOx emissions (daily averages) for the month of December 2023 against emission limit for Unit 5

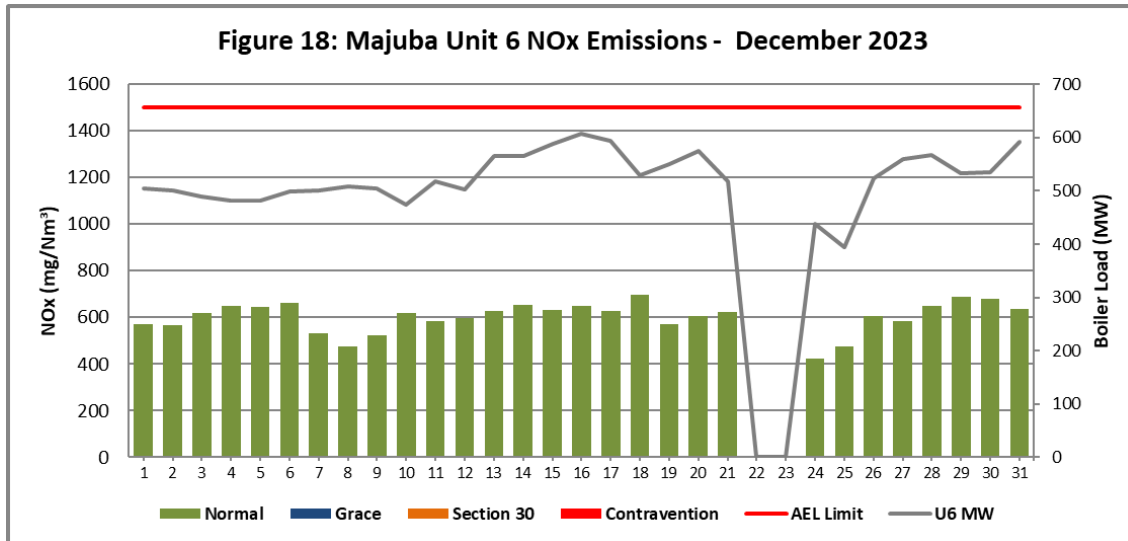


Figure 18. NOx emissions (daily averages) for the month December 2023 against emission limit for Unit 6

Table 4: Monthly tonnages for the month of December 2023

| Unit | PM (tons) | SO ₂ (tons) | NOx (tons) |
|--------|-----------|------------------------|------------|
| Unit 1 | 31.7 | 2 613 | 1 512 |
| Unit 2 | 24.5 | 1 509 | 819 |
| Unit 3 | 55.9 | 4 599 | 2 343 |
| Unit 4 | 17.0 | 3 446 | 2 018 |
| Unit 5 | 53.3 | 2 593 | 1 504 |
| Unit 6 | 66.4 | 3 749 | 1 356 |

Table 5: Average monthly concentrations (mg/Nm³) for the month of December 2023

| Unit | PM (Mg/Nm ³) | SO ₂ (Mg/Nm ³) | NOx (Mg/Nm ³) |
|------|--------------------------|---------------------------------------|---------------------------|
| 1 | 29.6 | 2 282.2 | 1 320.7 |
| 2 | 28.6 | 1 658.5 | 869.7 |
| 3 | 27.1 | 2 274.6 | 1 148.1 |
| 4 | 7.3 | 1 465.6 | 843.1 |
| 5 | 41.1 | 1 786.1 | 1 026.2 |
| 6 | 31.3 | 1 664.4 | 602.2 |

Table 6: Each unit and respective days operating in compliance to the AEL Emission Limits (SO₂, NOx, and PM)

| Associated Unit/Stack | Normal | Grace | Section 30 | Contravention | Total Exceedance |
|-----------------------|--------|-------|------------|---------------|------------------|
| Unit 1 | 26 | 0 | 0 | 0 | 0 |
| Unit 2 | 14 | 0 | 0 | 0 | 0 |
| Unit 3 | 31 | 0 | 0 | 0 | 0 |
| Unit 4 | 28 | 0 | 0 | 0 | 0 |
| Unit 5 | 19 | 0 | 0 | 0 | 0 |
| Unit 6 | 27 | 0 | 0 | 0 | 0 |

Table 7: MONITOR RELIABILITY (%)

| Associated Unit/Stack | PM | SO ₂ | NO | O ₂ |
|-----------------------|-------|-----------------|-------|----------------|
| Unit 1 | 100.0 | 100.0 | 97.8 | 0.0 |
| Unit 2 | 100.0 | 93.3 | 93.3 | 93.3 |
| Unit 3 | 99.7 | 100.0 | 100.0 | 100.0 |
| Unit 4 | 100.0 | 100.0 | 99.7 | 84.2 |
| Unit 5 | 100.0 | 100.0 | 100.0 | 99.8 |
| Unit 6 | 99.5 | 97.9 | 99.1 | 99.6 |

Table 8: CO₂ and O₂ deviations of the Month of December 2023

*Blank spaces indicate that the unit was offline during that period

CO₂ and O₂ Relationship

| CO ₂ (Actual Dry %) | | | | | | Final O ₂ CEMS Data (%) | | | | | | SUM CO ₂ + O ₂ CEMS Data (%) | | | | | |
|--------------------------------|-----|------|-----|------|------|------------------------------------|------|------|------|------|------|--|------|------|------|------|------|
| U1 | U2 | U3 | U4 | U5 | U6 | U1 | U2 | U3 | U4 | U5 | U6 | U1 | U2 | U3 | U4 | U5 | U6 |
| 7.5 | 8.9 | 8.6 | | 9.1 | 11.9 | 12.0 | 10.5 | 12.4 | | 11.7 | 9.2 | 19.6 | 19.4 | 20.9 | | 20.7 | 21.1 |
| 7.5 | 6.6 | 8.3 | 8.9 | | 11.8 | 12.0 | 12.2 | 12.7 | 10.2 | | 9.3 | 19.6 | 18.8 | 21.0 | 19.1 | | 21.1 |
| 7.5 | 8.9 | 8.6 | 9.2 | | 11.8 | 12.0 | 9.6 | 12.2 | 10.2 | | 9.5 | 19.6 | 18.4 | 20.7 | 19.4 | | 21.3 |
| 7.5 | 8.9 | 9.2 | 9.5 | | 11.6 | 12.0 | 10.4 | 11.4 | 10.2 | | 9.5 | 19.6 | 19.3 | 20.6 | 19.7 | | 21.2 |
| 7.5 | 9.2 | 8.7 | 9.2 | | 11.4 | 12.0 | 10.2 | 12.0 | 10.2 | | 9.6 | 19.6 | 19.4 | 20.7 | 19.4 | | 21.0 |
| 7.5 | 8.8 | 9.4 | 9.4 | | 11.7 | 12.0 | 10.7 | 11.1 | 10.0 | | 9.5 | 19.6 | 19.5 | 20.5 | 19.5 | | 21.2 |
| 7.5 | 8.7 | 9.3 | 9.6 | | 11.5 | 12.0 | 10.7 | 11.3 | 9.8 | | 9.7 | 19.6 | 19.4 | 20.6 | 19.4 | | 21.2 |
| 7.5 | 8.7 | 9.4 | 9.5 | 9.5 | 11.7 | 12.0 | 10.7 | 11.3 | 9.9 | 10.4 | 9.5 | 19.6 | 19.4 | 20.7 | 19.4 | 19.9 | 21.1 |
| 7.5 | 8.5 | 9.0 | 9.4 | 10.4 | 11.5 | 12.0 | 11.0 | 11.7 | 10.4 | 10.1 | 9.5 | 19.6 | 19.5 | 20.8 | 19.9 | 20.5 | 21.0 |
| 7.5 | 8.6 | 9.5 | 9.3 | 10.6 | 11.0 | 12.0 | 11.0 | 11.1 | 10.4 | 9.9 | 10.0 | 19.6 | 19.5 | 20.5 | 19.7 | 20.5 | 21.0 |
| 7.5 | 8.8 | 9.4 | 9.3 | 10.5 | 11.9 | 12.0 | 10.7 | 11.3 | 10.6 | 10.0 | 9.2 | 19.6 | 19.5 | 20.7 | 19.9 | 20.5 | 21.1 |
| 7.5 | 8.6 | 8.9 | 9.4 | 10.2 | 11.1 | 12.0 | 10.9 | 11.9 | 10.6 | 10.4 | 10.0 | 19.6 | 19.5 | 20.8 | 20.0 | 20.6 | 21.1 |
| 7.5 | 8.7 | 9.1 | 9.4 | 10.5 | 12.0 | 12.0 | 10.6 | 11.5 | 10.2 | 10.1 | 9.2 | 19.6 | 19.4 | 20.6 | 19.5 | 20.6 | 21.2 |
| 7.5 | 8.9 | 9.1 | 9.5 | 10.4 | 12.2 | 12.0 | 10.5 | 11.5 | 9.7 | 10.2 | 9.2 | 19.6 | 19.4 | 20.7 | 19.2 | 20.7 | 21.4 |
| | 9.0 | 9.6 | 9.4 | 10.4 | 12.4 | | 10.5 | 10.8 | 9.7 | 10.3 | 9.0 | | 19.5 | 20.4 | 19.1 | 20.6 | 21.3 |
| | | 10.0 | 9.4 | 10.8 | 12.8 | | | 10.4 | 9.5 | 9.9 | 8.6 | | | 20.4 | 18.8 | 20.7 | 21.3 |
| | | 9.6 | 9.4 | 10.6 | 12.8 | | | 10.9 | 9.7 | 10.1 | 8.6 | | | 20.6 | 19.1 | 20.8 | 21.3 |
| 7.5 | | 9.2 | 9.4 | 10.4 | 12.0 | 12.0 | | 11.6 | 10.4 | 10.5 | 9.3 | 19.6 | | 20.8 | 19.8 | 20.9 | 21.3 |
| 7.5 | | 9.1 | 9.4 | 10.3 | 12.1 | 12.0 | | 11.5 | 10.5 | 10.6 | 9.0 | 19.6 | | 20.7 | 19.9 | 20.9 | 21.1 |
| 7.5 | | 9.1 | 9.3 | 10.4 | 12.4 | 12.0 | | 11.7 | 10.5 | 10.5 | 8.7 | 19.6 | | 20.7 | 19.8 | 20.9 | 21.1 |
| 7.5 | | 9.0 | 9.3 | 10.5 | 11.6 | 12.0 | | 11.7 | 9.9 | 10.3 | 9.5 | 19.6 | | 20.7 | 19.2 | 20.8 | 21.1 |
| 7.5 | | 9.2 | 9.2 | 10.9 | | 12.0 | | 11.5 | 9.7 | 9.7 | | 19.6 | | 20.7 | 18.9 | 20.7 | |
| 7.5 | | 9.3 | 9.2 | 10.4 | | 12.0 | | 11.4 | 10.1 | 10.4 | | 19.6 | | 20.7 | 19.3 | 20.8 | |
| 7.5 | | 9.6 | 9.2 | 10.6 | 10.6 | 12.0 | | 11.1 | 9.4 | 10.1 | 10.5 | 19.6 | | 20.7 | 18.6 | 20.7 | 21.1 |
| 7.5 | | 9.4 | 9.1 | 10.7 | 9.8 | 12.0 | | 11.2 | 9.6 | 10.0 | 11.3 | 19.6 | | 20.6 | 18.7 | 20.7 | 21.1 |
| 7.5 | | 9.1 | 9.1 | | 11.7 | 12.0 | | 11.6 | 10.0 | | 9.8 | 19.6 | | 20.7 | 19.1 | | 21.4 |
| 7.5 | 8.6 | 9.3 | 9.0 | | 12.3 | 12.0 | 10.7 | 11.3 | 10.0 | | 9.2 | 19.6 | 19.3 | 20.6 | 19.0 | | 21.5 |
| 7.5 | | 9.4 | 9.2 | | 12.1 | 12.0 | | 11.2 | 10.7 | | 9.3 | 19.6 | | 20.5 | 19.9 | | 21.4 |
| 7.5 | | 9.3 | 9.1 | | 11.7 | 12.0 | | 11.2 | 10.8 | | 9.8 | 19.6 | | 20.5 | 19.9 | | 21.5 |
| 7.5 | | 9.6 | 9.0 | 9.3 | 11.8 | 12.0 | | 10.9 | 11.5 | 10.6 | 9.6 | 19.6 | | 20.4 | 20.5 | 19.9 | 21.4 |
| 7.5 | | 9.8 | 9.2 | 10.9 | 12.4 | 12.0 | | 10.6 | 11.5 | 9.4 | 9.0 | 19.6 | | 20.4 | 20.7 | 20.4 | 21.4 |

Calculation: CO₂% + O₂% = 19.5-21.5%

Emergency Generation

Table 9: Emergency Generation for the month of December 2023

| | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 |
|---|--------|--------|--------|--------|--------|--------|
| Emergency Generation hours declared by national Control | 0 | 0 | 0 | 0 | 0 | 0 |
| Emergency Hours declared including hours after stand down | 0 | 0 | 0 | 0 | 0 | 0 |
| Hours over the Limit during Emergency Generation | 0 | 0 | 0 | 0 | 0 | 0 |

Comments on the performance and availability of each unit

UNIT 1

The unit base loaded for most of the days during the month and off for three days. Twenty fabric filter bags were replaced during the month.

UNIT 2

The unit base loaded for 15 days and was shut down for an Outage. Forty fabric filter bags were replaced during the month.

UNIT 3

The unit base loaded for all of the days during the month. Six fabric filter bags were replaced during the month.

UNIT 4

The unit base loaded for all of the days during the month. Seventeen fabric filter bags were replaced during the month.

UNIT 5

The unit base loaded for most of the days during the month and off for ten days. Fourteen fabric filter bags were replaced during the month.

UNIT 6

The unit base loaded for most of the days during the month and off for two days. Ten fabric filter bags were replaced during the month.

Complaints Register

Table 10: Complaints for the month of December 2023

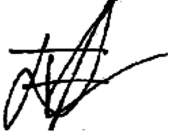
| Source Code/ Name | Root Cause Analysis | Calculation of Impacts/ emissions associated with the incident | Dispersion modelling of pollutants where applicable | Measures implemented to prevent reoccurrence | Date by which measure will be implemented |
|-------------------|--|--|---|--|---|
| | No complaints were received during the month of December 2023. | | | | |

General

The investigations for the exceedances reported in March has been completed and the investigation report is attached to this report. The faulty O2 monitor at Unit 4 reported in the previous month has been repaired. However, the Unit 1 CO₂ and H₂O monitor, and Unit 6 stack pressure monitor has since become faulty. The Original Equipment Manufacturer (OEM) has been called to site and they will be repairing the faulty monitors.

Yours sincerely

Report compiled by:



Faith Kagoda
ENVIRONMENTAL MANAGER: (MAJUBA)

Date 09/01/2024

Report verified by:



Lindani Madonsela
BOILER ENGINEERING MANAGER: (MAJUBA)

Date 09/01/2024

Report approved by:



Johan Swanepoel
ENGINEERING MANAGER: (MAJUBA)

2024/01/09
Date