Eskom

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MAJUBA POWER STATION'S MONTHLY EMISSIONS REPORT FOR THE MONTH OF DECEMBER 2022

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 2022. Verified emissions of particulates are included. SO_2 and NO_x (as NO_2) emissions are included for all units. Greenhouse gasses are excluded as per the agreement reached between Eskom and the Department of Environmental, Forestry and Fisheries 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 2022

Raw Materials and Products used	Raw Material Type	Unit	Maximum Permitted Consumption/ Rate (Quantity)	Consumption/ Rate in Month of December 2022
	Coal	Tons/month	1 800 000	570 561.9
	Fuel Oil	Tons/month	6 000	11 183.4
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity - MW)**	**Production Rate in Month of December 2022**
	Energy	GWh	4 110	923.41
	Ash	Tons/month	Not stated in the license	176 931.25

Abatement Technology

Table 2. Abatement Equipment Control Technology for the month of December 2022

Associated Unit	Technology Type	Actual Utilisation (%) for the month of December 2022	*Minimum Control Efficiency (%)
Unit 1	Fabric Filter Plant	100	99.97
Unit 2	Fabric Filter Plant	100	99.90
Unit 3	Fabric Filter Plant	0	0.00
Unit 4	Fabric Filter Plant	100	99.93
Unit 5	Fabric Filter Plant	0	0.00
Unit 6	Fabric Filter Plant	100	99.94

*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 2022

Characteristic	Stipulated Range (Unit)	Monthly Average Content
Sulphur Content	*0.6 to >0.94%*	*0.62*
Ash Content	*28 to >30%*	*31.01*

Emissions Reporting

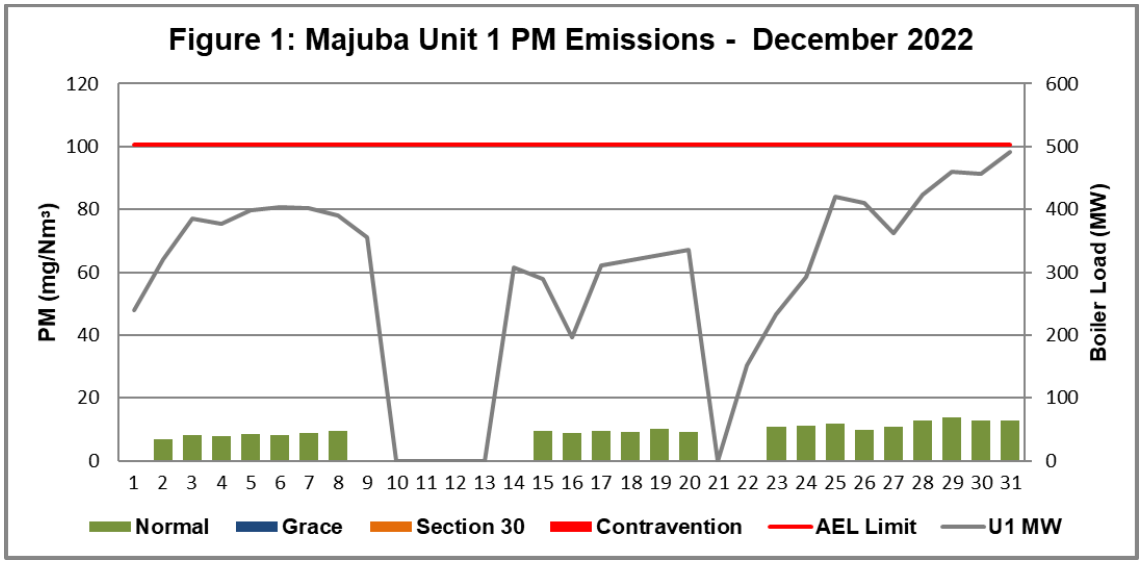


Figure 1. Particulate Matter emissions (daily averages) for the month of December 2022 against emission limit for Unit 1.

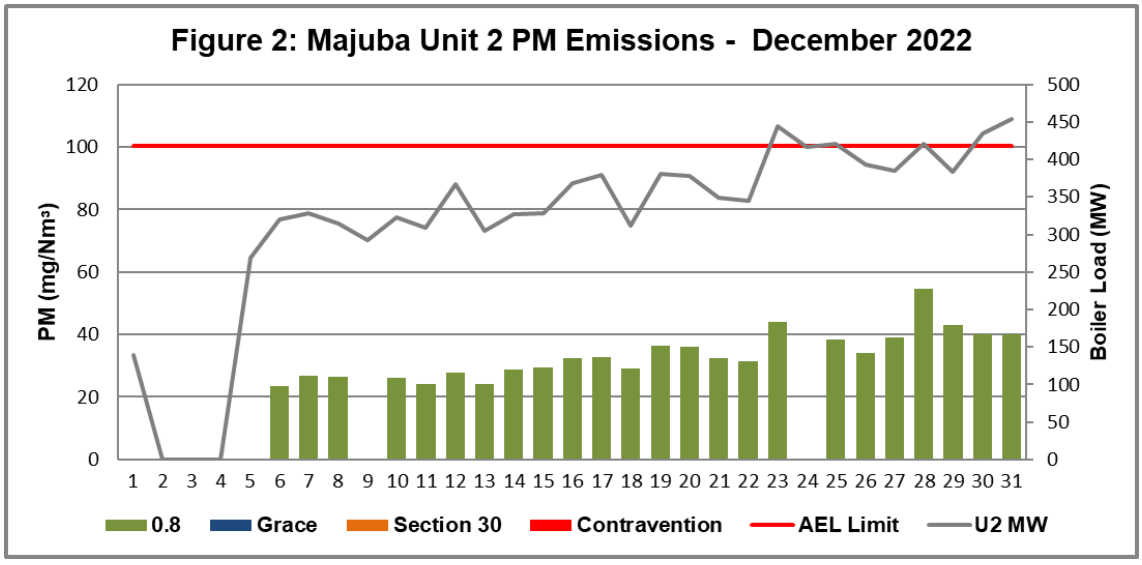


Figure 2. Particulate Matter emissions (daily averages) for the month of December 2022 against emission limit for Unit 2.

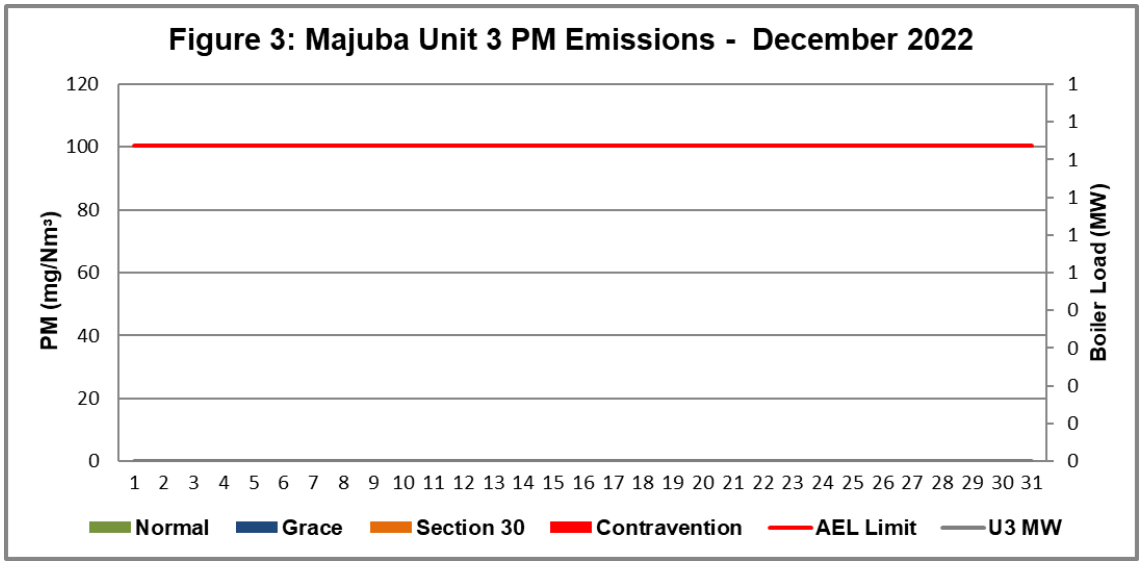


Figure 3. Particulate Matter emissions (daily averages) for the month of December 2022 against emission limit for Unit 3.

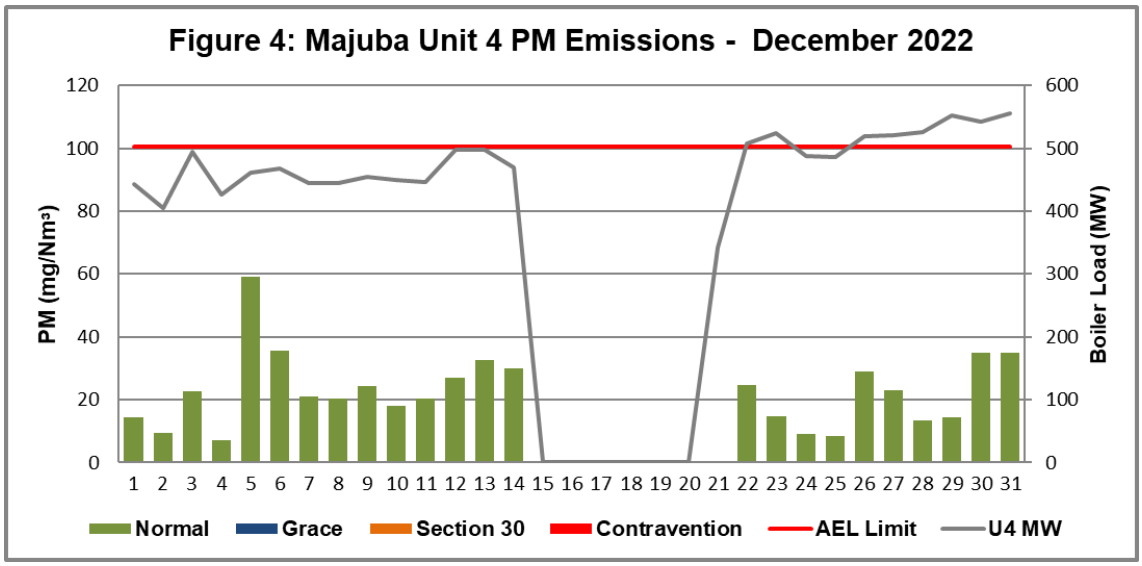


Figure 4. Particulate Matter emissions (daily averages) for the month of December 2022 against emission limit for Unit 4.

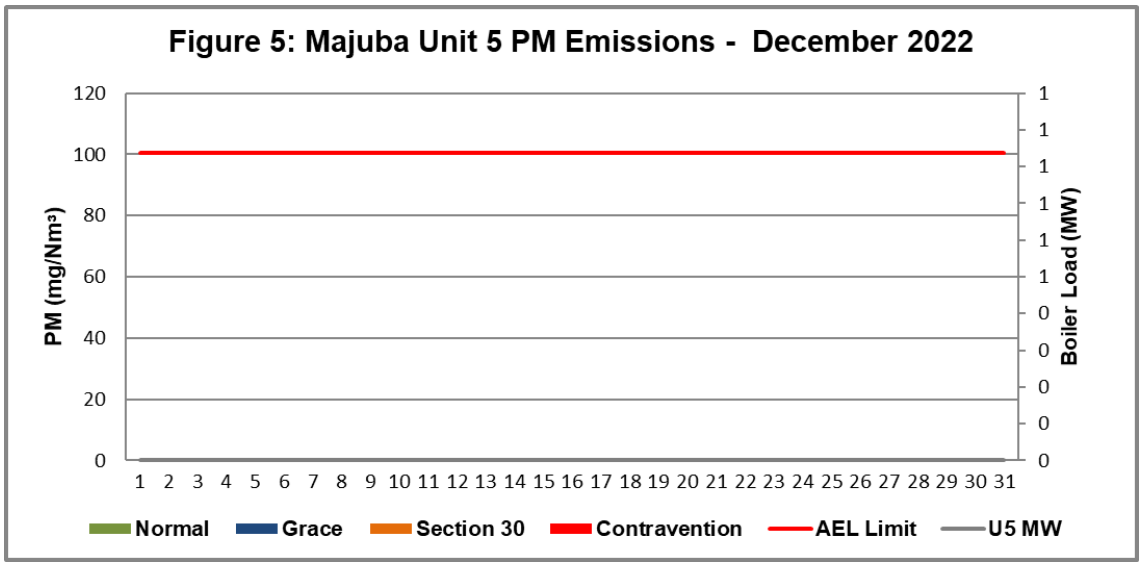


Figure 5. Particulate Matter emissions (daily averages) for the month of December 2022 against emission limit for Unit 5.

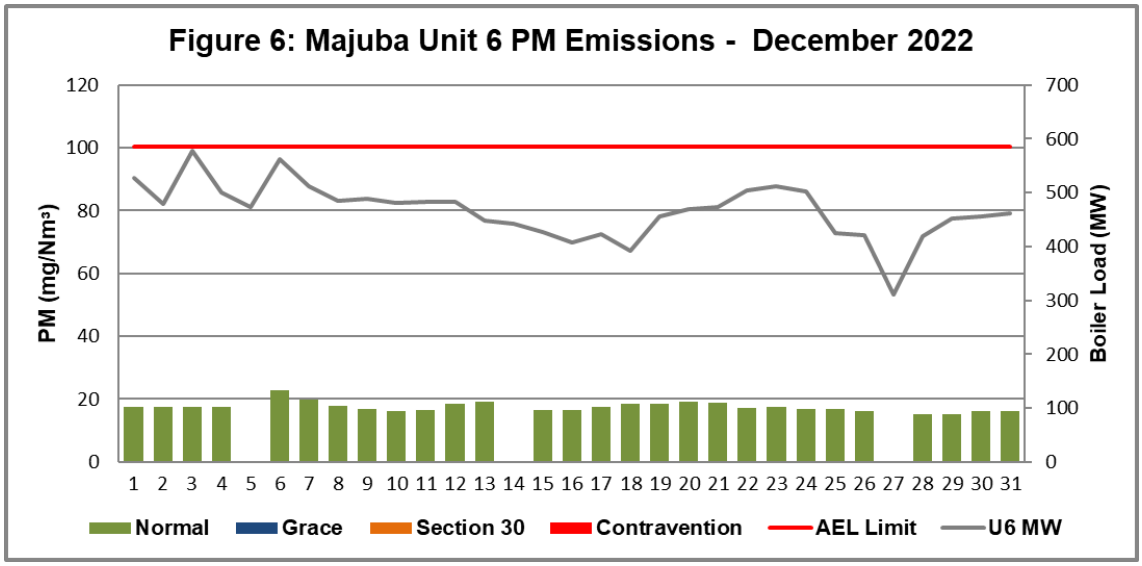


Figure 6. Particulate Matter emissions (daily averages) for the month of December 2022 against emission limit for Unit 6.

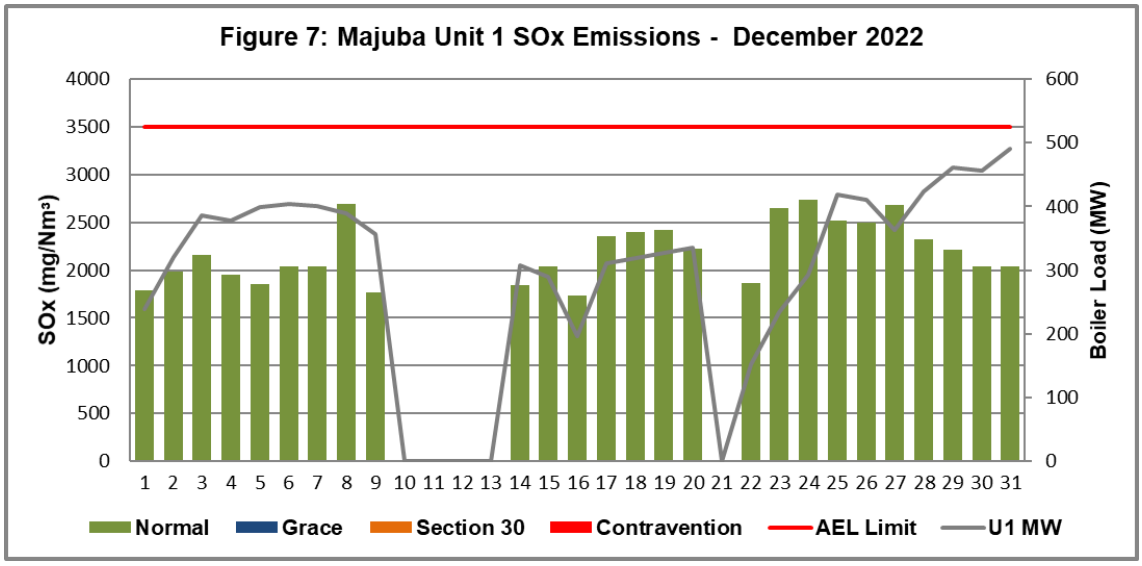


Figure 7. Sox emissions (daily averages) for the month of December 2022 against emission limit for Unit 1.

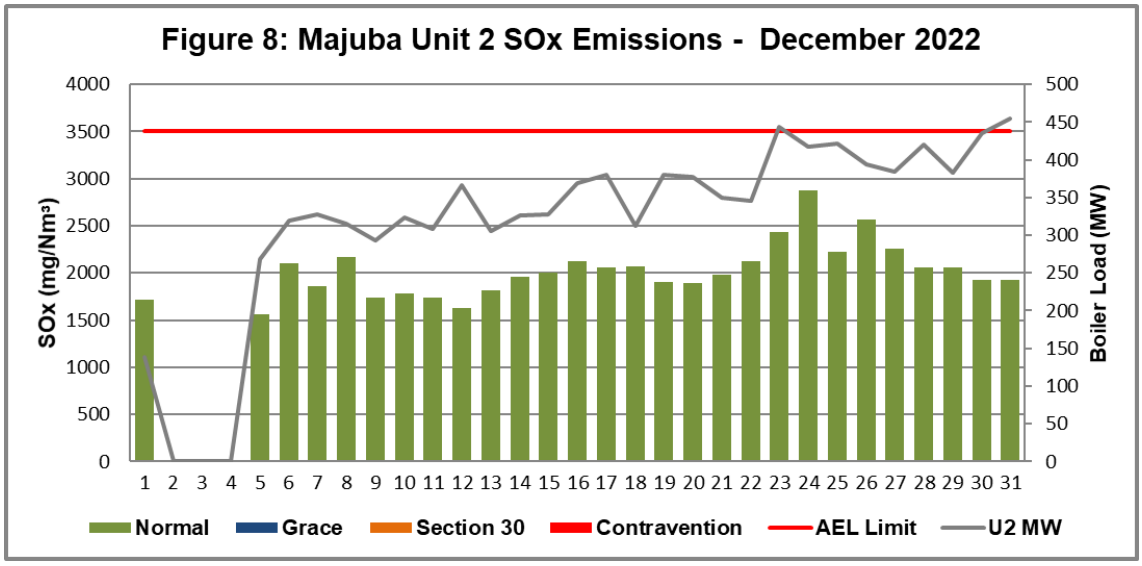


Figure 8. Sox emissions (daily averages) for the month of December 2022 against emission limit for Unit 2.

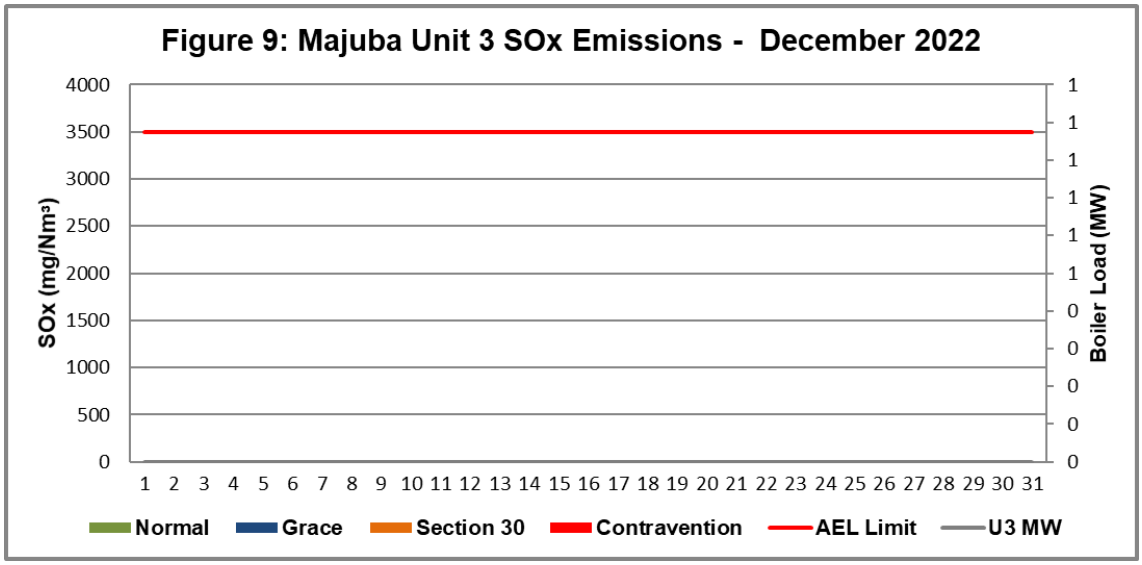


Figure 9. Sox emissions (daily averages) for the month of December 2022 against emission limit for Unit 3.

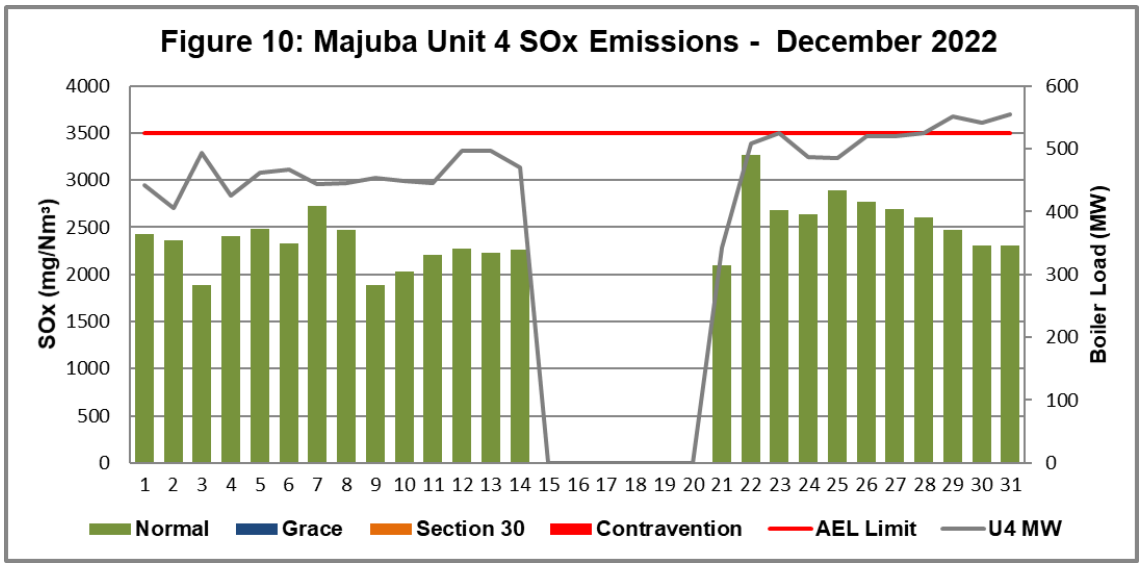


Figure 10. Sox emissions (daily averages) for the month of December 2022 against emission limit for Unit 4.

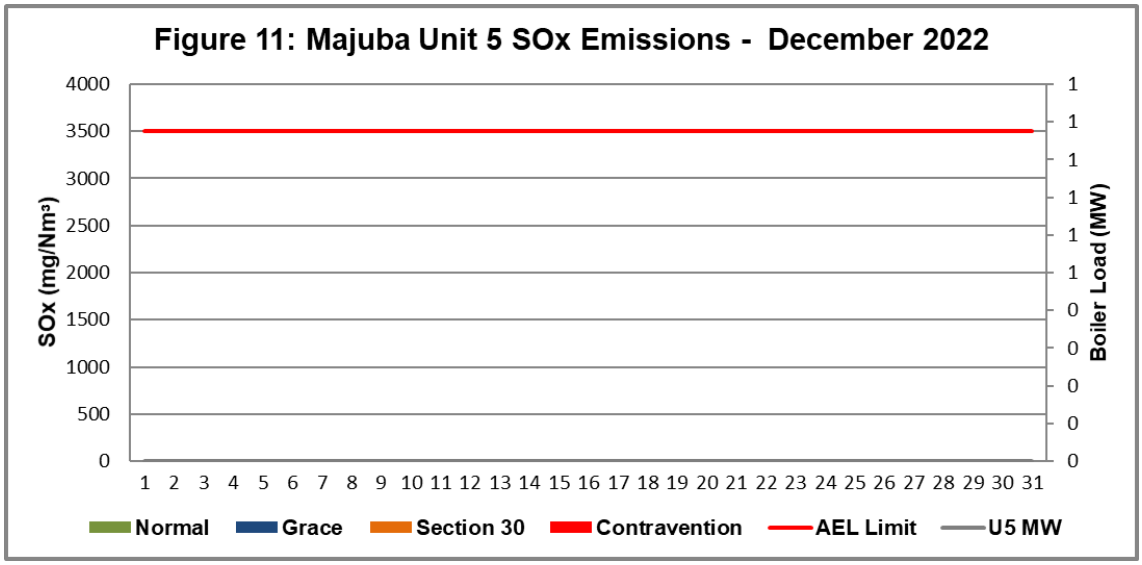


Figure 11. Sox emissions (daily averages) for the month of December 2022 against emission limit for Unit 5.

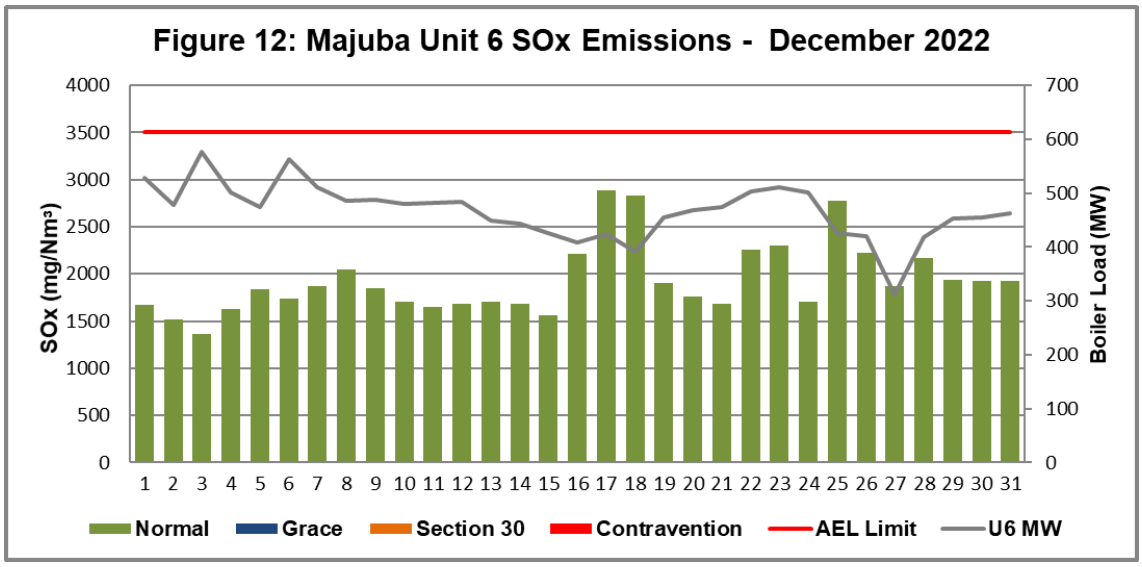


Figure 12. Sox emissions (daily averages) for the month of December 2022 against emission limit for Unit 6.

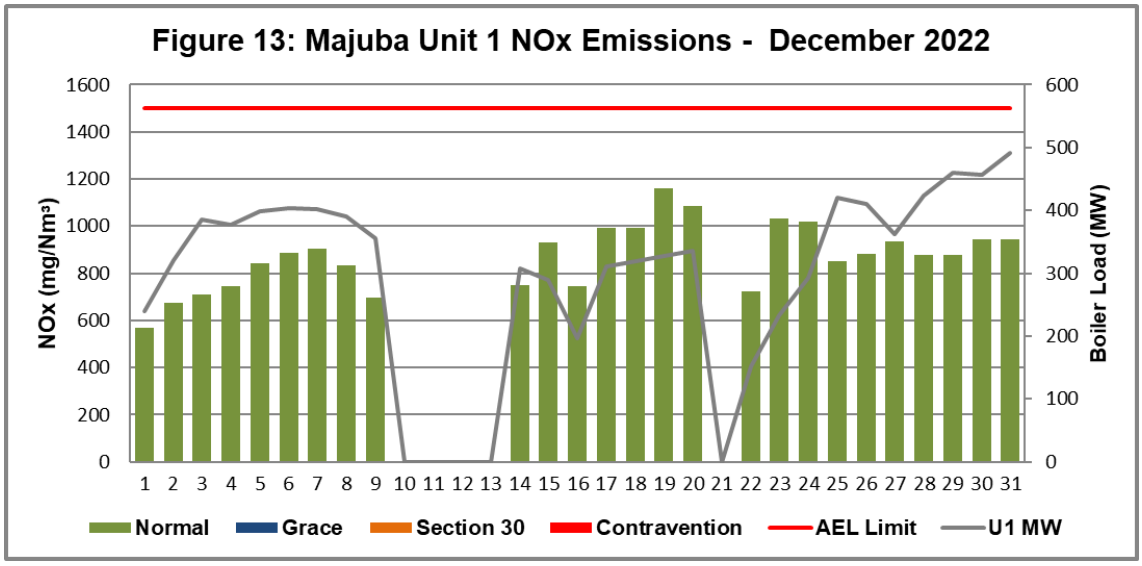


Figure 13. Nox emissions (daily averages) for the month of December 2022 against emission limit for Unit 1.

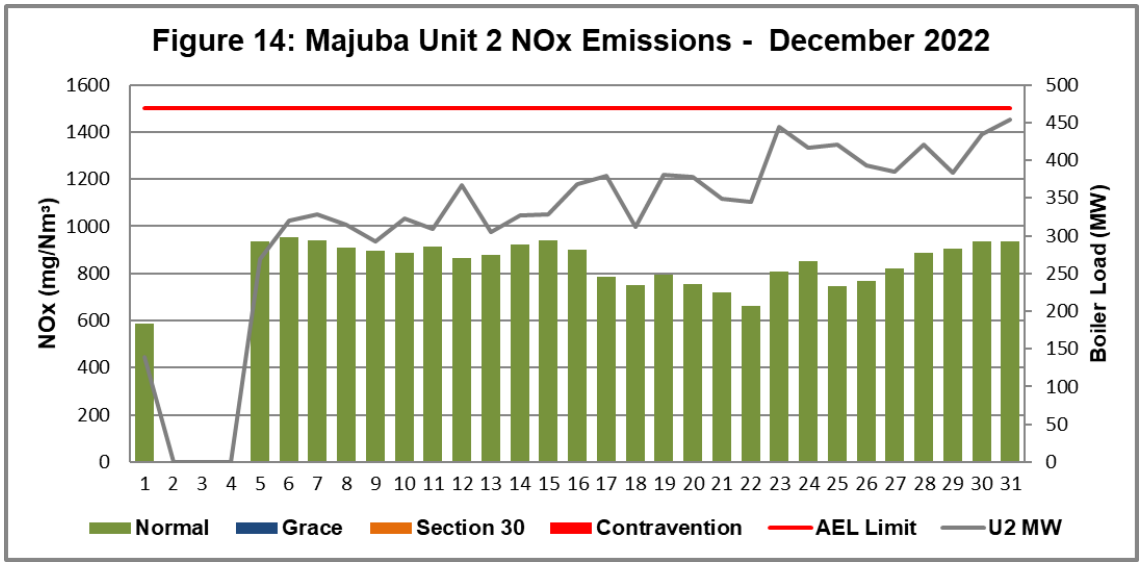


Figure 14. Nox emissions (daily averages) for the month of December 2022 against emission limit for Unit 2.

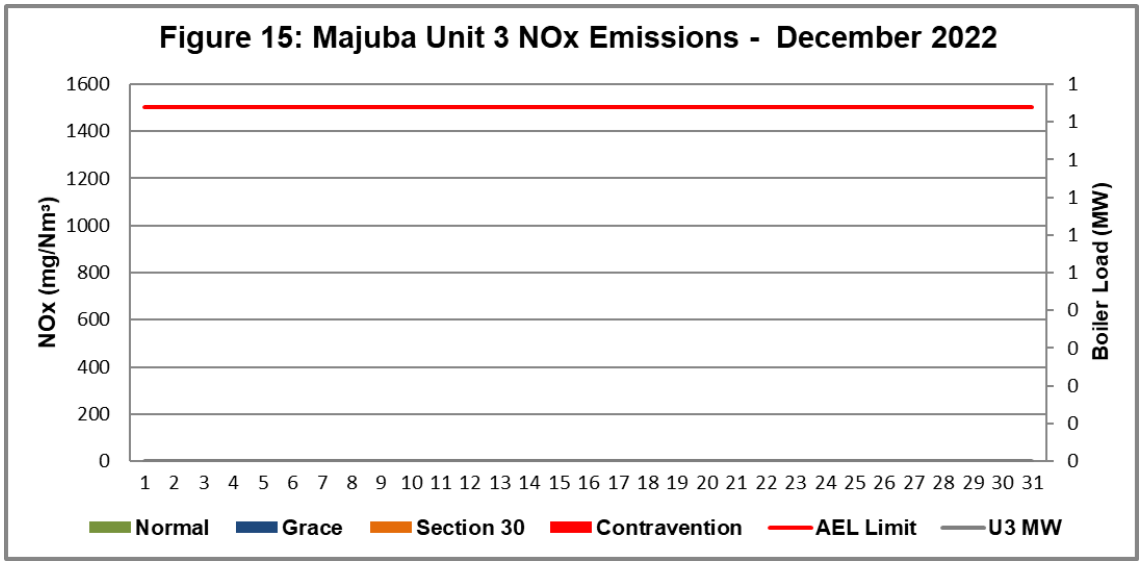


Figure 15. Nox emissions (daily averages) for the month of December 2022 against emission limit for Unit 3.

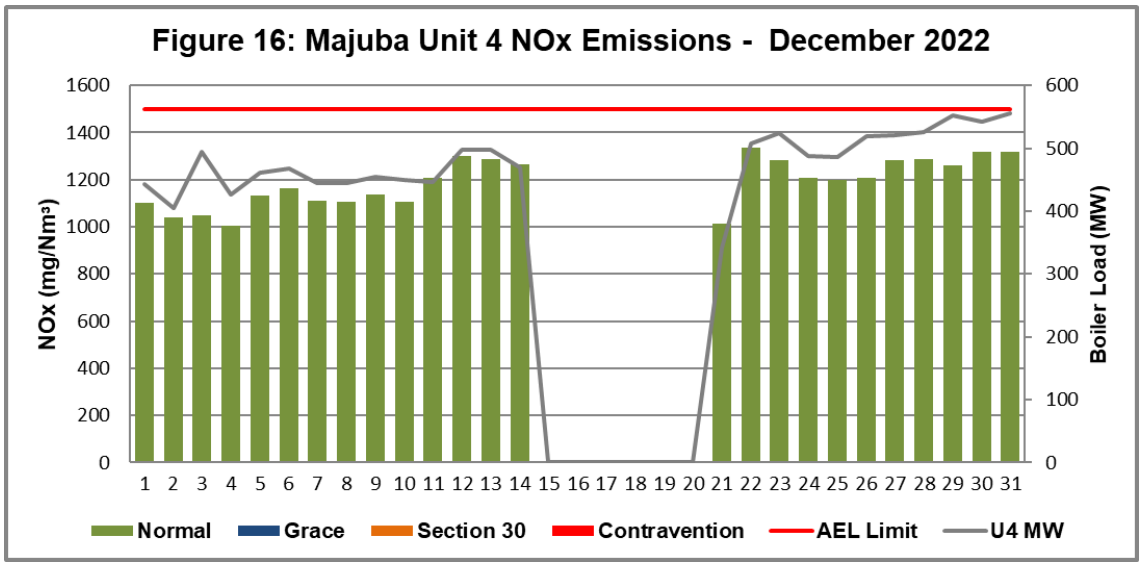


Figure 16. Nox emissions (daily averages) for the month of December 2022 against emission limit for Unit 4

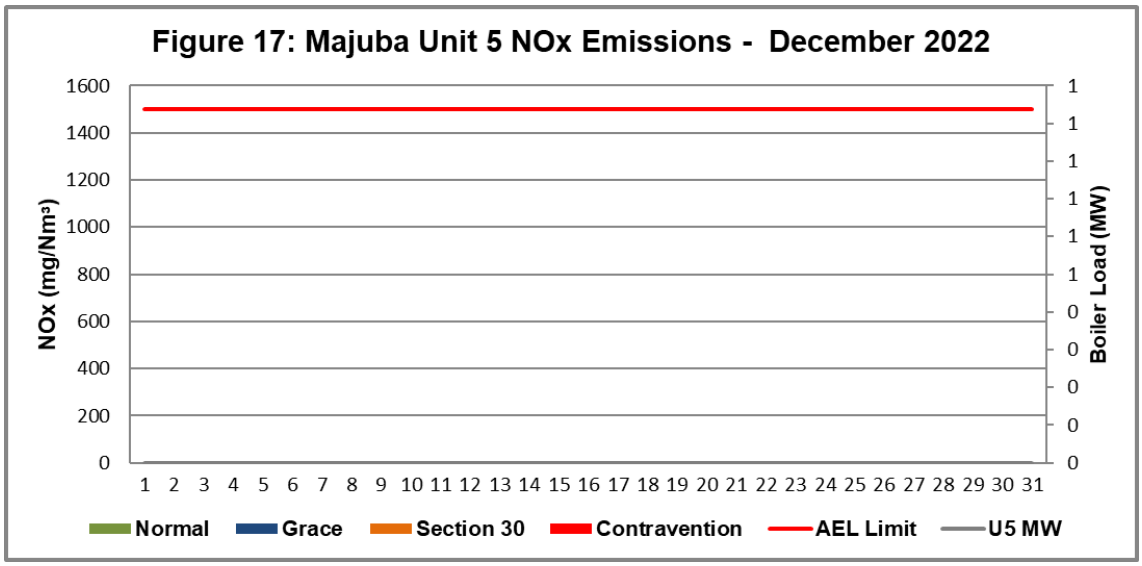


Figure 17. Nox emissions (daily averages) for the month of December 2022 against emission limit for Unit 5

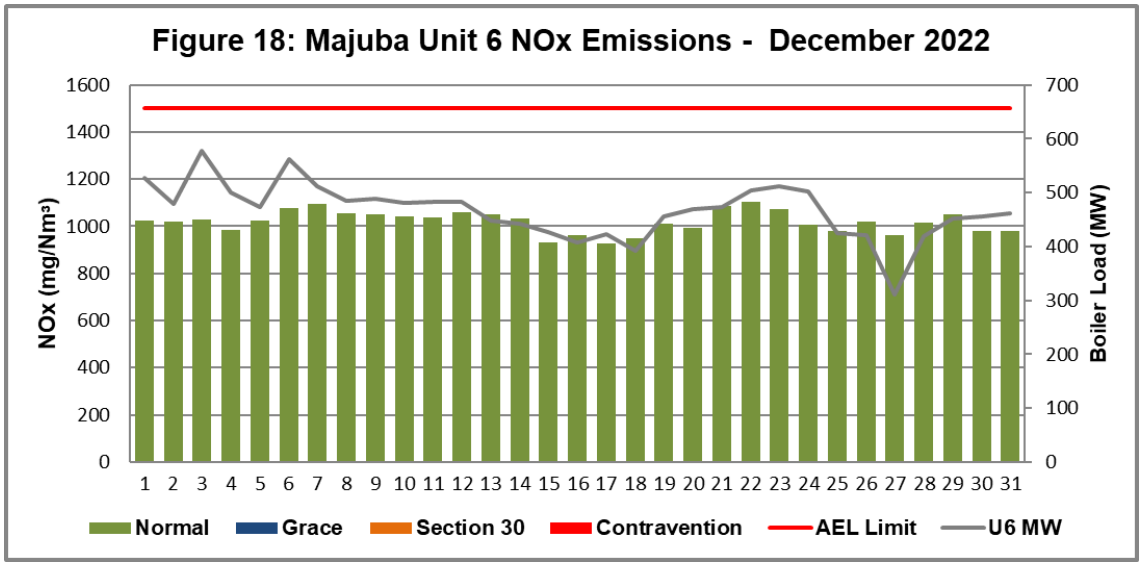


Figure 18. Nox emissions (daily averages) for the month December 2022 against emission limit for Unit 6

Table 4: Monthly tonnages for the month of December 2022

Unit	PM (tons)	SO2 (tons)	NOx (tons)
Unit 1	10.5	2 652	1 057
Unit 2	35.7	2 514	1 054
Unit 3	0.0	0	0
Unit 4	30.2	3 508	1 712
Unit 5	0.0	0	0
Unit 6	28.4	3 522	1 887

Table 5: Average monthly concentrations (mg/Nm^3) for the month of December 2022

Unit	PM (Mg/Nm³)	SO_2 (Mg/Nm³)	NO_2 (Mg/Nm³)
1	10.0	2 180.4	869.5
2	33.4	2 014.2	845.7
3			
4	22.7	2 443.5	1 190.0
5			
6	17.5	1 926.8	1 020.4

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance
Unit 1	22	0	0	0	0
Unit 2	24	0	0	0	0
Unit 3	0	0	0	0	0
Unit 4	24	0	0	0	0
Unit 5	0	0	0	0	0
Unit 6	28	0	0	0	0

Table 7: MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO_2	NO	CO_2
Unit 1	100.0	98.7	96.8	80.1
Unit 2	100.0	100.0	100.0	100.0
Unit 3				
Unit 4	92.1	100.0	100.0	99.6
Unit 5				
Unit 6	100.0	100.0	100.0	100.0

CO_2 and O_2 Relationship

	Final Average CO_2 (%)						Final Average O_2 (%)						Final Average CO_2 + O_2 (%)					
Date	U1	U2	U3	U4	U5	U6	U1	U2	U3	U4	U5	U6	U1	U2	U3	U4	U5	U6
01-Dec	6.5	9.0		8.3		10.5	13.3	13.9		12.7		9.7	19.7	22.9		21.0		20.2
02-Dec	6.7			8.2		10.3	13.3			12.5		9.9	20.0			20.7		20.2
03-Dec	7.4			9.6		11.5	12.4			10.9		8.4	19.8			20.5		19.9
04-Dec	7.4			9.1		10.5	12.5			12.2		9.8	20.0			21.3		20.3
05-Dec	7.8	9.0		9.2		10.0	12.1	13.6		11.9		10.4	19.9	22.6		21.2		20.5
06-Dec	8.0	9.0		9.3		11.1	11.9	13.1		11.7		9.3	19.8	22.1		21.0		20.3
07-Dec	7.7	9.0		8.8		10.7	12.1	12.7		12.2		9.6	19.8	21.7		21.0		20.4
08-Dec	7.7	9.0		9.0		10.3	12.2	12.7		12.0		10.2	19.9	21.7		20.9		20.5
09-Dec	7.8	9.0		9.0		10.3	11.9	13.0		11.6		10.0	19.7	22.0		20.6		20.4
10-Dec		9.0		9.2		10.4		13.1		11.2		10.0		22.1		20.4		20.4
11-Dec		9.0		9.1		10.5		13.0		12.0		9.9		22.0		21.1		20.4
12-Dec		9.0		10.2		10.6		12.3		10.8		9.8		21.3		21.0		20.5
13-Dec		9.0		10.3		10.2		12.8		10.7		10.4		21.8		21.0		20.6
14-Dec	7.2	9.0		10.3		10.1	12.5	12.5		10.5		10.3	19.7	21.5		20.8		20.4
15-Dec	6.7	9.0				9.8	13.4	12.6				10.6	20.1	21.6				20.4
16-Dec		9.0				9.4	13.0	11.8				11.0	13.0	20.9				20.4
17-Dec	6.5	9.0				10.1	13.3	11.9				10.4	19.8	20.9				20.4
18-Dec	6.5	9.0				9.8	13.3	12.7				10.6	19.8	21.7				20.5
19-Dec	6.6	9.0				10.4	13.2	11.8				9.8	19.9	20.8				20.3
20-Dec	6.7	9.0				10.6	13.2	11.9				9.7	20.0	21.0				20.3
21-Dec		9.0		8.0		10.7		12.5		12.1		9.8		21.5		20.1		20.4
22-Dec	6.6	9.0		9.5		10.7	12.9	12.5		12.0		9.7	19.5	21.6		21.5		20.4
23-Dec	6.7	9.0		10.0		10.8	13.3	10.8		11.2		9.5	20.0	19.8		21.2		20.3
24-Dec	6.9	9.0		9.3		10.9	12.9	11.4		11.9		9.2	19.7	20.4		21.2		20.2
25-Dec	8.1	9.0		9.3		9.5	11.5	10.5		11.9		10.6	19.6	19.5		21.2		20.1
26-Dec	8.0	9.0		9.6		9.3	11.5	11.9		11.7		11.1	19.5	21.0		21.3		20.4
27-Dec	7.4	9.0		10.1		8.3	12.3	12.0		11.3		12.4	19.7	21.0		21.4		20.7
28-Dec	8.5	9.2		10.1		9.3	10.9	11.5		11.2		11.4	19.5	20.7		21.4		20.7
29-Dec	9.6	9.4		10.6		9.7	9.7	11.8		10.7		10.9	19.3	21.2		21.3		20.6
30-Dec	9.3	9.4		10.2		10.0	10.1	11.5		11.2		10.5	19.4	20.9		21.4		20.5
31-Dec	9.6	9.4		10.4		10.1	9.8	11.6		11.1		10.3	19.4	20.9		21.5		20.4
Totals	**7.5**	**9.1**		**9.5**		**10.2**	**12.3**	**12.3**		**11.6**		**10.2**	**19.8**	**21.3**		**21.0**		**20.4**

Calculation: CO_2% + O_2% = 19.5-21.5%

Table 8: CO_2 and O_2 deviations of the Month of December 2022

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

Emergency Generation
Table 9: Emergency Generation for the month of December 2022

	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 five days. Nine fabric filter bags were replaced during the month.

UNIT 2

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

UNIT 3

The unit was on outage for the entire month. No fabric filter bags were replaced during the month.

UNIT 4

The unit base loaded for most of the days during the month and off for six days for half station shut down. Nineteen fabric filter bags were replaced during the month.

UNIT 5

The unit was on outage for the entire month. No fabric filter bags were replaced during the month.

UNIT 6

The unit base loaded for all of the days during the month. No fabric filter bags were replaced during the month.

Complaints Register

Table 10: Complaints for the month of December 2022

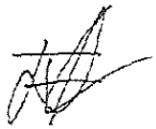
Source Code/ Name	Root Cause Analysis	Calculation of Impacts/ emissions associated with the incident	Dispersion modelling of pollutants where applicable	Measures implemented to prevent reoccurrence	Date by which measure will be implemented
	No complaints were received during the month of December 2022.				

General

Fuel oil consumption for the month of December 2022 exceeded the AEL limit of 6000/tons and the station is currently implementing an action plan to address the high fuel oil consumption associated with mills capability support

Yours sincerely

Report compiled by



Faith Kagoda
ENVIRONMENTAL MANAGER: (MAJUBA)

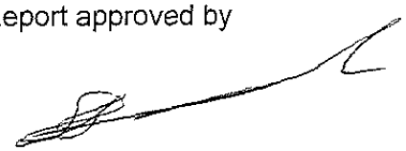
Date 09/01/2023

Report verified by

Lindani Madonsela
BOILER ENGINEERING MANAGER: (MAJUBA)

Date 09/01/2023

Report approved by



09/01/2023

Johan Swanepoel
ENGINEERING MANAGER : (MAJUBA)

Date