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Stanley Koenaitse

Waterberg District Municipality  
Private Bag X1018  
Modimolle  
0510

[skoenaite@waterberg.gov.za](mailto:skoenaite@waterberg.gov.za)

Date: 2023/01/31

Enquiries: MF Dikgale

Tel: 014 762 6820

Ref: H16/1/13-AEL/M1/R1 – January 2023

Dear Mr Koenaitse

### **MEDUPI POWER STATION MONTHLY EMISSIONS REPORT FOR THE MONTH OF JANUARY 2023**

This document serves as the monthly emissions report required in terms of Section 7.7.1 of Medupi Power Station Provisional Atmospheric Emission License (AEL), H16/1/13-AEL/M1/R1.

This report is a reflection of Unit 1, 2, 3, 5 and 6 gaseous and particulate emissions performance against the AEL limit for the month of January 2023 only.

## **1. Raw Materials and Products**


**TABLE 1: QUANTITY OF RAW MATERIALS AND PRODUCTS CONSUMPTION IN JANUARY 2023**

<b>Raw Materials and Products used</b>	<b>Raw Material Type</b>	<b>Unit</b>	<b>Maximum Permitted Consumption/ Rate (Quantity)</b>	<b>Consumption – January 2023</b>
	Coal	Tons/month	1 875 000	867 505.0
	Fuel Oil	Tons/month	20 000	1778
<b>Production Rates</b>	<b>Product/ By-Product Name</b>	<b>Unit</b>	<b>Maximum Production Capacity Permitted (Quantity)</b>	<b>Production Rate in Month of January 2023</b>
	Energy	GWh	3 571.2	1828.03
	Ash Emitted	Tons/month	not specified	270.24

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**TABLE 2: DAILY CONSUMPTION AND PRODUCTION RATES**


Date	Reportable hours of Operation						Coal usage	Production rate (MW)					
	U1	U2	U3	U4	U5	U6		U1	U2	U3	U4	U5	U6
01-Jan	24.0	9.5	0.0	0.0	24.0	0.0	25674	678	618	569	off	635	off
02-Jan	24.0	24.0	23.7	0.0	24.0	0.0	27526	682	650	658	off	661	off
03-Jan	24.0	24.0	24.0	0.0	24.0	0.0	29043	722	723	682	off	639	off
04-Jan	24.0	24.0	24.0	0.0	24.0	0.0	29948	758	755	666	off	669	off
05-Jan	24.0	24.0	17.3	0.0	24.0	0.0	26684	699	777	640	off	621	off
06-Jan	24.0	24.0	0.0	0.0	24.0	0.0	26486	738	745	563	off	709	off
07-Jan	24.0	24.0	14.0	0.0	24.0	0.0	29568	728	716	678	off	719	off
08-Jan	24.0	24.0	24.0	0.0	24.0	0.0	29182	772	715	595	off	742	off
09-Jan	24.0	24.0	24.0	0.0	24.0	0.0	29273	767	741	652	off	651	off
10-Jan	24.0	24.0	24.0	0.0	24.0	0.0	29818	748	733	646	off	701	off
11-Jan	24.0	24.0	24.0	0.0	24.0	0.0	28331	684	758	549	off	668	off
12-Jan	24.0	24.0	24.0	0.0	24.0	0.0	29993	728	742	597	off	709	off
13-Jan	24.0	24.0	24.0	0.0	24.0	0.0	29590	735	723	605	off	736	off
14-Jan	24.0	24.0	24.0	0.0	24.0	0.0	30939	761	754	668	off	735	off
15-Jan	24.0	24.0	24.0	0.0	23.8	0.0	30488	771	748	690	off	709	off
16-Jan	24.0	24.0	24.0	0.0	0.0	0.0	23109	746	735	685	off	off	off
17-Jan	24.0	24.0	24.0	0.0	0.0	0.0	23142	757	745	678	off	off	off
18-Jan	24.0	24.0	24.0	0.0	0.0	0.0	23854	780	741	676	off	off	off
19-Jan	24.0	24.0	24.0	0.0	0.0	0.0	23216	759	717	670	off	off	off
20-Jan	24.0	24.0	24.0	0.0	0.0	0.0	23682	759	717	670	off	off	off
21-Jan	24.0	24.0	24.0	0.0	0.0	0.0	23479	724	757	662	off	off	off
22-Jan	24.0	24.0	24.0	0.0	0.0	0.0	28049	724	757	662	off	10	off
23-Jan	24.0	24.0	24.0	0.0	0.0	0.0	30497	708	776	691	off	708	off
24-Jan	24.0	24.0	24.0	0.0	24.0	0.0	31211	759	767	685	off	703	off
25-Jan	24.0	24.0	24.0	0.0	24.0	0.0	30859	723	733	678	off	730	off
26-Jan	24.0	24.0	24.0	0.0	24.0	0.0	30512	760	752	658	off	723	off
27-Jan	24.0	24.0	24.0	0.0	24.0	0.0	30728	753	760	677	off	721	off
28-Jan	24.0	24.0	24.0	0.0	24.0	0.0	27373	715	766	667	off	629	off
29-Jan	24.0	24.0	24.0	0.0	24.0	0.0	28739	682	693	628	off	684	off
30-Jan	22.1	24.0	24.0	0.0	24.0	0.0	28901	710	741	617	off	687	off
31-Jan	0.0	24.0	24.0	0.0	24.0	0.0	27611	700	740	631	off	745	off

NB: reportable hours less than 24 highlighted in pink

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## 2. Abatement Technology

**Table 3: Abatement Equipment Control Technology efficiency for month of January 2023**

Associated Unit/Stack	Technology Type	Efficiency	FFP Utilization
Unit 1	Fabric Filter Plant (FFP)	97.219%	100%
Unit 2	Fabric Filter Plant (FFP)	99.287%	100%
Unit 3	Fabric Filter Plant (FFP)	96.741%	100%
Unit 4	Fabric Filter Plant (FFP)	off	Off
Unit 5	Fabric Filter Plant (FFP)	97.299%	100%
Unit 6	Fabric Filter Plant (FFP)	off	off

*Note: FFP does not have bypass mode operation, hence plant 100% Utilised.*

## 3. Energy Source Characteristics

**TABLE 4: ENERGY SOURCE MATERIAL CHARACTERISTICS FOR THE MONTH OF JANUARY 2023**

Characteristic	Stipulated Range (% by weight on a dry basis)	Monthly Average Content (% by weight on a dry basis)
<b>Coal</b>		
<b>Sulphur Content</b>	1.3 - 2.2	1.5
<b>Ash Content</b>	35 - 39	34.5

**TABLE 5: ENERGY SOURCE MATERIAL CHARACTERISTICS FOR THE MONTH OF JANUARY 2023**

Characteristic	Stipulated Range (%)	Monthly Average Content (%)
<b>Oil</b>		
<b>Sulphur Content</b>	0.5 - 3.5	2.450
<b>Ash Content</b>	0.02 - 0.1	0.038

## 4. Emissions Reporting

Medupi Power Station uses Continuous Emission Monitoring System which uses the extractive method for analysis.

The emission limits are as follows:

SO<sub>2</sub> Monthly = 3500 mg/Nm<sup>3</sup>

Dust Daily= 50 mg/Nm<sup>3</sup>

NO<sub>2</sub> Daily= 750 mg/Nm<sup>3</sup>

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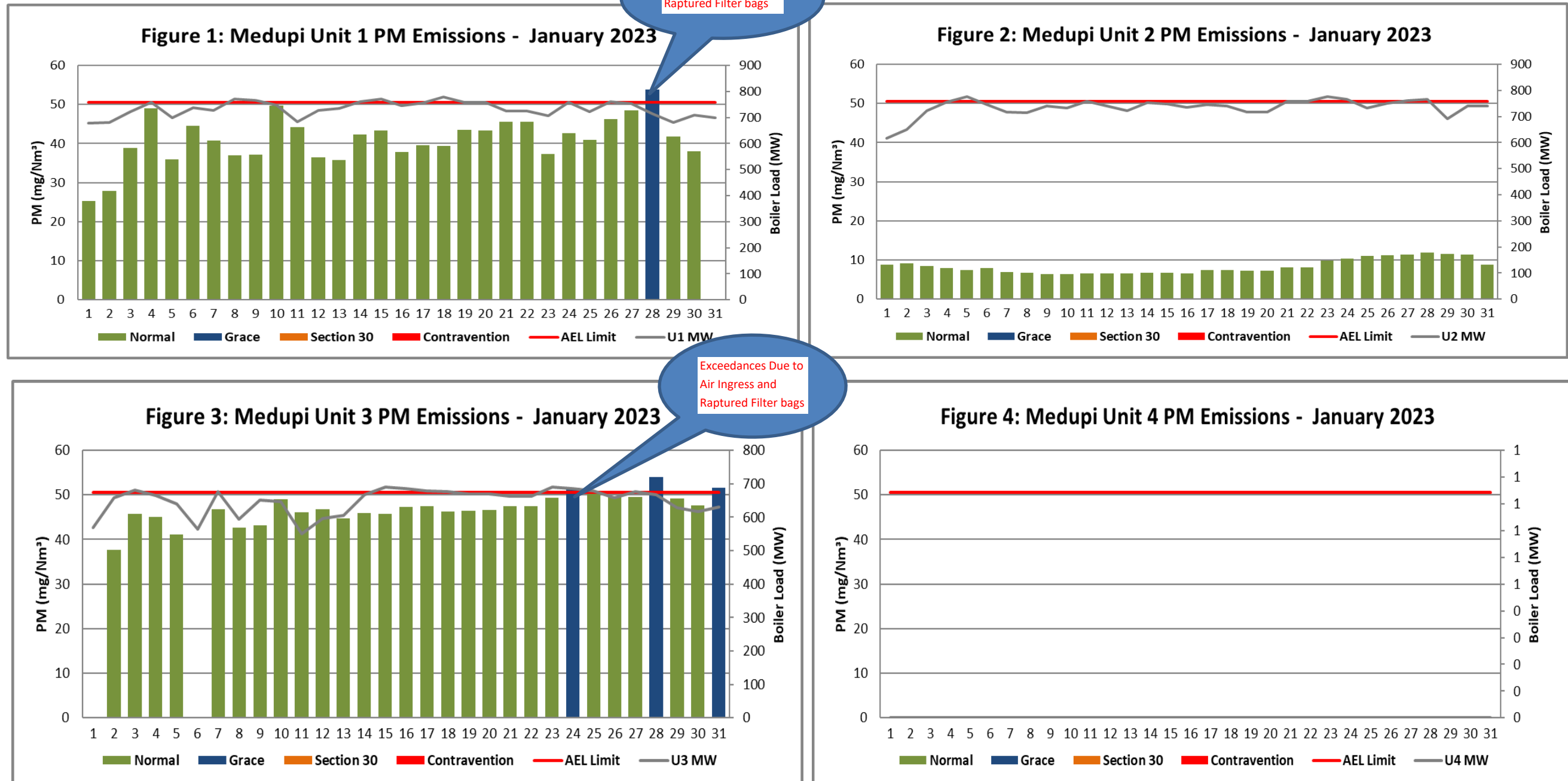
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4.1 PM Daily Averages



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Filter bags have reached end of life

Figure 5: Medupi Unit 5 PM Emissions - January 2023

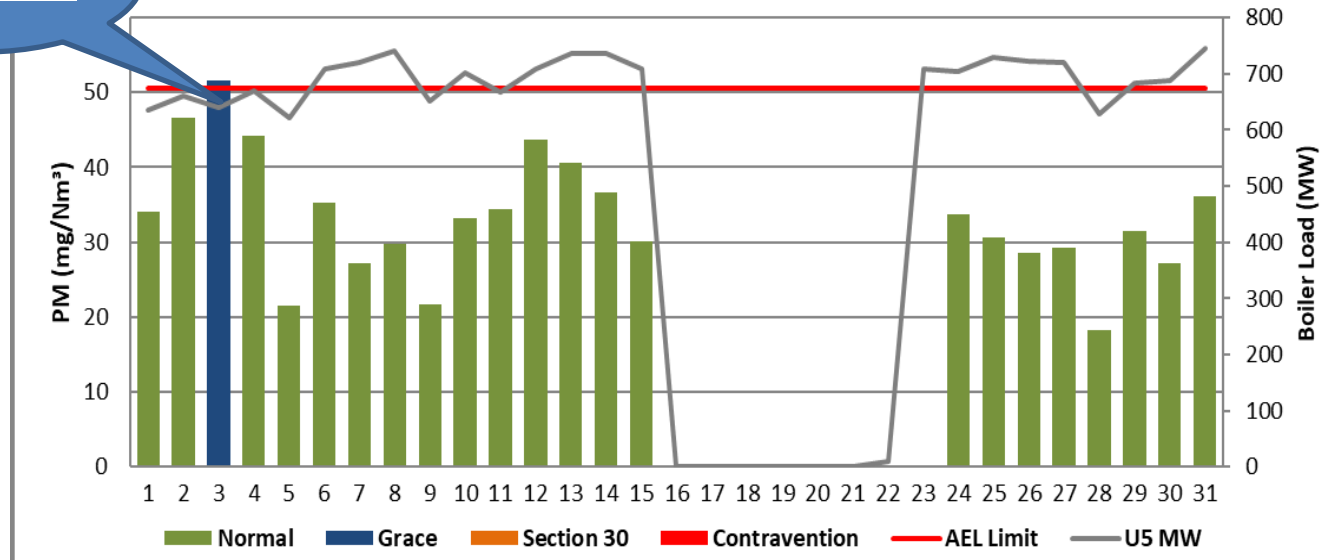
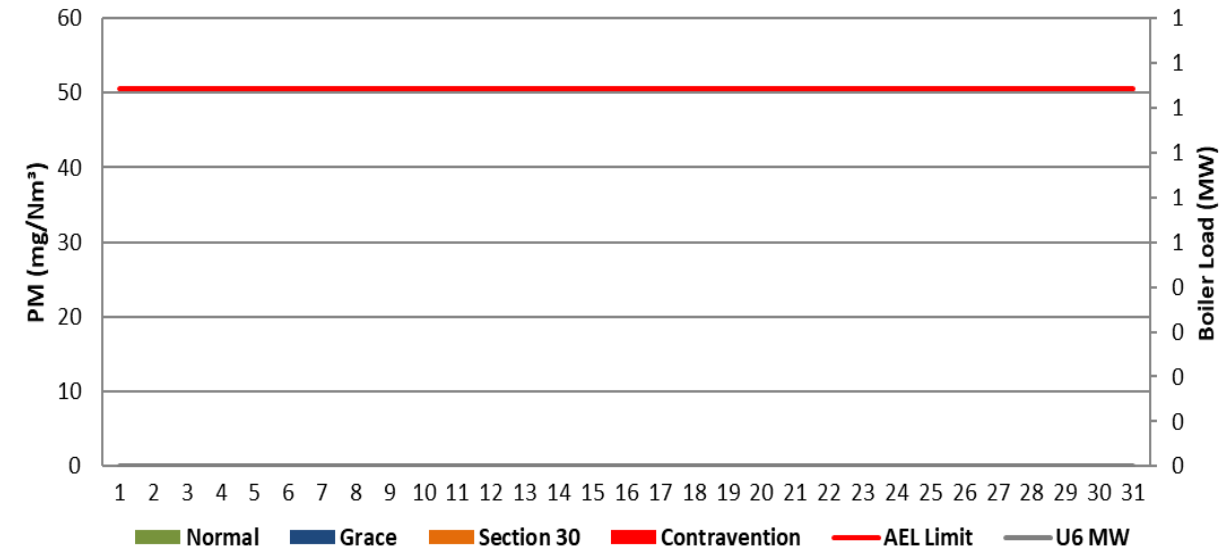


Figure 6: Medupi Unit 6 PM Emissions - January 2023



4.2 SOx Daily Averages

Figure 7: Medupi Unit 1 SOx Emissions - January 2023

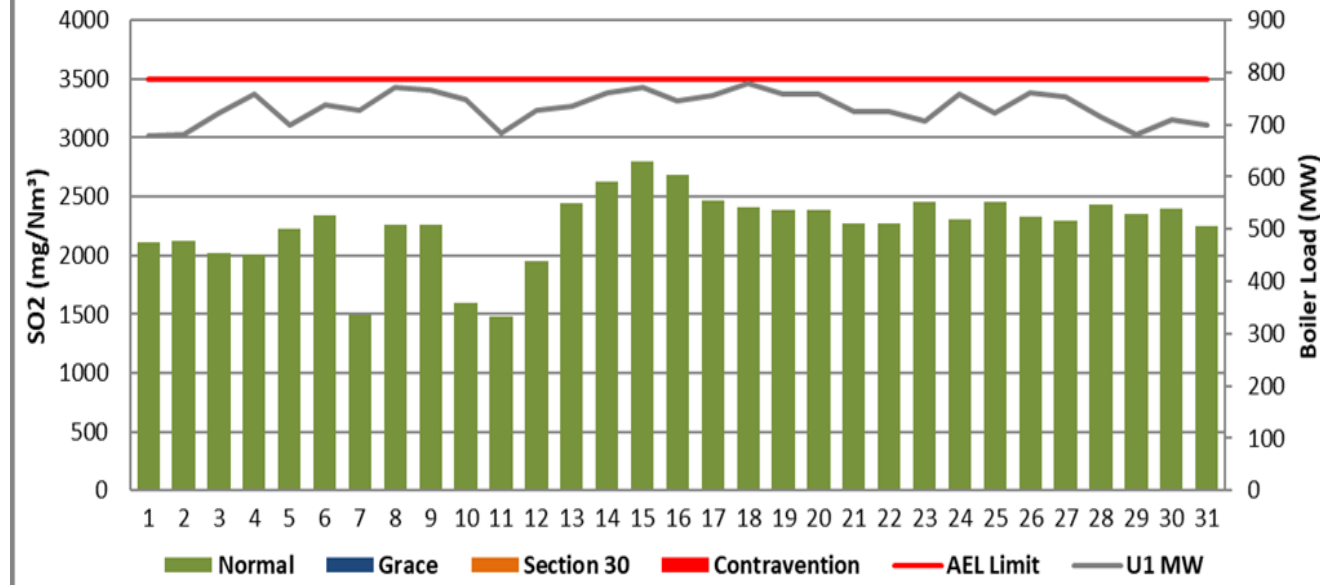
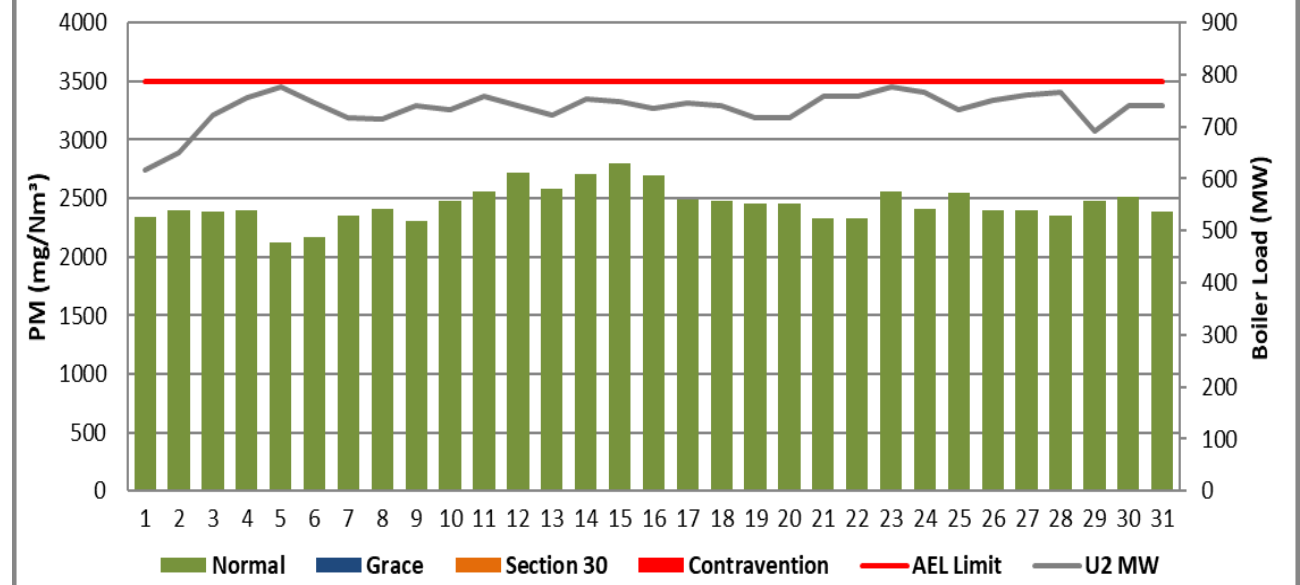


Figure 8: Medupi Unit 2 SOx Emissions - January 2023



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Figure 9: Medupi Unit 3 SOx Emissions - January 2023

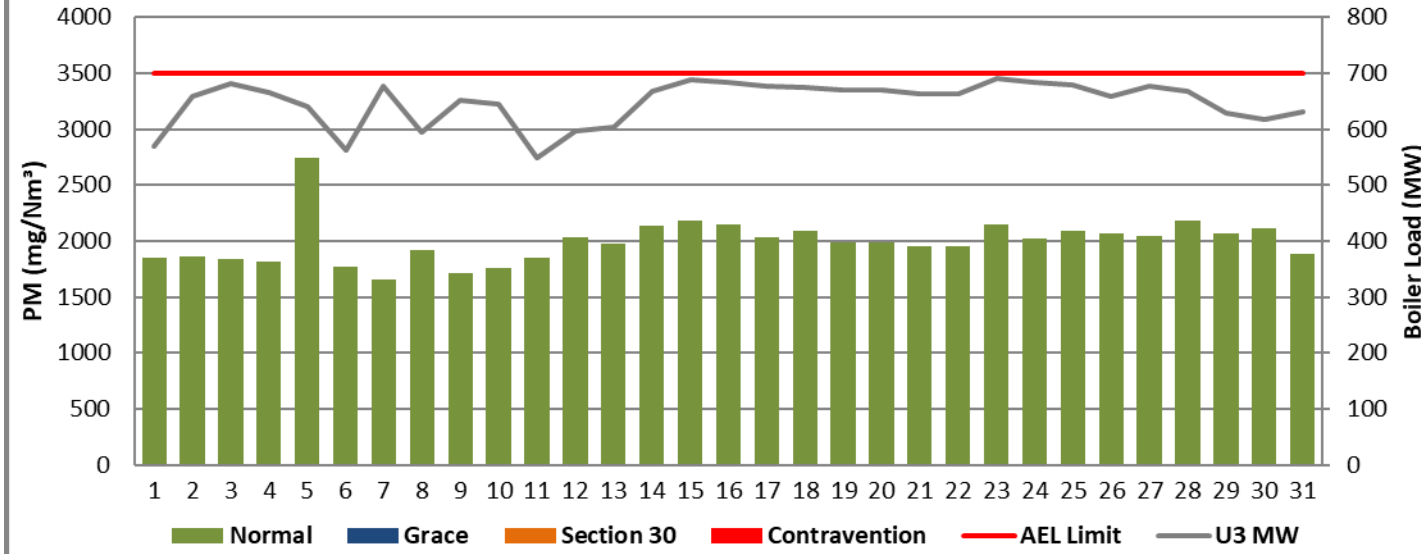


Figure 10: Medupi Unit 4 SOx Emissions - January 2023

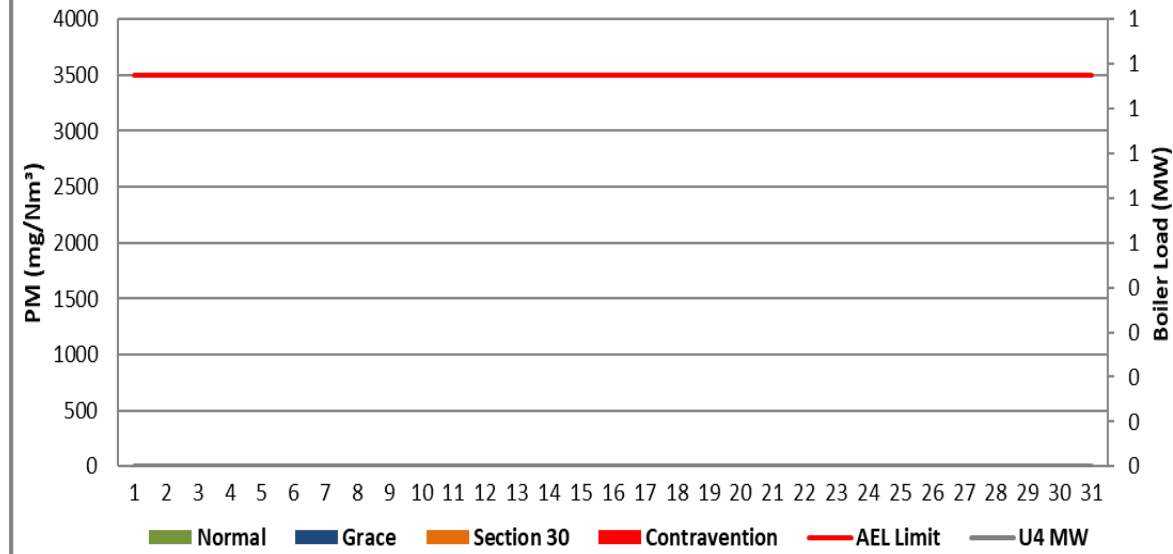


Figure 11: Medupi Unit 5 SOx Emissions - January 2023

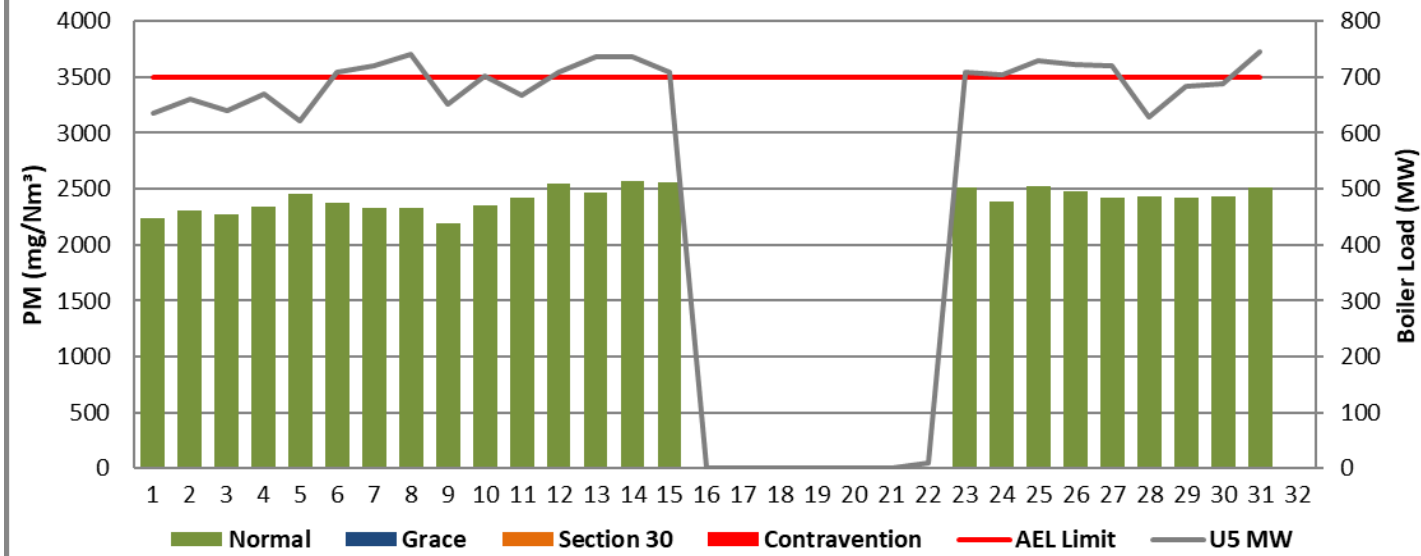
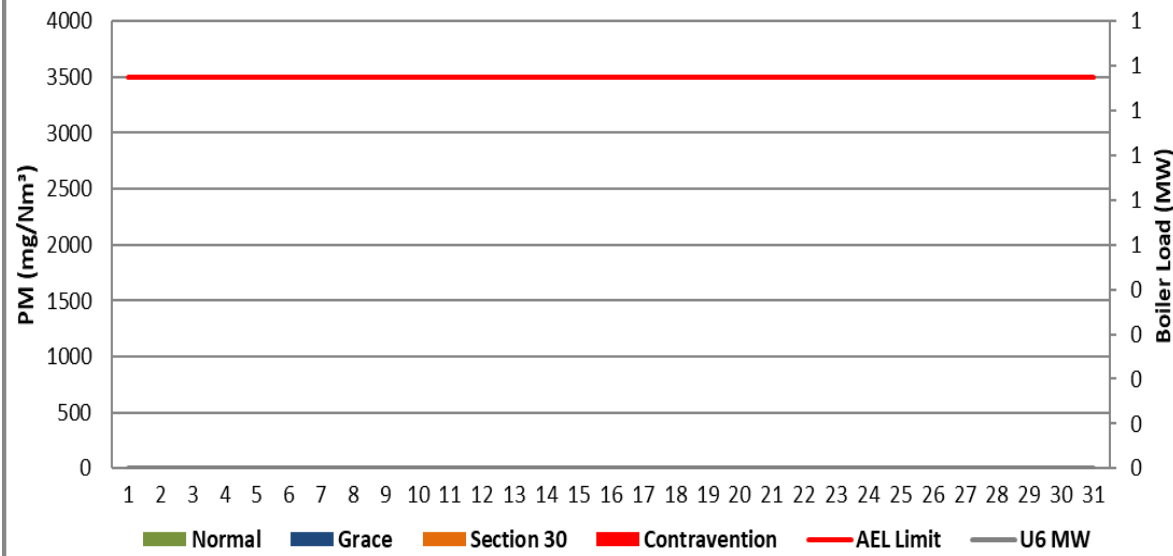


Figure 12: Medupi Unit 6 SOx Emissions - January 2023



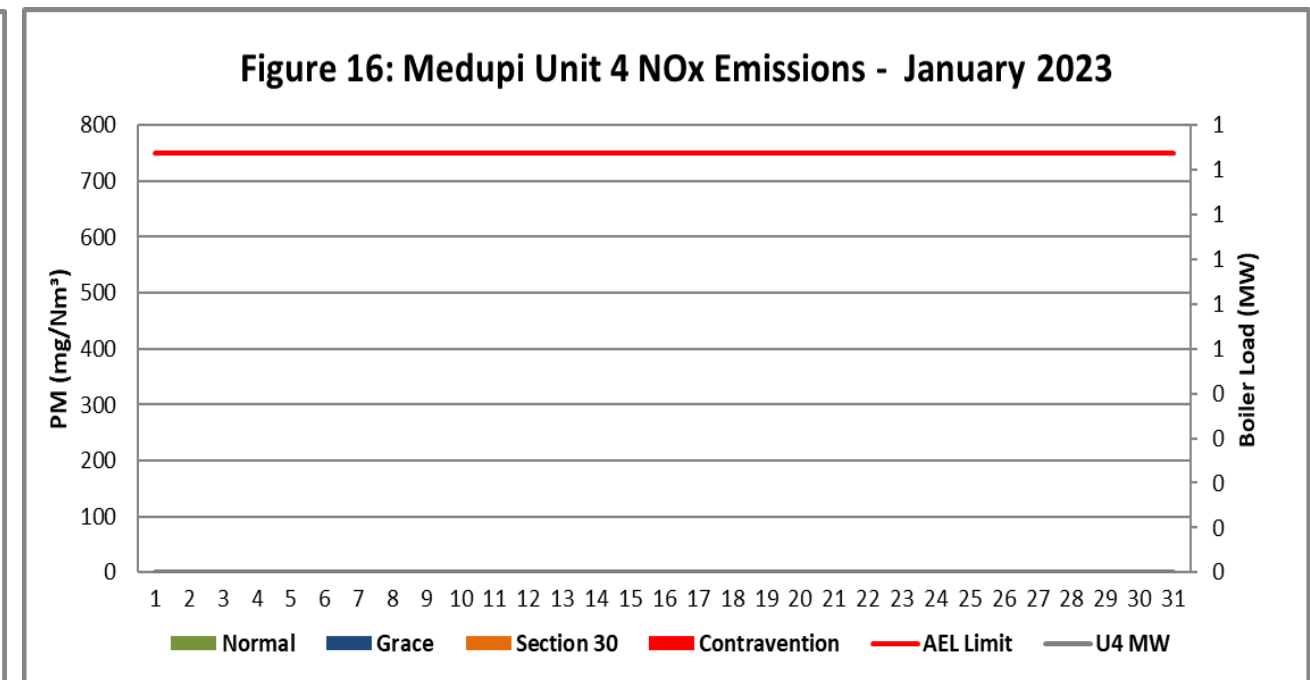
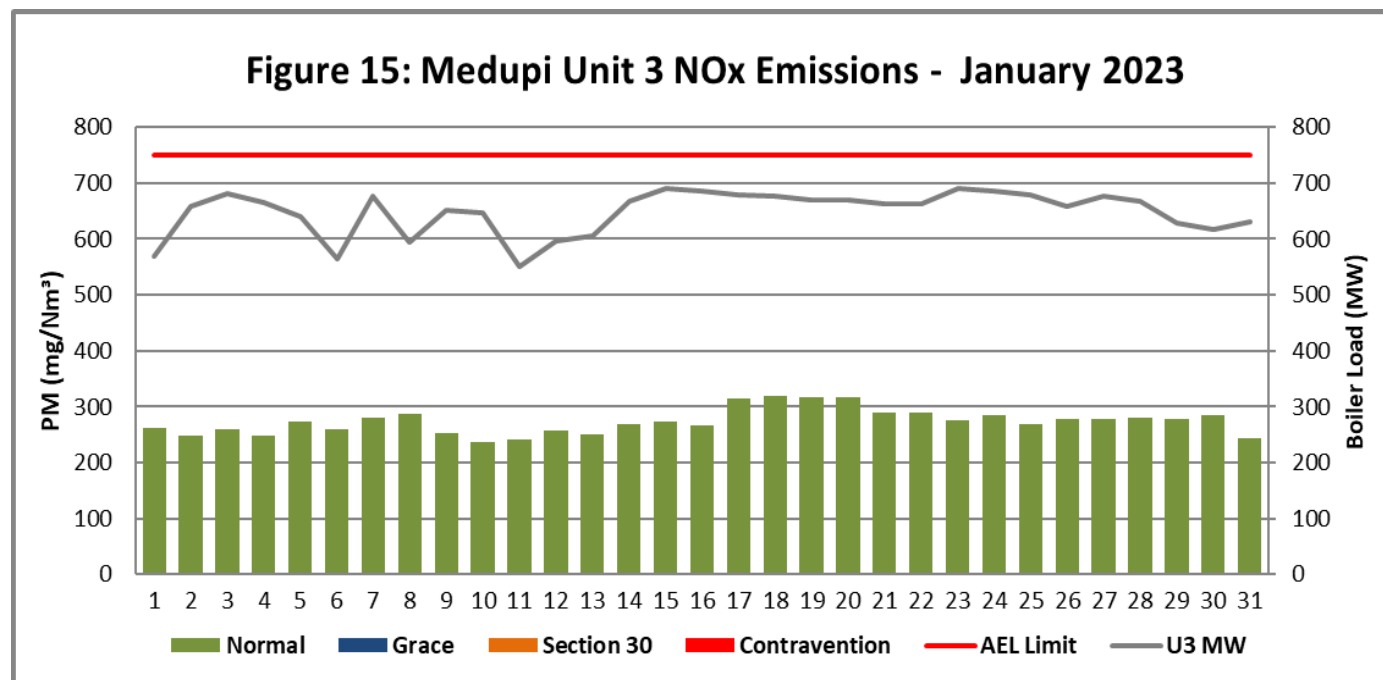
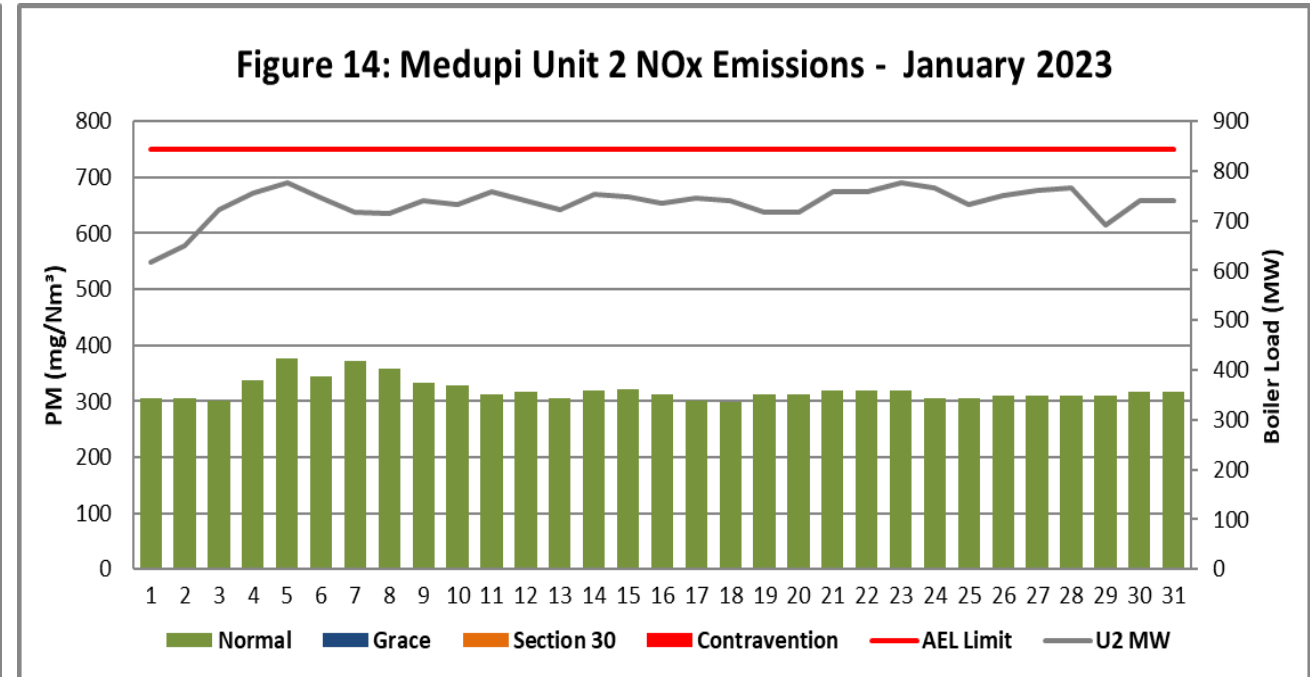
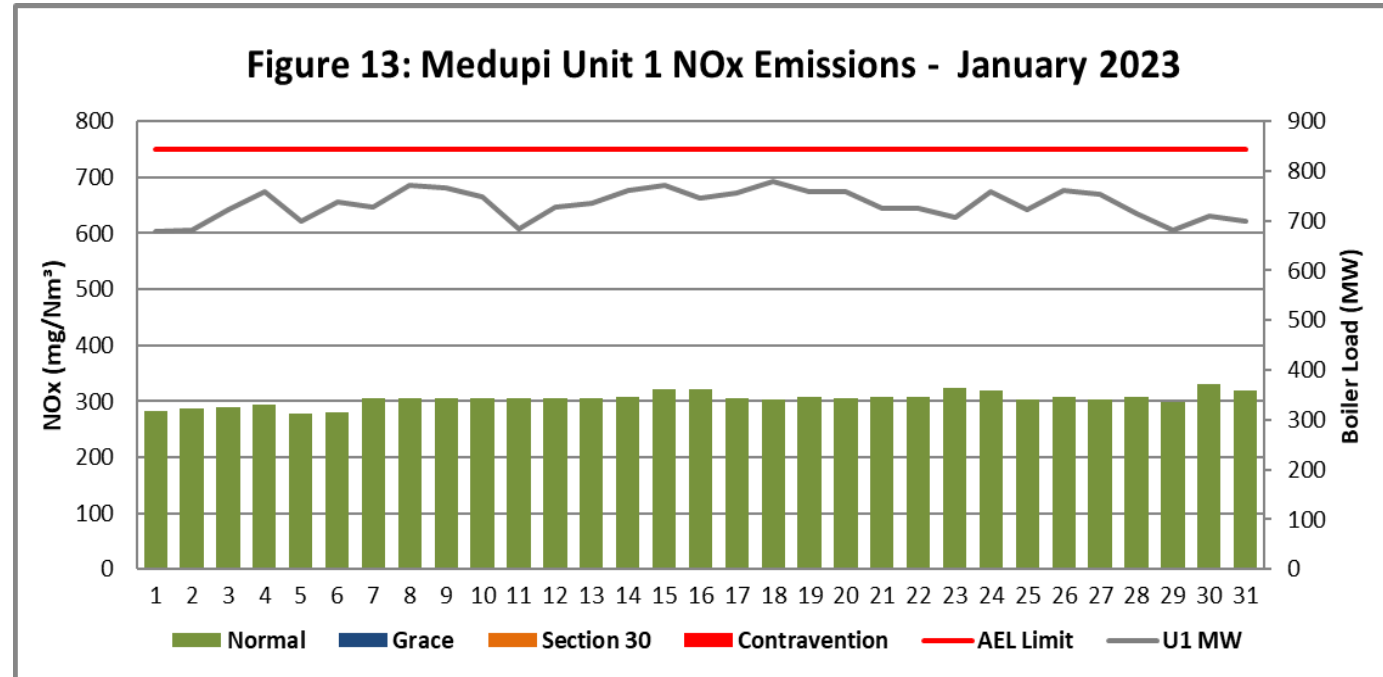
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4.3 NOx Daily Averages



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Figure 17: Medupi Unit 5 NOx Emissions - January 2023

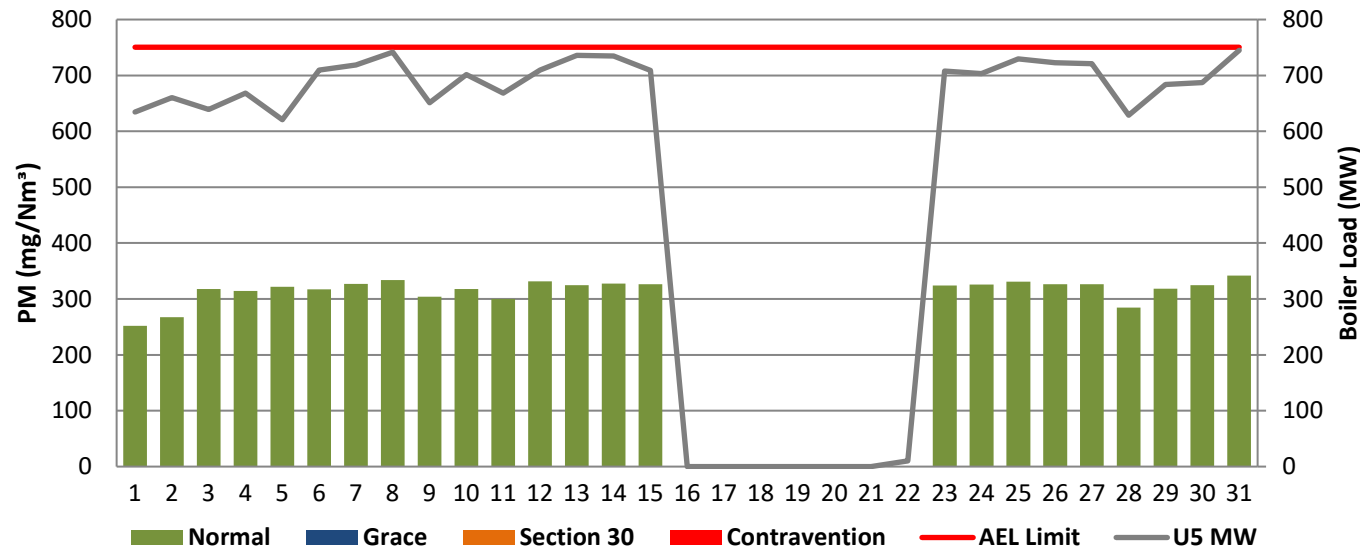
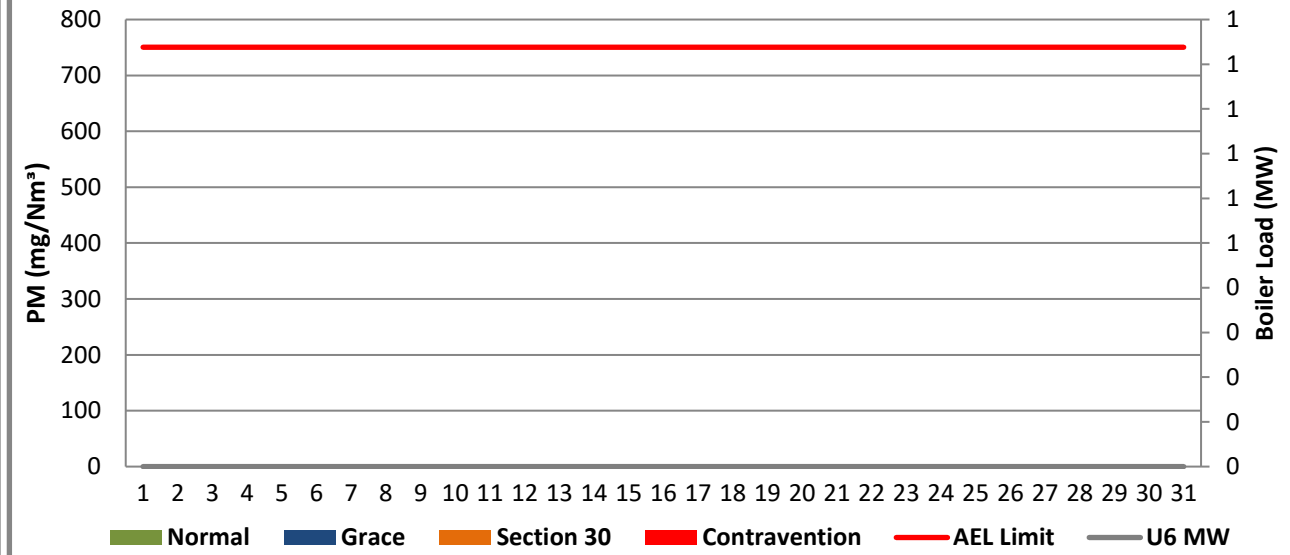


Figure 18: Medupi Unit 6 NOx Emissions - January 2023




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**TABLE 6: MONTHLY TONNAGES FOR THE MONTH OF JANUARY 2023**

Associated Unit/Stack	PM	SO <sub>2</sub>	NO <sub>2</sub>
Unit 1	91.6	5 144.2	694.1
Unit 2	23.2	6 936.4	904.1
Unit 3	93.5	4 212.4	579.0
Unit 4	0.0	0.0	0.0
Unit 5	62.0	4 681.4	614.2
Unit 6	0.0	0.0	0.0
<b>SUM</b>	<b>270.2</b>	<b>20 974.4</b>	<b>2 791.4</b>

**TABLE 7: MONTHLY AVERAGES FOR THE MONTH OF JANUARY 2023**

Associated Unit/Stack	Average PM (mg/Nm <sup>3</sup> )	Average SO <sub>x</sub> (mg/Nm <sup>3</sup> )	Average NO <sub>x</sub> (mg/Nm <sup>3</sup> )
Unit 1	41.1	2 253.4	304.5
Unit 2	8.4	2 450.1	319.8
Unit 3	47.0	1 996.4	273.5
Unit 4	off	off	off
Unit 5	33.3	2 410.7	316.0
Unit 6	off	off	off

## 4 Continuous Emission Monitoring Systems (CEMS)

Unit 1, 2, 3, 5 and 6 Continuous Emission Monitoring Systems were always in operation when the unit was on load. For days where the CEMS were readings incorrectly are indicated on the performance graphs above.


**TABLE 8: PERIODS DURING WHICH CEMS WAS INOPERATIVE**

Date	CEMS status	Comments

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**TABLE 9: CEMS MONITOR RELIABILITY PERCENTAGE (%)**

Associated Unit/Stack	PM	SO <sub>2</sub>	NO <sub>2</sub>	CO <sub>2</sub>	O <sub>2</sub>
Unit 1	98.9	87.7	78.2	0.0	70.0
Unit 2	98.7	96.4	93.3	76.2	94.0
Unit 3	99.4	96.6	91.0	67.0	0.0
Unit 4	off	off	off	off	off
Unit 5	97.9	97.3	97.3	97.3	0.0
Unit 6	off	off	off	off	off

**Note:** The gas monitor analyser reliability on Units 1, 3 and 5, for CO<sub>2</sub> and O<sub>2</sub> was below the 90% target and in some instances, it was zero percent reliable for the month of January 2023. Manual input were made in the emissions reporting tool was to ensure more accurate reporting.

## 5 CEMS Calibration certificates and equipment used for calibration

A service provider was appointed to calibrate CEMS equipment at Medupi Power Station, calibration certificates to be made available upon request. The service appointed for the CEMS calibration is in a process of obtaining SANAS accreditation. Verification of the CEMS after calibration is conducted internally by Eskom.


## 6 Ambient Air Quality Monitoring Report

The Ambient Air Quality Monitoring and Dust fall-out report for January 2023 was e-mailed to the Licensing Authority.

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## 7 Visual inspection of the exterior walls of the fuel oil tanks and TVOC Estimation

Visual inspection was conducted and there were no leaks observed on the exterior walls of the fuel oil tanks.


**TABLE 10: TOTAL VOLATILE ORGANIC COMPOUND (TVOC) FOR JANUARY 2023**

		
<b>CALCULATION OF EMISSIONS OF TOTAL VOLATILE COMPOUNDS FROM FUEL OIL STORAGE TANKS*</b>		
<b>Date:</b>	Tuesday, 31 January 2023	
<b>Station:</b>	Medupi Power Station	
<b>Province:</b>	Limpopo Province	
<b>Tank no.</b>	1-2	
<b>Description:</b>	Outdoor fuel oil storage tank	
<b>Tank Type:</b>	Vertical fixed roof (vented to atmosphere)	
<b>Material stored:</b>	Fuel Oil 150	
<b>MONTHLY INPUT DATA FOR THE STATION</b> Please only insert relevant monthly data inputs into the <b>blue cells</b> below Choose from a dropdown menu in the <b>green cells</b> The total VOC emissions for the month are in the <b>red cells</b> <b>IMPORTANT: Do not change <u>any</u> other cells without consulting the AQ CoE</b>		
<b>MONTH:</b>	January	
<b>GENERAL INFORMATION:</b>		
	<b>Data</b>	<b>Unit</b>
Total number of fuel oil tanks:	2	NA
Height of tank:*	14.2	m
Diameter of tank:	12	m
Net fuel oil throughput for the month:	1778	tons/month
Molecular weight of the fuel oil:	166.00	Lb/lb-mole
<b>METEROLOGICAL DATA FOR THE MONTH</b>		
	<b>Data</b>	<b>Unit</b>
Daily average ambient temperature	25.11	°C
Daily maximum ambient temperature	31.57	°C
Daily minimum ambient temperature	17.48	°C
Daily ambient temperature range	14.10	°C
Daily total insolation factor	5.87	kWh/m <sup>2</sup> /day
Tank paint colour	Aluminum/Specular	NA
Tank paint solar absorbance	0.39	NA
<b>FINAL OUTPUT:</b>		
	<b>Result</b>	<b>Unit</b>
Breathing losses:	0.74	kg/month
Working losses:	0.05	kg/month
<b>TOTAL LOSSES (Total TVOC Emissions for the month):</b>	<b>0.79</b>	<b>kg/month</b>
<small>*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, Trittech 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.</small>		

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## 8 Air quality improvements initiatives and public education and awareness campaigns

No awareness campaigns for this month.

## 9 Complaints Register


TABLE 6: COMPLAINTS FOR THE MONTH OF JANUARY 2023

Source Code/ Name	Air pollution complaints received	Calculation of Impacts/ emissions associated with the incident	Date of complaint and date of response by the license holder	Results of investigation	Action taken to resolve the complaint
N/A	No complaints received	N/A	N/A	N/A	N/A

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Compiled by: Lutendo Murovhi Nemutankhatho Date: 09 March 2023  
 Environmental Officer

Verified by: Malose Langa [Signature] Date: 2023-03-09  
 System Engineer Boiler

Verified by: Kevin Mathebula [Signature] Date: 2023/03/09  
 System Engineer C&I

Supported by: Mokgadi Dikgale [Signature] Date: 13/03/2023  
 Environmental Manager

Supported by: Jabulani Mkhathshwa [Signature] Date: 2023-03-14  
 Engineering Group Manager

I Zweli Witbooi, declares that the information provided in this report is accurate and correct.

Yours sincerely

[Signature]

Zweli Witbooi  
 GENERAL MANAGER: MEDUPI POWER STATION

Date: 2023/03/15

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