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Ref: H16/1/13-AEL/M1M/R1\_Bi-Annual 2023/2024

Dear Mr Koenaitse

**Date:** 2024/04/30

**Enquiries:** MF Dikgale

**Tel:** 014 762 6820

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## MEDUPI POWER STATION BI-ANNUAL EMISSIONS REPORT


This report serves to fulfil the requirements of Section 7.7.2 of the Medupi Power Station Provisional Atmospheric Emission License (AEL) number H16/1/13-AEL/M1M/R1. This report reflects verified emissions data for the period of October 2023 to March 2024. The daily emissions figures for the reporting period were submitted monthly to the licensing authority.

The content of this report is aligned to the requirements of the Medupi Power Station provisional Atmospheric Emissions Licence and covers the following aspects:

- Compliance with regards to each AEL condition
- Interpretation of all available data, tests, and monitoring results regarding operation and all impacts on the environment
- Recommendations regarding non-compliance or potential non-compliance
- Target dates for the implementation of recommendations by the License Holder to achieve compliance.
- Impact of implemented corrective action taken for identified non-compliance.

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## 1. Bi-annual Reporting Requirements as per condition 7.7.2 of the AEL

- **Compliance with regards to each AEL condition, Recommendations regarding non-compliance or potential non-compliance and Target dates.**

Non-compliances to conditions of the licence are reported to the licensing authority as soon as they are identified by the Power Station. The Station uses Continuous Emissions Monitoring System (CEMS) for emissions monitoring. Online monitoring is conducted on Unit 1, 2, 3, 5 and 6 for both Particulate Matter (PM) and Gaseous (NO<sub>2</sub> and SO<sub>2</sub>) emissions. The accuracy of the monitors is confirmed by the parallel tests and correlation tests conducted annually. Note the AEL requirement is to conduct the tests once every two years. The AEL Compliance status is indicated on table 1 below.


**Table 1: AEL Compliance Status and Action Plan**

Category of Listed Activity	Sub-category of the Listed Activity	Description of the listed activity
1-Combustion Installations	1.1 -Solid Fuel combustion installations	Solid fuels combustion installations used primarily for steam raising or electricity generation.
2-Petroleum industry	2.4-Storage and handling of petroleum	Petroleum product storage tanks and product transfer facilities, except those under liquefied petroleum gas.
5-Mineral Processing, Storage, and handling	5.1 -Storage and Handling of ore and coal	Storage and handling of ore and coal not situated on premises of a mine or works as defined in mines healthy and safety Act 29/1996

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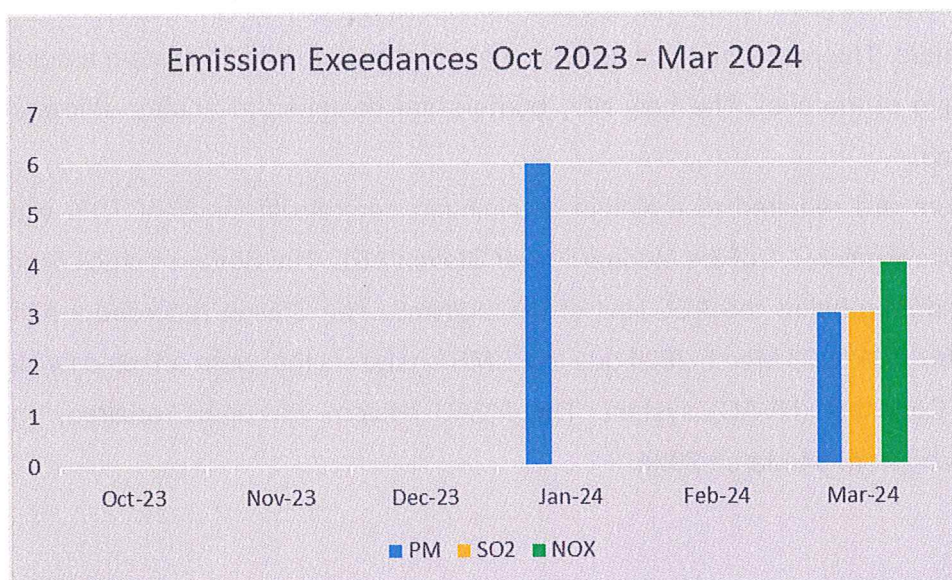
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## 2. Interpretation of all available data, test, and monitoring results regarding operation of the plant and all impacts on the environment.

### Emission Exceedances



**Figure 1: Stack Emission Exceedances Unit 1 - 6**

### PM Emissions

Medupi Power Station makes use of the Pulse Jet Fabric Filter Plant (PJFF) to reduce PM from the stacks. A daily average PM limit of 50 mg/Nm<sup>3</sup> was granted and is in effect from July 2019 as reflected on the Medupi Power Station AEL. There was a total of nine (9) PM exceedances recorded during the reporting period. Six (6) of the exceedances were within grace (start-up and shutdowns), and three (3) were due to CEMS issues. No section 30 incidents were reported for this reporting period.

### SO<sub>2</sub> and NO<sub>2</sub> Exceedances

A monthly average SO<sub>2</sub> limit of 3500 mg/Nm<sup>3</sup> was granted and is in effect from July 2019 as reflected on the Medupi Power Station AEL. SO<sub>2</sub> emissions are monitored and managed daily to ensure duty of care. There was a total of three (3) SO<sub>2</sub> exceedances of the 3500mg/Nm<sup>3</sup> limit from 01-03 March 2024, however the monthly limit of 3500 mg/Nm<sup>3</sup> was not exceeded.

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All the exceedances were due to the faulty analyzer at Unit 3 that was affected by Heating Ventilation and Air Condition (HVAC) system.

The Medupi Power Station firing system is equipped with 30 swirl stage low NO<sub>2</sub> burners, arranged in 5 rows of burners, and designed for normal operation with one standby-mill (4- mill operation), i.e., with 24 out of 30 burners. The processes that occur in the pulverized-coal firing system are grinding, drying, and distributing of the coal. The Low NO<sub>2</sub> burners are designed to ensure efficiency and improved performance.

The Low NO<sub>2</sub> Burners are required to maintain a minimum control efficiency of 70% with 100 utilizations in terms of condition 7.1 of the Medupi Power Station AEL. The Station's stack emissions for NO<sub>2</sub> generally performs below the AEL limit of 750mg/Nm<sup>3</sup>. The Station recorded a high NO<sub>2</sub> above 750 mg/Nm<sup>3</sup> from 01 to 03 March 2024 due to CEMS analyzers that were affected by Heating Ventilation and Air Condition (HVAC) system. The HVAC system was then repaired, and the temperature normalized from 04 March 2024.

#### Unit 1-6 Emission Tonnages

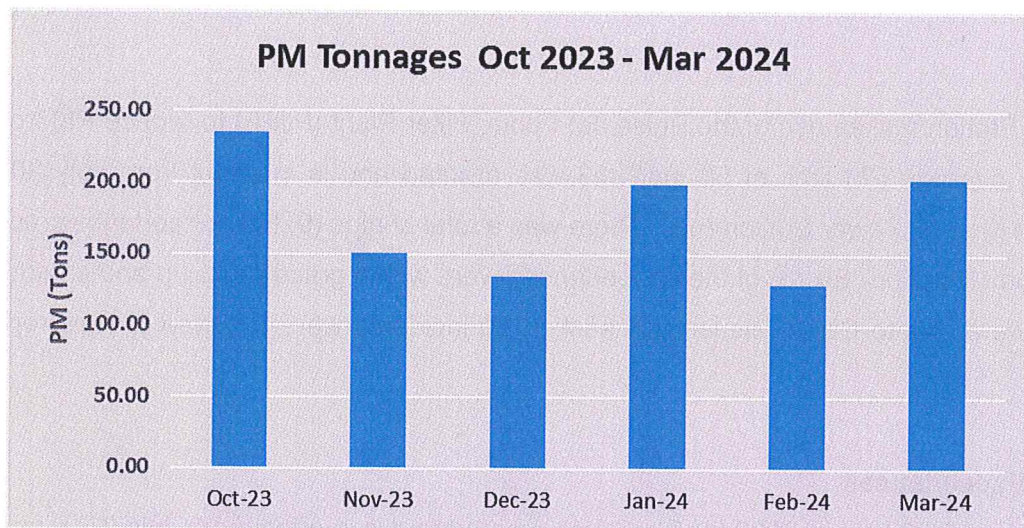



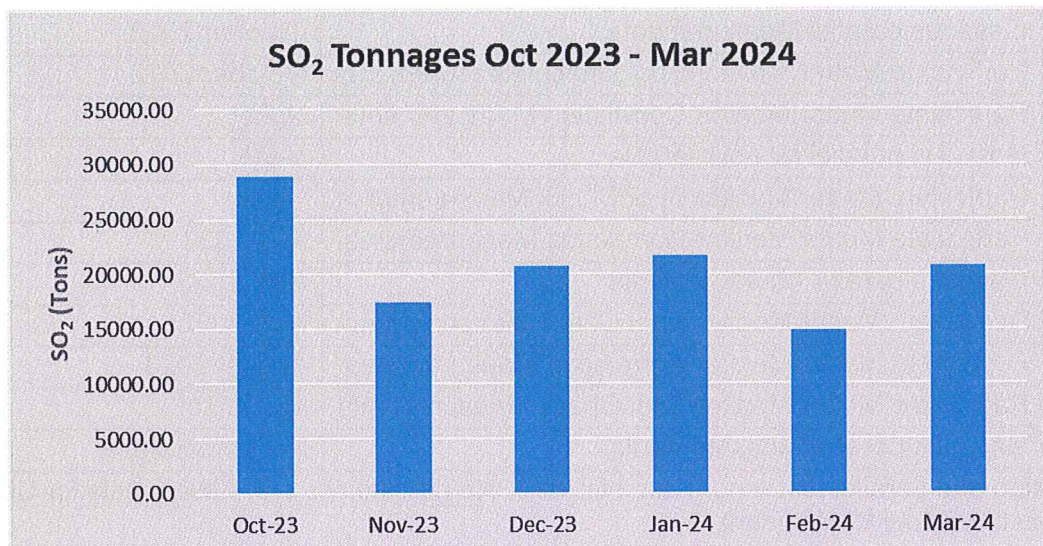
Figure 2: Six monthly PM Tonnages

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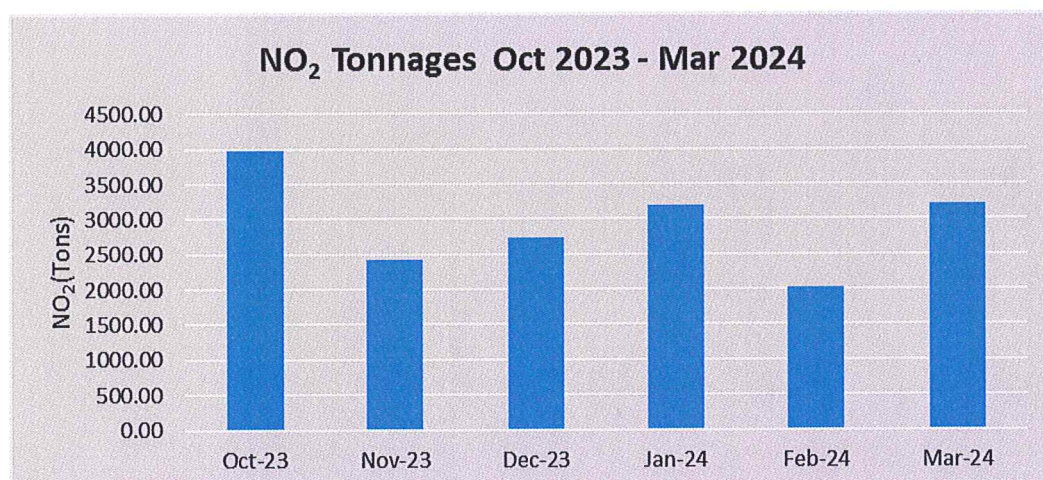
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**Figure 3: Six monthly SO<sub>2</sub> tonnages**



**Figure 4: Six monthly NO<sub>2</sub> tonnages**


**Table 2: Emissions spot/verification/correlation/parallel test results**

Unit	Type of test	Date
1	Particulate Matter Monitor Correlation Measurements	May 2022
	Gaseous parallel Measurements	January 2023
	Particulate Matter Monitor Spot Check Measurements	None
2	Particulate Matter Monitor Correlation Measurements	February 2023
	Gaseous parallel Measurements	November 2022
	Particulate Matter Monitor Spot Check Measurements	None
3	Particulate Matter Monitor Correlation Measurements	January 2023

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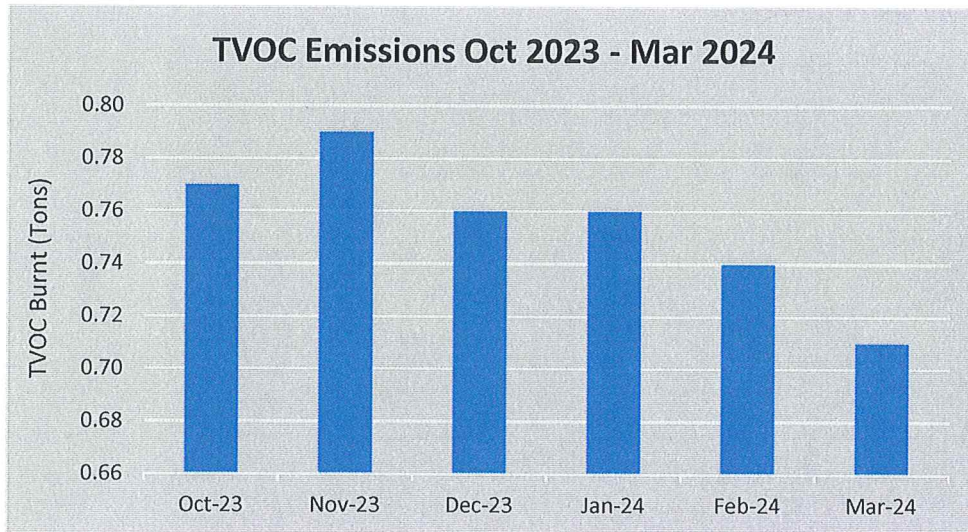
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	Gaseous parallel Measurements	October 2022
	Particulate Matter Monitor Spot Check Measurements	October 2022
4	Particulate Matter Monitor Correlation Measurements	None
	Gaseous parallel Measurements	None
	Particulate Matter Monitor Spot Check Measurements	None
5	Particulate Matter Monitor Correlation Measurements	July 2022
	Gaseous parallel Measurements	April 2023
	Particulate Matter Monitor Spot Check Measurements	May 2022
6	Particulate Matter Monitor Correlation Measurements	August 2023
	Particulate Matter Monitor Spot Check Measurements	March 2022
	Gaseous parallel Measurements	November 2022

All the correlation and parallel test reports are still valid. No parallel and correlation tests for Unit 4 which is off due the Generator incident.



**Figure 5: Six monthly fuel oil TVOC emissions performance**

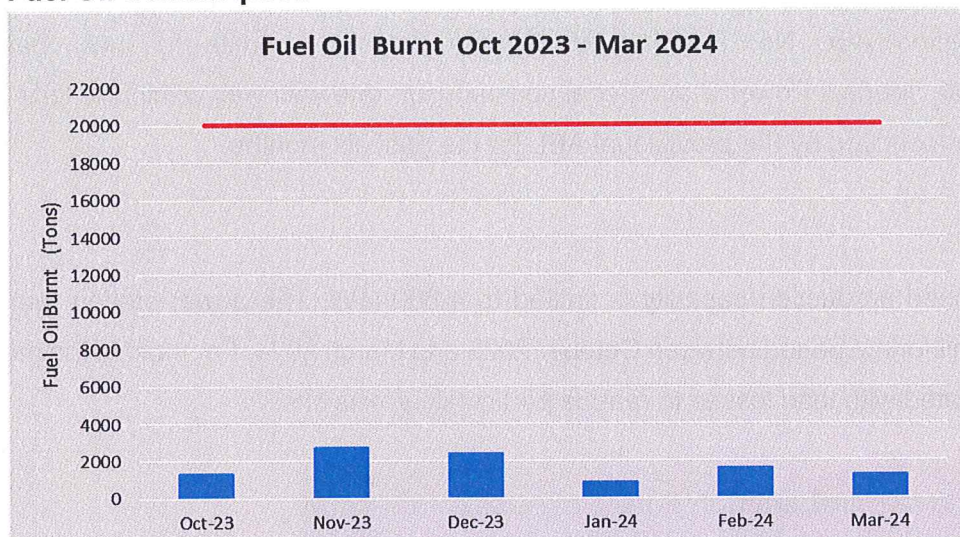
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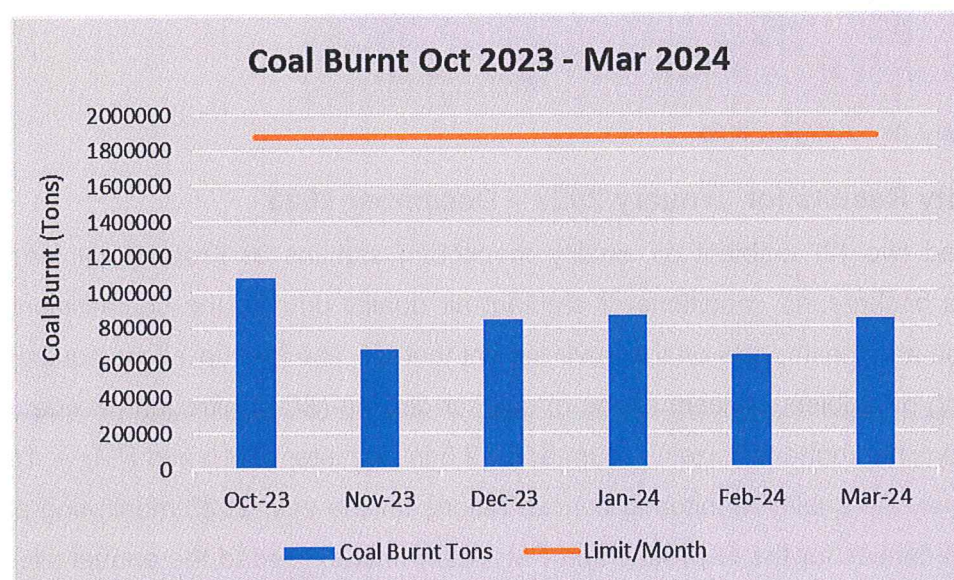
## Fuel Oil Consumption



**Figure 6: Six monthly fuel oil consumption**

Medupi Power Station uses fuel oil during unit light up, the maximum allowable tons of fuel oil to be used by Medupi Power Station is 20 000 tons/month. The Power Station monitors the monthly usage and report to Waterberg District Municipality (WDM), figure 6 above indicates that the Power Station complies with the requirements of the provisional AEL limit of 20 000 tons per month.

## Coal Burnt Rate




**Figure 7: Six monthly coal burnt rate.**

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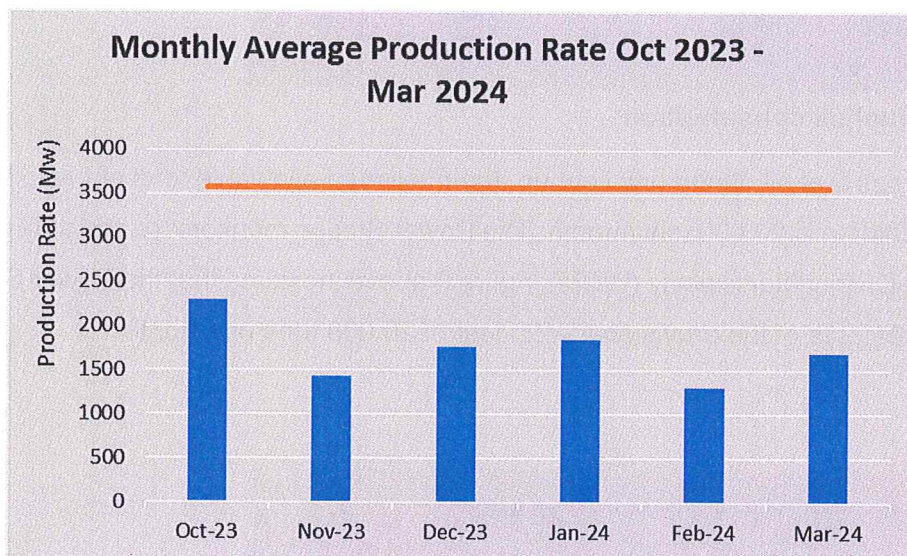


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Medupi Power Station AEL No. H16/1/13-AEL/M1/R1 prescribes limits for raw materials consumption for coal. Medupi Power Station coal consumption rate was well within the limit 1 875 000 tons/month as prescribed by the provisional AEL for the past six months.

### Production rates

The maximum licensed production capacity is limited to 4 800 MW. The power station remained within prescribed limit for the period between October 2023 and March 2024. For most of the months, the Units were operated with load losses to reduce particulate emissions.



**Figure 8: Six monthly production rate**

### Ambient Air Quality Results for January 2023 – December 2023

Eskom commissioned two (2) ambient air quality monitoring stations at Kroomdraai farm and Marapong to assess background conditions of ambient air quality prior to the commissioning of Medupi Power Station and the impacts on the environment thereof. The Medupi site is equipped for continuous monitoring of ambient concentrations of sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), fine particulate matter of sizes <10µm and <2.5 in diameter (PM<sub>10</sub> and PM<sub>2.5</sub>). Table 3 below presents ambient air quality monitoring concentrations for the year 2023 monitoring period. The number of exceedances for the O<sub>3</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> daily limit exceeded the annual allowable limit. The rest of the ambient pollutants are still within the allowable limits.

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Months	SO <sub>2</sub> Hourly	SO <sub>2</sub> Daily	SO <sub>2</sub> 10-Minute	NO <sub>2</sub> Hourly	PM <sub>10</sub> Daily	PM <sub>2.5</sub> Daily	O <sub>3</sub> 8- Hourly
Jan-23	0	0	0	0	4	ND	0
Feb-23	0	0	0	0	1	ND	2
Mar-23	0	0	0	0	4	7	0
Apr-23	3	0	8	0	0	1	0
May-23	5	1	14	0	0	0	0
Jun-23	2	0	11	0	0	2	0
Jul-23	1	0	2	0	2	2	0
Aug-23	3	0	4	0	3	ND	17
Sep-23	2	0	4	0	4	ND	69
Oct-23	4	0	3	0	2	ND	42
Nov-23	0	0	4	0	3	ND	0
Dec-23	1	0	3	0	0	ND	ND
<b>Total</b>	<b>21</b>	<b>1</b>	<b>53</b>	<b>0</b>	<b>23</b>	<b>12</b>	<b>130</b>
<b>Allow Number of exceedances</b>	<b>88</b>	<b>4</b>	<b>526</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>11</b>

**Table 3: Number of exceedances of the National Ambient Air Quality Limits for reporting period.**

**ND – No Data**

PM<sub>2.5</sub> Daily monitoring equipment has been faulty since august 2023. PM<sub>2.5</sub> was removed from site due to errors on the data. Eskom Research and Testing department is in a process of setting up a new contract. The Marapong Ambient Monitoring station was not operational during the reporting period due to vandalism. The ambient monitoring station was relocated to a more secure location at Marapong and reinstated on 03 April 2024.

### Fugitive Dust Fall Results


Medupi Power Station dust monitoring network consists of 20 buckets which are collected and analysed within 30 +/- 3 days. The results for the reporting period of October 2023 to April 2024 is depicted in figure 9 below. It is evident that the dust management practice within the Power Station is a challenge, however from January 2024 to March 2024 the station recorded only one exceedance at D03.

**Table 4: Six monthly Fugitive Dust Buckets Exceedances**

Monitoring Point	Number of Exceedances	Months and Dust fallout (mg/m <sup>2</sup> /days)
D03	1	March 2024 =1860 mg/m <sup>2</sup> /d.

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D15a	6	July 2023 = 1712 mg/m <sup>2</sup> /d, Aug 2023 = 1873 mg/m <sup>2</sup> /d, Sep 2023 = 1895 mg/m <sup>2</sup> /d, Oct 2023 = 1474 mg/m <sup>2</sup> /d, Nov 2023 = 1223 mg/m <sup>2</sup> /d, and Dec 2023 = 1979 mg/m <sup>2</sup> /d.
D13	2	Oct 2023 = 1645 mg/m <sup>2</sup> /d, and Nov 2023 = 2046 mg/m <sup>2</sup> /d.
D5a	5	Aug 2023 = 1544 mg/m <sup>2</sup> /d, Sep 2023 = 1525 mg/m <sup>2</sup> /d, Oct 2023 = 2574 mg/m <sup>2</sup> /d, Nov 2023 = 2496 mg/m <sup>2</sup> /d, and Dec 2023 = 1555 mg/m <sup>2</sup> /d.
D16	2	Oct 2023 = 1558mg/m <sup>2</sup> /d, and Nov 2023 = 1501 mg/m <sup>2</sup> /d.

Note: Medupi Power Station developed a dust management plan, and the measures are being implemented and monitored regularly to determine their effectiveness

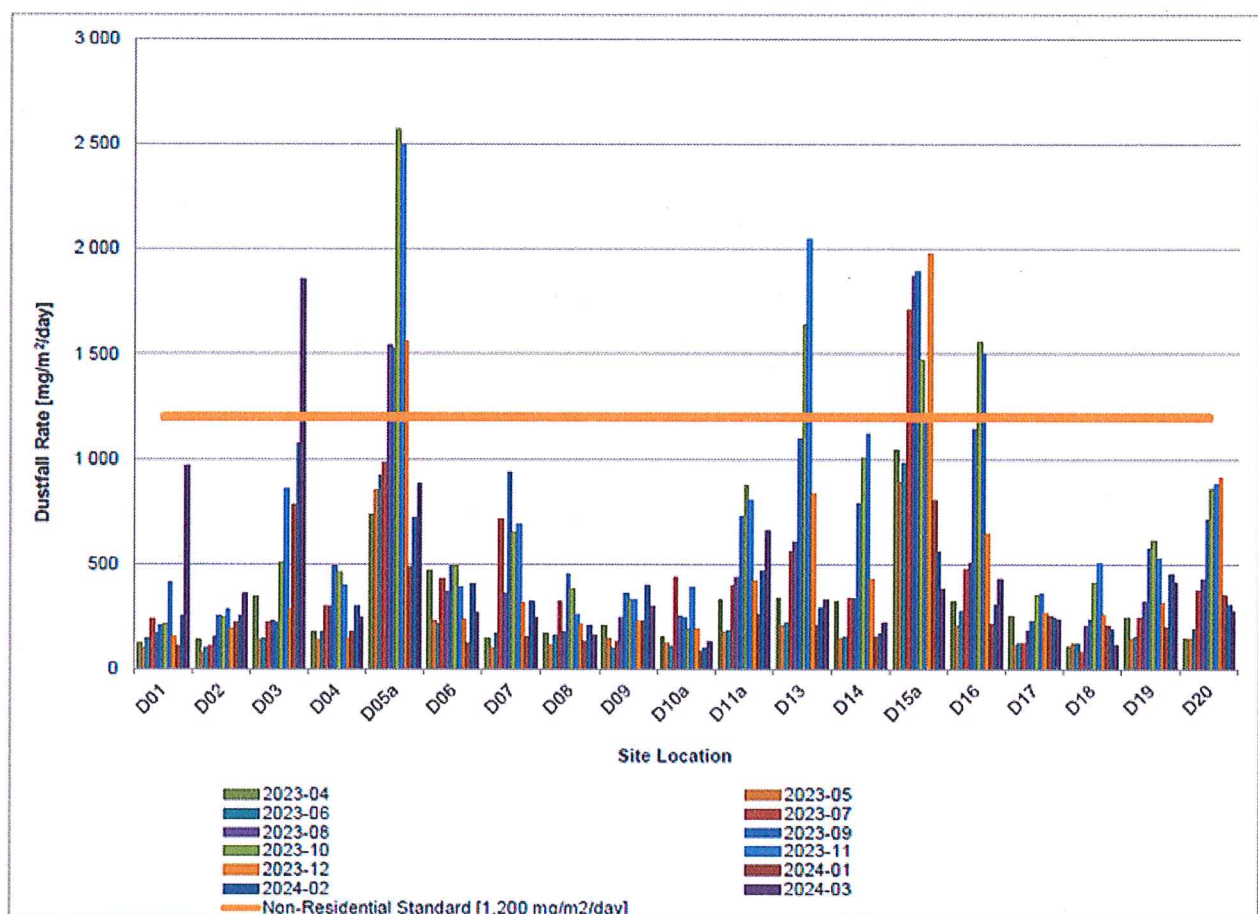



Figure 9: Fugitive Dust-Fall Emissions

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## Conclusion


Medupi Power Station complies with most of the requirement of the AEL issued in terms of Section 40(1) (a) of the National Environmental Management: Air Quality Act, 2004, listed activity No. 1.1, 2.4 and 5.1.

The stack emissions performance showed improved performance between October 2023 and March 2024. Most of the exceedances that were recorded were attributed to poor CEMS performance. This had an impact on the reliability of the data mostly for Unit 6, where in some instances low PM figures were recorded.

The ambient air monitoring station indicated exceedances of PM10 and PM2.5. The other parameters did not exceed the allowable annual limit of the National Ambient Air Quality for reporting period. The ADF and other sources of fugitive dust around Lephalale contributed to the elevated PM concentrations. Fugitive dust monitoring network recorded multiple exceedances at D15a and D5. A dust management plan with actions to address the exceedances was developed and submitted to the authorities. Implementation of the actions is in progress.

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Compiled by:



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Reviewed by:



**Thabo Khoza**

**MEDUPI POWER STATION: ENVIRONMENTAL MANAGEMENT SENIOR ADVISOR**

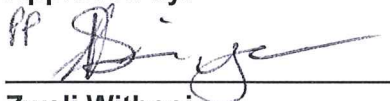
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**Mokgadi Dikgale**

**MEDUPI POWER STATION: ENVIRONMENTAL MANEGEMENT MANAGER**

Approved by:



**Zweli Witbooi**

**MEDUPI POWER STATION: GENERAL MANAGER**

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