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Date:
 22 May 2018

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Ref: ENV-2018-19-001

Dear Mr Hlanyane

MAJUBA POWER STATION'S ANNUAL EMISSIONS REPORT FOR FY 2017/18

This serves as the annual report which is required in terms of Section 7.6 of Majuba Power Station's Atmospheric Emission License (License No. Dr PKI Seme/Eskom H SOC Ltd/ MPS/0014/2014/F01) as well as in terms other reporting requirements listed in the Minimum Emission Standards. The emissions are for Majuba's 2017/2018 financial year, from 1 April 2017 to 31 March 2018. Verified emissions as measured by installed CEMS of particulate matter (PM), SO₂, NO_x (as NO₂) and CO₂ and N₂O emissions as calculated are included.

Name, description and reference number of plant as specified in the AEL:

Enterprise name; trading as	Eskom Holdings SOC Limited; Majuba Power Station
Industry Sector	Electricity Generation
Enterprise Registration Number	2002/015527/06

Table 1: Listed activities as per Majuba's AEL

Category of Listed Activity	Sub-category of the Listed Activity	Listed Activity Name	Description of the Listed Activity
Category 1	Sub-category 1.1	Solid Fuel Combustion Installations (excluding any material that is regarded as waste in terms of the Waste Act, 2008)	Solid fuel combustion installations used primarily for steam raising or electricity generation
Category 1	Sub-category 1.4	Gas Combustion Installation	Gas combustion (including gas turbines burning natural gas) use primarily for steam raising or electricity generation.

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Category 2	Sub-category 2.4	Storage and Handling of Petroleum Products	Storage and Handling of Petroleum Products
Category 5	Sub-category 5.1	Storage and handling of ore and coal	Storage and handling of ore and coal not situated on a premises of a mine or works as defined in the Mines Health and Safety Act 29/1996

1. Pollutant emission trends and greenhouse gas emissions

The emissions in the table below are that of the 2017/2018 financial year.

Table 2: Summary of total emissions at Majuba Power Station 2017/2018

Power Station	Coal-fired emissions (tons/annum)	Fuel-oil emissions (tons/annum)	Total (tons/annum)
Majuba Power Station	CO ₂ : [REDACTED] N ₂ O: 442.855 PM: 2 015.00 SO ₂ : 247 856 NO ₂ : 147 715	N ₂ O: - PM: - SO ₂ : 2 753.01 NO ₂ : -	N ₂ O: 442.855 PM: 2 015.00 SO ₂ : 250 609.01 NO ₂ : 147 715

CO2 removed due to commercial sensitivity

Table 3: Pollutant Emission Trends for 2017/18

Month	PM (tons)	SO ₂ (Tons)	NO _x (Tons)	CO ₂ (tons)	N ₂ O (tons)
April 2017	170.3	19 465	12 436	[REDACTED]	37.0
May 2017	183.1	19 966	12 692	[REDACTED]	39.0
June 2017	150	18 352	11 850	[REDACTED]	34.2
July 2017	141.5	19 157	11 338	[REDACTED]	36.7
August 2017	144.8	20 625	11 797	[REDACTED]	35.5
September 2017	125.2	20 302	12 158	[REDACTED]	35.5
October 2017	145.4	17 421	10 918	[REDACTED]	36.5
November 2017	169.1	23 120	13 691	[REDACTED]	39.5
December 2017	159.6	19 561	11 383	[REDACTED]	33.1
January 2018	198	22 203	12 453	[REDACTED]	36.4
February 2018	177.7	21 719	11 940	[REDACTED]	36.9
March 2018	250.3	25 965	15 059	[REDACTED]	42.5

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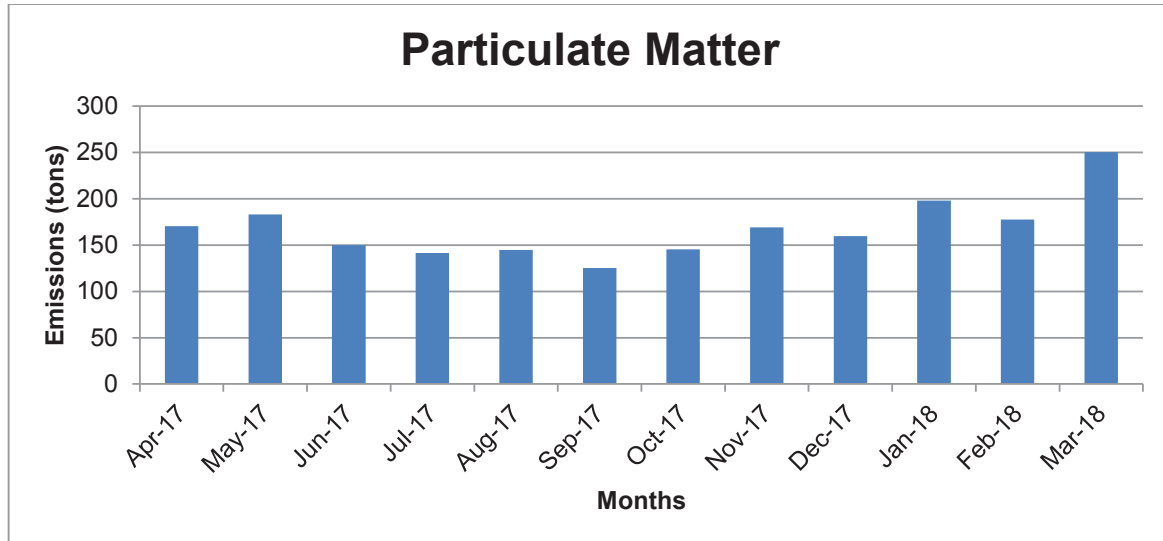


Figure 1. Monthly Particulate Emissions in tons from Majuba Power Station for FY 2017/18

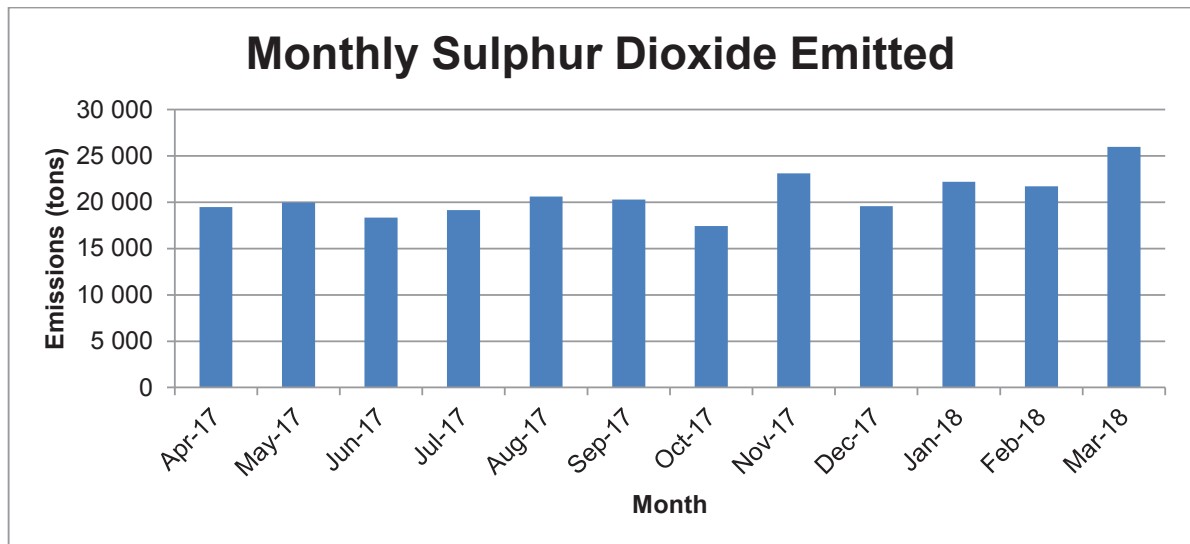


Figure 2. Monthly SO₂ Emissions in tons from Majuba Power Station Financial Year 2017/18

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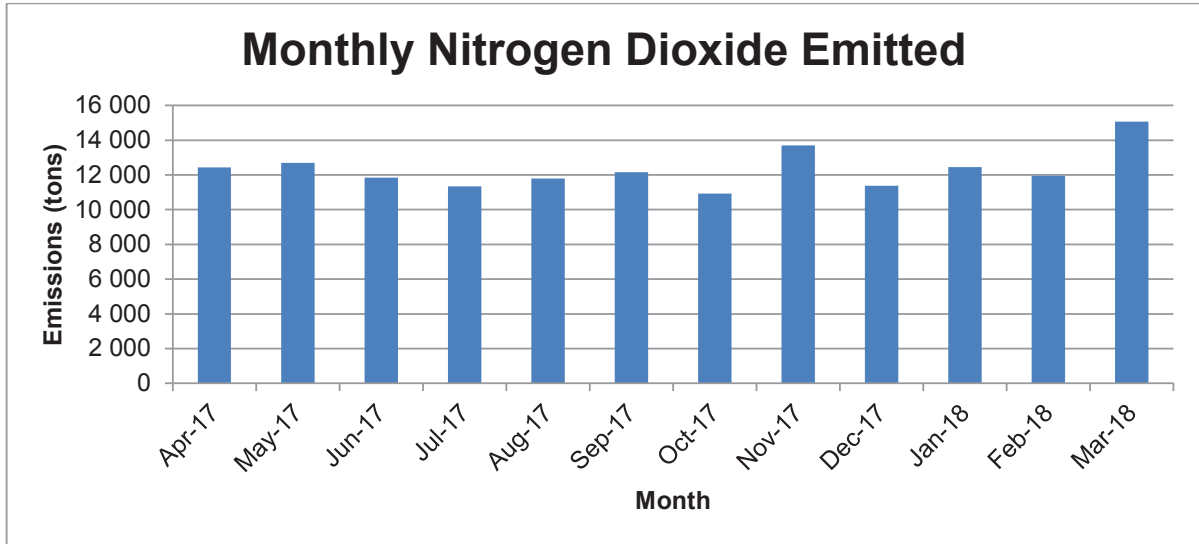


Figure 3. Monthly NO₂ Emissions in tons from Majuba Power Station Financial Year 2017/18

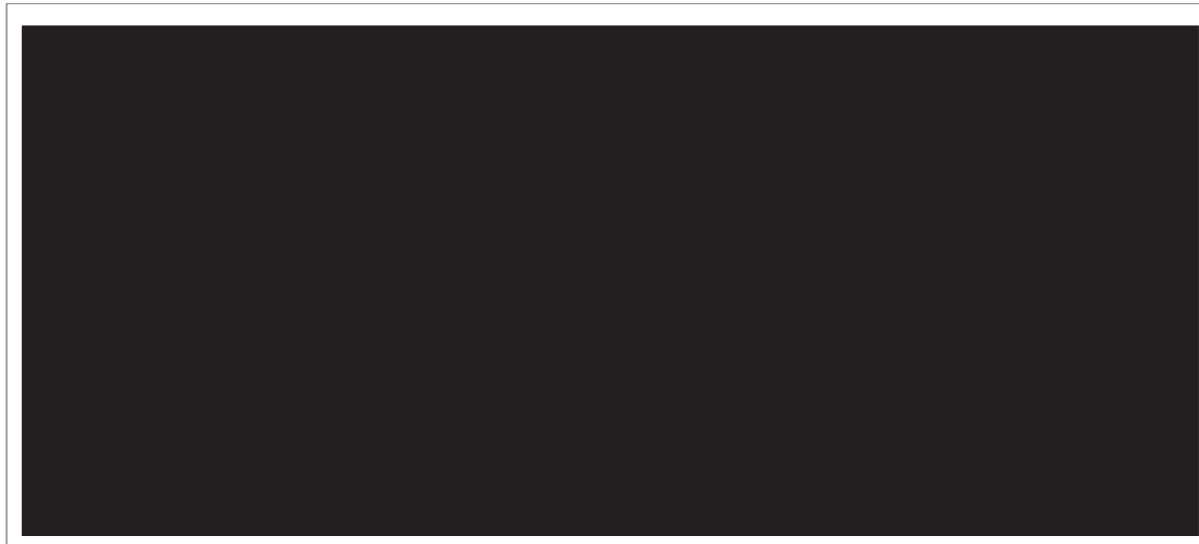


Figure 4. Monthly CO₂ Emissions in tons from Majuba Power Station Financial Year 2017/18

*Note: Figure 4 shows the sum of monthly coal and fuel oil burtn CO₂

CO2 removed due to commercial sensitivity

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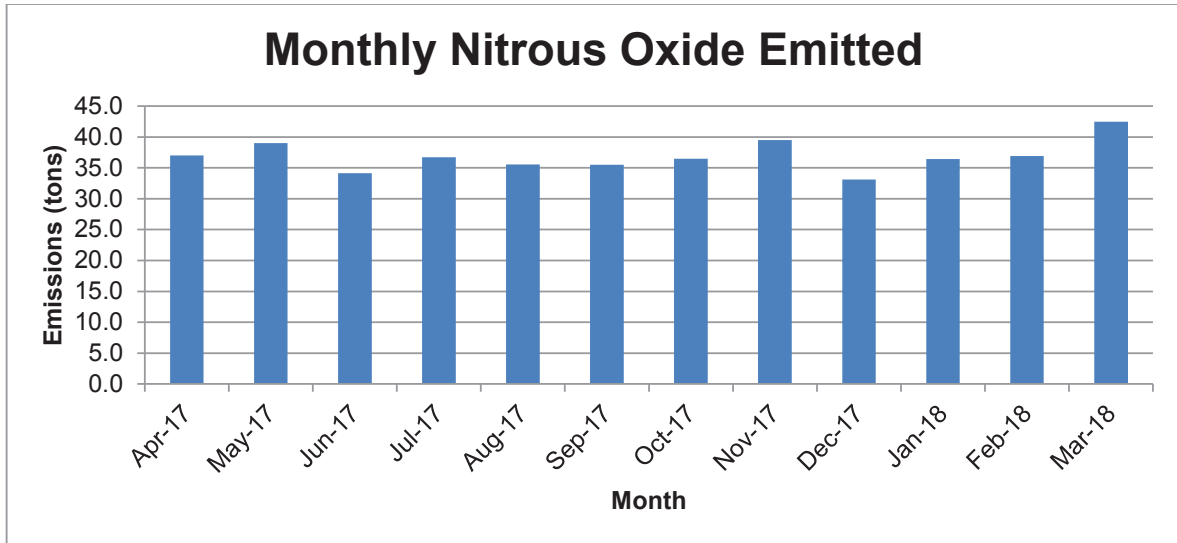


Figure 5: Monthly N₂O Emissions in Tons from Majuba Power Station Financial Year 2017/18

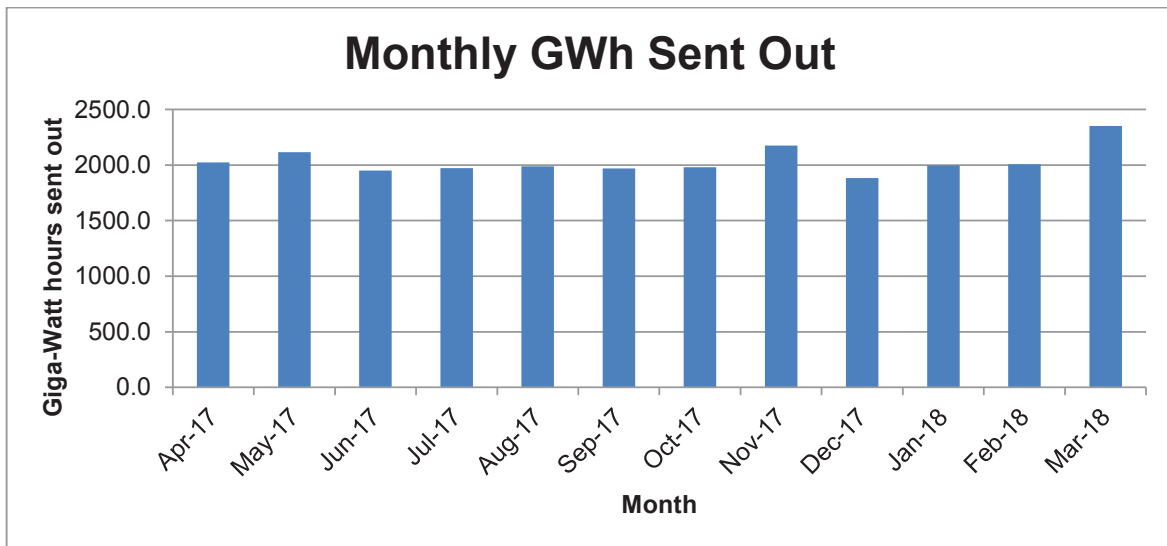


Figure 5. Monthly GWh sent out at Majuba Power Station Financial Year 2017/18

2. Compliance and Audit Report(s):

No external compliance audits were conducted during 2017/18.

3. Major upgrades projects:

No major upgrades were conducted at Majuba during the 2017/18 financial year.

4. Greenhouse gas emissions:

Greenhouse gases as CO₂ and N₂O are presented in Tables 2 & 3 and Figures 4 & 5 above.

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5. Monitor Reliability

Table 4 indicates monitor reliability throughout the 2017/18 monitoring period. These values indicate the level of compliance to the requirement of a minimum of 80% valid hourly average values during the reporting period, as stipulated within the NEM: AQA (Act 39 of 2004) List of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage (GNR 893 of 2013).

Table 4: Percentage monitor reliability (%)

Unit(s)	Particulate Matter	SO ₂	NO _x
Unit 1	99.88	99.26	99.90
Unit 2	99.88	99.97	100.00
Unit 3	99.68	100.00	100.00
Unit 4	96.22	65.06	96.33
Unit 5	65.87	91.65	91.10
Unit 6	99.83	100.00	100.00

- For the reporting period, Unit 5 PM monitor did not achieve the required level of reliability. This issue was reported to the Licensing Authority in the letter dated 05 February 2018. In summary, the issue stemmed from the PM monitor not accepting an updated extinction range, as prescribed during a correlation test, due to a technical error.
- Unit 4 SO₂ monitor was found to be reading abnormally low values and negative values while the unit was offline. This was indicative of monitor drift and that the monitor requires recalibration. The issue has subsequently been resolved.

6. Emissions in terms of Subcategory 2.4 Storage of petroleum products

Majuba Power Station has conducted volatile organic compounds emissions monitoring as required by Section 7.7 of the station's AEL. This investigation was concluded prior to the due date of 12 months from the date of signature of the license (i.e. November 2017). The results of the monitoring were subsequently communicated to the Licensing Authority in the letter dated 6 February 2018.

Passive badge monitoring of VOCs was conducted for a period of three months (August-October 2017) at six sampling sites to determine the ambient concentrations of these pollutants within and surrounding the Power Station. Three monitoring sites were located directly adjacent to Majuba's fuel oil tanks (deemed to be the primary source of VOCs on site) and three sites were located on Majuba's primary parameter fence. Detailed results were shared with the Licensing Authority along with the letter dated 6 February 2018. Importantly however, observed benzene concentrations across all sites were well below the annual average limit of 5µm/m³ as required by the National Annual Ambient Air Quality Standard (GNR 32816), for the three month monitoring period.

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7. National Atmospheric Emissions Inventory System

Majuba Power Station submitted its annual report on the NAEIS system by the 31 March 2018.

8. Status of stratification, parallel and correlation tests

The results of the most recent stratification, parallel and correlation tests will be attached with this report. Table 5 serves as a brief summary:

Table 5: Overview of dates of last conducted CEMS verification tests for PM, SO₂ and NOx

Stack/ Unit	PM	SO ₂	NOx
1	27 July – 06 August 2017	28 Feb-20 March 2018	28 Feb-20 March 2018
2	1 & 3 April 2016	28 Feb-20 March 2018	28 Feb-20 March 2018
3	27 July – 06 August 2017	28 Feb-20 March 2018	28 Feb-20 March 2018
4	27 July – 06 August 2017	28 Feb-20 March 2018	28 Feb-20 March 2018
5	1-5 November 2017	28 Feb-20 March 2018	28 Feb-20 March 2018
6	4 & 11 November 2016	28 Feb-20 March 2018	28 Feb-20 March 2018

Sampling Methods used: Parallel Tests

The following sampling methods were used in accordance with Annexure 2 of the NEM:AQA Listed Activities (GN 893 of 2013):

Table 6: Sampling methods used in parallel tests

Compound	Method	Comment
Combustion gases	Using the Horiba PG 250 Portable gas analyzer (SRM)	
O ₂	Based on USEPA Method 3A - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)	Zirconium cell measuring principle
CO ₂		NDIR measuring principle
CO	Based on USEPA Method 10 - Determination of Carbon Monoxide Emissions from Stationary Sources	NDIR measuring principle
SO ₂	Based on USEPA Method 6C - Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)	NDIR measuring principle
NOx	Based on USEPA Method 7E - Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)	Chemiluminescence measuring principle
Homogeneity	BS EN 15259:2007 - Air quality. Measurement of stationary source emissions. Measurement strategy, measurement planning, reporting and design of measurement sites	.

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Report format	BS EN 15259:2007 - Air quality. Measurement of stationary source emissions. Measurement strategy, measurement planning, reporting and design of measurement sites	
Correlation function	Based on BS EN 14181: 2014	CEMS Review Template V12.2016
Variability test	Based on BS EN 14181: 2014	CEMS Review Template V12.2016

Sampling Methods used: Correlation tests

The following sampling methods were used in accordance with Annexure 2 of the NEM:AQA Listed Activities (GN 893 of 2013):

Table 7: Sampling methods used in correlation tests

Compound	Method	Comment
Particulate Matter	Based on ISO 9096: 2003 Stationary source emissions - Manual Determination of mass concentration of particulate matter.	
Low mass concentrations	Based on BS EN 13284-1:2002 Stationary source emissions — Determination of low range mass concentration of dust — Part 1: Manual gravimetric method	Based on ISO 9096 with additional requirements on the filter preparation and procedures before and after the tests.
Combustion Gasses		
O ₂	Based on USEPA Method 3A - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)	Electrochemical cell measuring principle
Correlation Function	VDI 2066, Part 4	In particular giving the 75% Tolerance and 95% Confidence bands.
Report format	BS EN 15259:2007 - Air quality. Measurement of stationary source emissions. Measurement strategy, measurement planning, reporting and design of measurement sites	
Velocity AMS Correlation function	Based on BS EN 14181: 2014	CEMS Review Template V15.2018

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Finally it should be noted, that Majuba received no complaints for the 2017/18 financial year. The rest of the information demonstrating compliance with the emission license conditions is supplied in the monthly emission reports sent to your office.

Hoping the above will meet your satisfaction.

Yours sincerely



Tebogo Lekalakala
GENERAL MANAGER: MAJUBA POWER STATION

Date 2018.05.24