Eskom

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Date
09 April 2022

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Dear Mrs Mpho Nembilwi

Ref Kendal Power Station AEL (17/4/AEL/MP312/11/15)

KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF MARCH 2022.

This is a monthly report required in terms of Section 7 4 in the Kendal Power Station's Atmospheric Emission License The emissions are for Eskom Kendal Power Station

Compiled by:

Tshilidzi Vilane
ENVIRONMENTAL OFFICER- KENDAL

Date: 09/05/2022

Supported by:

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ENVIRONMENTAL MANAGER- KENDAL

Date: 17/05/2022

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KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTHS OF MARCH 2022.

Verified by:

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BOILER ENGINEERING: SYSTEM ENGINEER- KENDAL

Date: 18/05/2022

Validated by:

Tendani Rasivhetshele
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Date 19/05/2022

Supported by:

Malibongwe Mabizela
ENGINEERING MANAGER-KENDAL

Date 19/05/2022

Approved by:

Lukhanyo Ndube
GENERAL MANAGER-KENDAL

Date 23/05/2022

Eskom MARCH 2022 REV 02

KENDAL POWER STATION MONTHLY EMISSIONS REPORT

Atmospheric Emission License 17/4/AEL/MP312/11/15

1 RAW MATERIALS AND PRODUCTS

Raw Materials and Products	Raw Material Type	Units	Maximum Permitted Consumption Rate	Consumption Rate Mar-2022
	Coal	Tons	*2 260 000*	*973 166*
	Fuel Oil	Tons	*5 000*	*2249.11*
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Mar-2022
	Energy	MWh(MW)	*3,153,600 (4380)*	*1 603 123.00*
	Ash	Tons	*770 000*	*335 255.7*
	RE Ash	kg/MWh	*not specified*	*0.590*

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	*<1 (%)*	*0.790*
Ash Content	%	*40 (%)*	*34.450*

3 EMISSION LIMITS (mg/Nm³)

Associated Unit/Stack	PM	SOx	NOx
Unit 1	*100*	*3500*	*1100*
Unit 2	*100*	*3500*	*1100*
Unit 3	*100*	*3500*	*1100*
Unit 4	*100*	*3500*	*1100*
Unit 5	*100*	*3500*	*1100*
Unit 6	*100*	*3500*	*1100*

4 ABATEMET TECHNOLOGY (%)

Associated Unit/Stack	Technology Type	Efficiency Mar-2022	Technology Type	Utilization Mar-2022
Unit 1	ESP + SO_3	99.8%	SO_3	0.0%
Unit 2	ESP + SO_3	Off-line	SO_3	Off-line
Unit 3	ESP + SO_3	99.9%	SO_3	0.0%
Unit 4	ESP + SO_3	99.9%	SO_3	0.0%
Unit 5	ESP + SO_3	99.6%	SO_3	0.0%
Unit 6	ESP + SO_3	99.7%	SO_3	0.0%

Unit 1, 2,3,4,5 & 6 sulphur utilization readings not available because KEPDATA04 and

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

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO_2	NO	O_2
Unit 1	100.0	99.3	99.3	99.6
Unit 2	Off-line	Off-line	Off-line	Off-line
Unit 3	99.7	100.0	0.0	98.9
Unit 4	95.3	98.6	98.6	90.4
Unit 5	94.6	100.0	100.0	99.8
Unit 6	94.0	99.9	96.2	0.0

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

Note: Unit 3 NO aalysers is defective and average emissions from AL2 tests were used and Unit 6 oxygen monitor reliability was low because of the monitors that were defective

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of March 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO_2
Unit 1	104.5	5 020	1 568	350 199
Unit 2	Off-line	Off-line	Off-line	Off-line
Unit 3	71.4	2 758	1 004	233 899
Unit 4	52.9	4 190	1 123	250 749
Unit 5	193.5	3 629	1 347	335 091
Unit 6	162.7	3 383	1 282	307 723
SUM	584.90	18 980	6 324	1 477 661

Table 6.2: Operating days in compliance to PM AEL Limit - March 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	31	0	0	0	0	50.7
Unit 2	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
Unit 3	31	0	0	0	0	44.9
Unit 4	25	3	0	0	3	51.7
Unit 5	20	2	0	2	8	126.1
Unit 6	19	7	0	1	8	93.8
SUM	126	12	0	3	19	

Table 6.3: Operating days in compliance to SOx AEL Limit - March 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm³)
Unit 1	31	0	0	0	0	3 159.1
Unit 2	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
Unit 3	31	0	0	0	0	2 061.6
Unit 4	31	0	0	0	0	2 238.7
Unit 5	25	0	0	0	0	1 937.0
Unit 6	29	0	0	0	0	2 336.4
SUM	147	0	0	0	0	

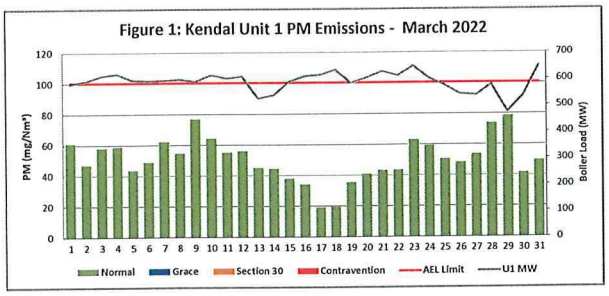
Table 6.4: Operating days in compliance to NOx AEL Limit - March 2022

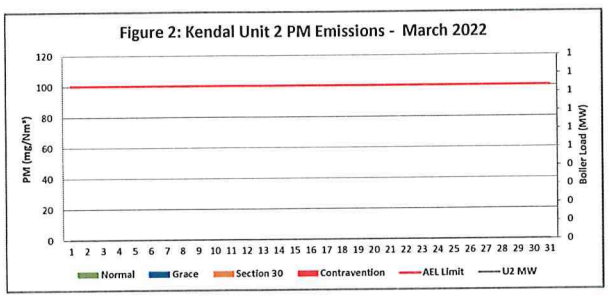
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	31	0	0	0	0	983.2
Unit 2	0	Off-line	Off-line	Off-line	Off-line	Off-line
Unit 3	31	0	0	0	0	750.6
Unit 4	31	0	0	0	0	602.9
Unit 5	25	0	0	0	0	711.5
Unit 6	29	0	0	0	0	882.5
SUM	147	0	0	0	0	

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

Table 6.5: Legend Description

Condition	Colour	Description
Normal		Emissions below Emission Limit Value (ELV)
Grace		Emissions above the ELV during grace period
Section 30		Emissions above ELV during a NEMA S30 incident
Contravention		Emissions above ELV but outside grace or S30 incident conditions





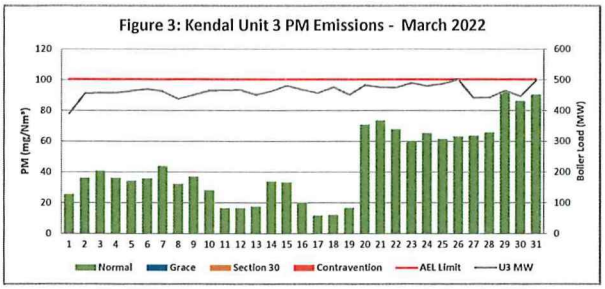


Figure 3: Kendal Unit 3 PM Emissions - March 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

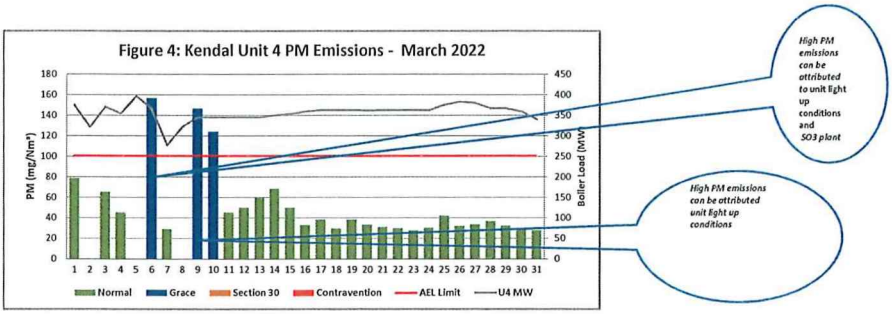


Figure 4: Kendal Unit 4 PM Emissions - March 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW
High PM emissions can be attributed to unit light up conditions and SO3 plant
High PM emissions can be attributed unit light up conditions

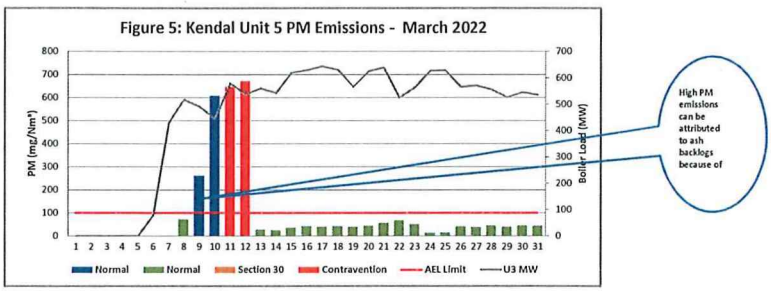


Figure 5: Kendal Unit 5 PM Emissions - March 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Normal
Section 30
Contravention
AEL Limit
U3 MW
High PM emissions can be attributed to ash backlogs because of

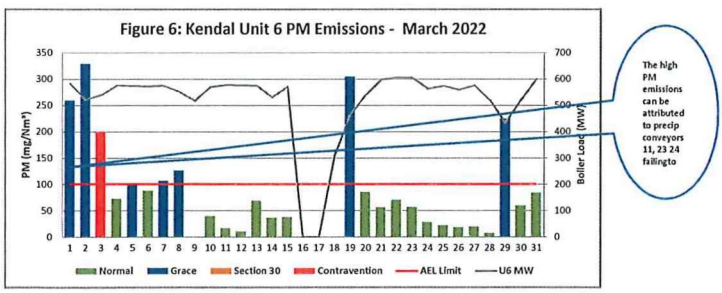


Figure 6: Kendal Unit 6 PM Emissions - March 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U6 MW
The high PM emissions can be attributed to precip conveyors 11, 23 24 failingto

Figure 7: Kendal Unit 1 SOx Emissions - March 2022

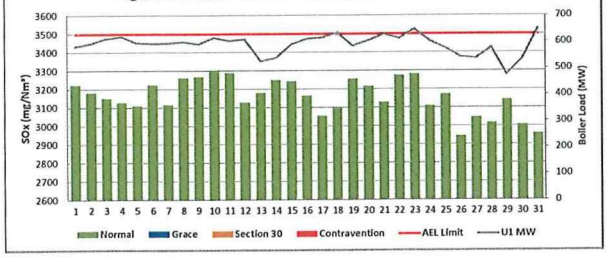


Figure 8: Kendal Unit 2 SOx Emissions - March 2022

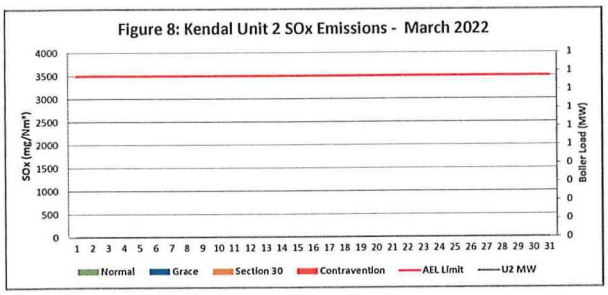
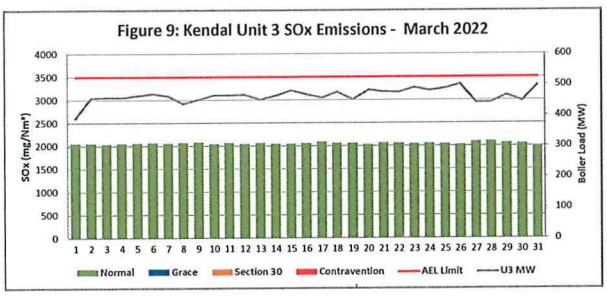


Figure 9: Kendal Unit 3 SOx Emissions - March 2022



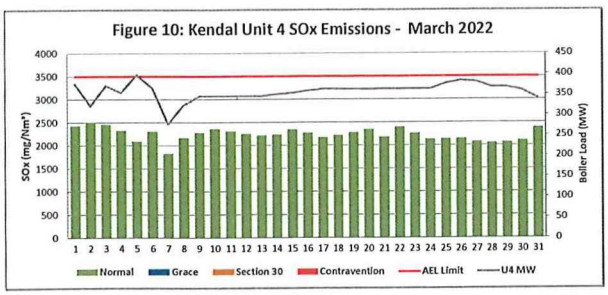


Figure 10: Kendal Unit 4 SOx Emissions - March 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

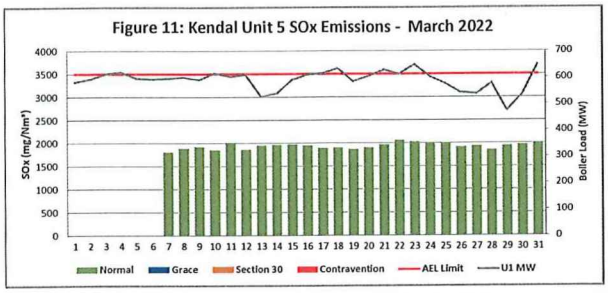


Figure 11: Kendal Unit 5 SOx Emissions - March 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

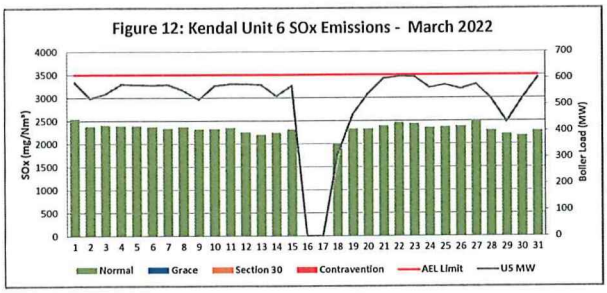


Figure 12: Kendal Unit 6 SOx Emissions - March 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

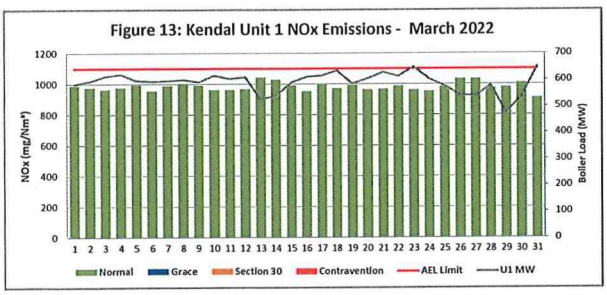
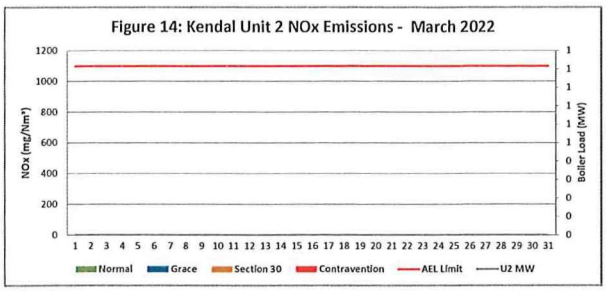
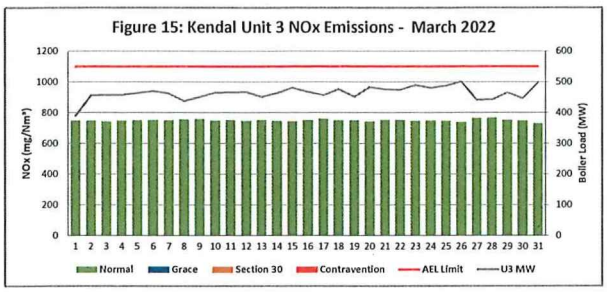
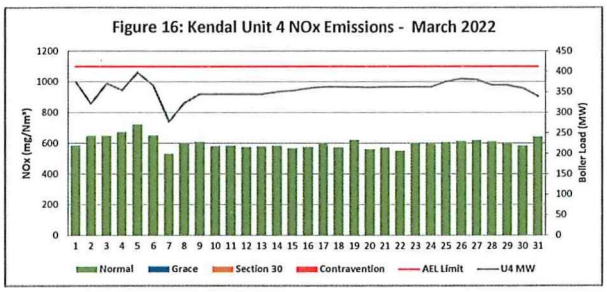
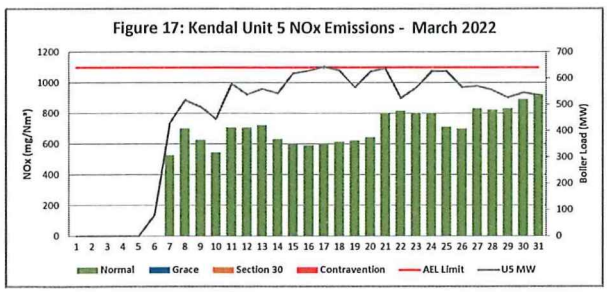


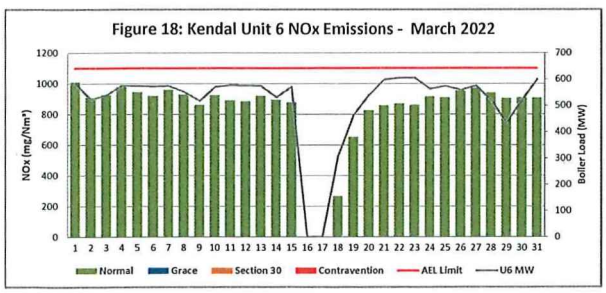
Figure 13: Kendal Unit 1 NOx Emissions - March 2022
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW











7 COMPLAINTS

One complaint was received during this month

Description of complaint	Root Cause Analysis	Calculation of Impacts / emissions associated	Measures implemented to prevent reoccurrence
High stack emissions	Plant failures		An email with responses explaining what was happening on the day of high emissions and measures that were taken to reduce emissions was sent to the complainant

Abatement Technology Table 4

In order to achieve the required operational dust removal efficiency based on measured values several assumptions such as

- Coal ash content (%) and burnt rate mass
- Fly Coarse ash ratio of 80 20 80% of fly ash mass obtained from burnt coal goes to ESP
- Measurement of dust emission by Dust Monitor over a period of time (monthly)

Operational Dust Removal Efficiency

$$\eta = (1 - (Output/Input)) \times 100$$

$$\eta = 1 \quad \frac{(DustEmissionFromAQR\ ReportDustMonitor(tons)}{(CoalBurnt(tons) * \%AshContent * 80\%)} \times 100$$

Monitor Reliability Table 5

In terms of the minimum emissions standard the requirement is that a monitor should be 80% reliable on a monthly average

The monitor reliability refers to data reliability because the assumed value of 98% reliability is compared to the dust concentration signal If the dust concentration signal is above 98% opacity, the data information is no longer reliable because the monitor reading is out of its maximum reading range The data reliability looks at how many times did the dust concentration signal go above 98% over a period of time e g 24hours

The formula is as follows

= (1 – (count hours above 98%/24hours))x 100

Emissions Performance

- Average velocity values from the latest correlation report were used on the gaseous emissions on Unit 1 2 3 4 due to defective CEMS monitors and velocity correction factors were set M=1 and C=0
- Avarage emissions for Unit 2 O2 was used from the QAL2 parallel report because the monitor was out of calibration
- Note Avarage emissions were used from the QAL2 parallel report for unit 3 NO and unit 5 CO2 due to defectve monitor Unit 6 oxygen and flow gaseseous monitors reliability were also low because of the monitors that were defective, avarage emissions were also used from the QAL2 parallel report
- Unit 2 was offload

Unit 2

Findings Unit 2 dust emissions can be attributed to Primary Air heater leakage and por ESP performance

Resolution Primary Air heater leakage and ESP to be fixed during GO

Unit 3

Findings **Unit 3** High PM emissions can be attributed to worn out secondary air heater packs ash backlogs DHP off due to compartment levels high and all precip conveyor knife gates fully closed So3 plant tripped due to steam temp low So3 plant tripping on Burner outlet temperature high Injection setpoint reduced to 12 ppm

Resolution The DHP and SO3 plant was returned back to service after repairs

Unit 4

Findings High PM emissions can be attributed to light up conditions

Unit 5

Findings attributed to ash backlogs because of precip conveyors tripping hopper knife gates closed and the following precip fields were faulty 11, 12, 15, 21 23 31, 32, 33 41 42 AND 43

Resolution Ash backlogs were cleared after the plant was repaired

Unit 6

Findings The high PM emissions can attributed to precip conveyors 11, 23 & 24 failingto run

Resolution The plant was repaired