Eskom

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Date
27 October 2021

Enquiries S Chokoe
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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 SEPTEMBER 2021.

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: 27/10/2021

Supported by:

Solly Chokoe
ENVIRONMENTAL MANAGER- KENDAL

Date: 28/10/2021

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KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTHS OF SEPTEMBER 2021.

Verified by:

Date: 27/10/2021

Fulufhelo Nganke
BOILER ENGINEERING: SYSTEM ENGINEER- KENDAL

Validated by:

Date 28/10/2021

Tendani Rasivhetshele
ACTING BOILER ENGINEERING MANAGER-KENDAL

Supported by:

Date 29-10-2021.

Malibongwe Mabizela
ENGINEERING MANAGER-KENDAL

Approved by:

Date 08-11-21

Lukhanyo Ndube
GENERAL MANAGER-KENDAL

Eskom

SEPTEMBER 2021 REV 01

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 Sep-2021
	Coal	Tons	*2 260 000*	*802 869*
	Fuel Oil	Tons	*5 000*	*3500.98*
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Sep-2021
	Energy	GWh(MW)	*4380*	*1 539 056.00*
	Ash	Tons	*770 000*	*265 348.2*
	RE Ash	kg/MWh	*not specified*	

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	*<1 (%)*	*1.550*
Ash Content	%	*40 (%)*	*33.050*

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 Sep-2021	Technology Type	Utlization Sep-2021
Unit 1	ESP + SO_3	99.9%	SO_3	100.0%
Unit 2	ESP + SO_3	99.9%	SO_3	99.5%
Unit 3	ESP + SO_3	99.8%	SO_3	95.2%
Unit 4	ESP + SO_3	99.6%	SO_3	98.5%
Unit 5	ESP + SO_3	99.2%	SO_3	0.0%
Unit 6	ESP + SO_3	Off-line	SO_3	Off-line

Unit 5 unavailability of sulphur utilisation readings can be attributed to the the server and PI historian which is still under commission

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	90.6	86.1	100.0
Unit 2	99.5	100.0	99.9	100.0
Unit 3	99.8	100.0	91.7	99.5
Unit 4	99.6	100.0	97.2	97.1
Unit 5	98.0	100.0	99.3	99.5
Unit 6	Off-line	Off-line	Off-line	Off-line

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of September 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO2
Unit 1	8.3	856	232	60148.85
Unit 2	51.5	2 621	983	200138
Unit 3	98.5	2 606	676	221000.7
Unit 4	195.8	2 444	926	171546.2
Unit 5	481.1	2 347	743	236560.1
Unit 6	Off-line	Off-line	Off-line	Off-line
SUM	835.17	10 874	3 560	889 394

Table 6.2: Operating days in compliance to PM AEL Limit - September 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contraven .tion	Total Exceedance	Average PM (mg/Nm³)
Unit 1	8	0	0	0	0	21.6
Unit 2	25	2	0	0	2	48.6
Unit 3	22	3	0	3	6	65.5
Unit 4	11	8	0	8	16	146.1
Unit 5	6	7	9	7	0	259.8
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	72	20	9	18	24	

Table 6.3: Operating days in compliance to SOx AEL Limit - September 2021

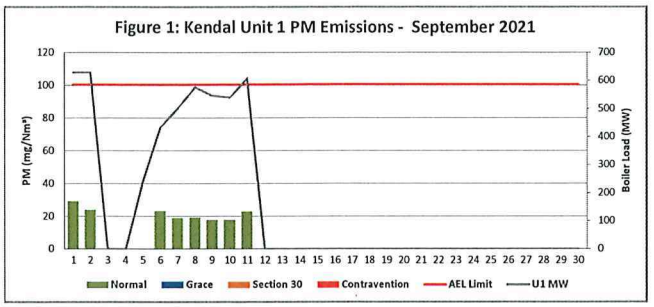
Associated Unit/Stack	Normal	Grace	Section 30	Contraven tion	Total Exceedance	Average SOx (mg/Nm³)
Unit 1	9	0	0	0	0	2 920.7
Unit 2	28	0	0	0	0	2 267.7
Unit 3	29	0	0	0	0	2 009.6
Unit 4	28	0	0	0	0	2 064.9
Unit 5	30	0	0	0	0	2 085.3
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	124	0	0	0	0	

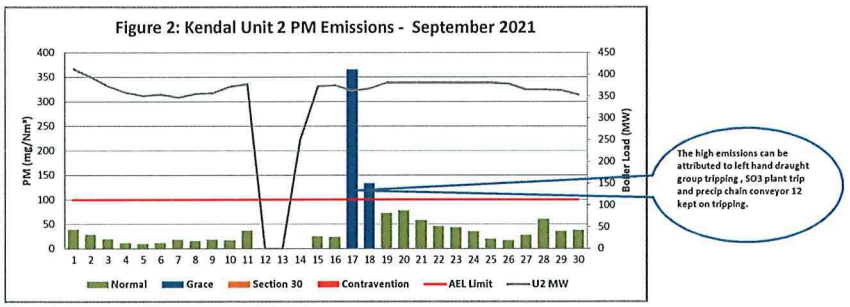
Table 6.4: Operating days in compliance to NOx AEL Limit - September 2021

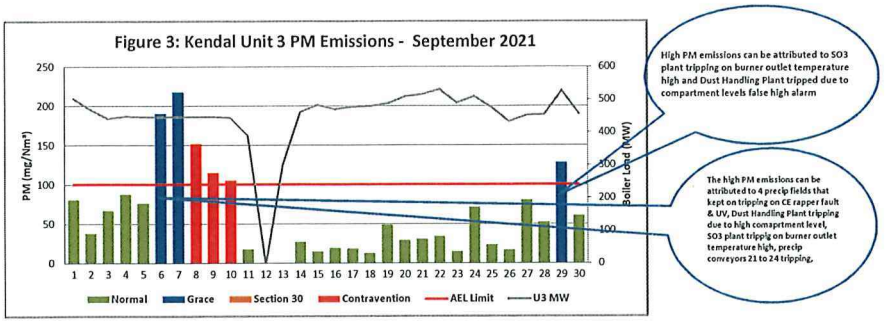
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	8	0	0	1	1	861.9
Unit 2	28	0	0	0	0	839.8
Unit 3	29	0	0	0	0	511.7
Unit 4	28	0	0	0	0	768.4
Unit 5	30	0	0	0	0	661.6
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	123	0	0	1	1	

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

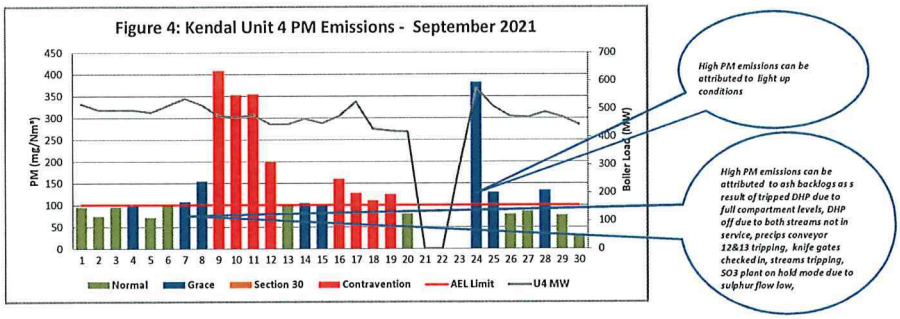






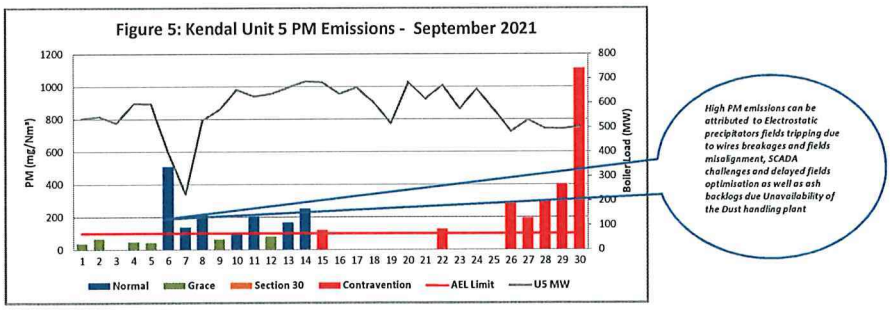
High PM emissions can be attributed to SO3 plant tripping on burner outlet temperature high and Dust Handling Plant tripped due to compartment levels false high alarm

The high PM emissions can be attributed to 4 precip fields that kept on tripping on CE rapper fault & UV, Dust Handling Plant tripping due to high compartment level, SO3 plant tripping on burner outlet temperature high, precip conveyors 21 to 24 tripping,

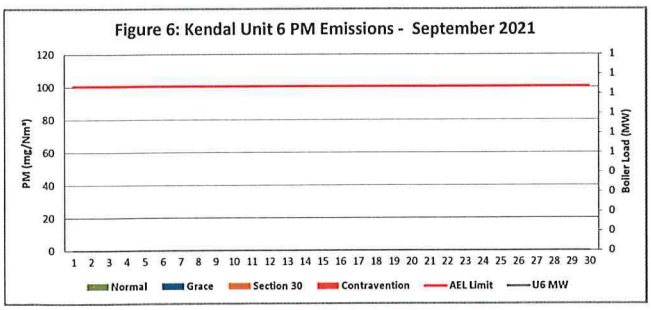


High PM emissions can be attributed to light up conditions

High PM emissions can be attributed to ash backlogs as s result of tripped DHP due to full compartment levels, DHP off due to both streams not in service, precips conveyor 12&13 tripping, knife gates checked in, streams tripping, SO3 plant on hold mode due to sulphur flow low,



High PM emissions can be attributed to Electrostatic precipitators fields tripping due to wires breakages and fields misalignment, SCADA challenges and delayed fields optimisation as well as ash backlogs due Unavailability of the Dust handling plant



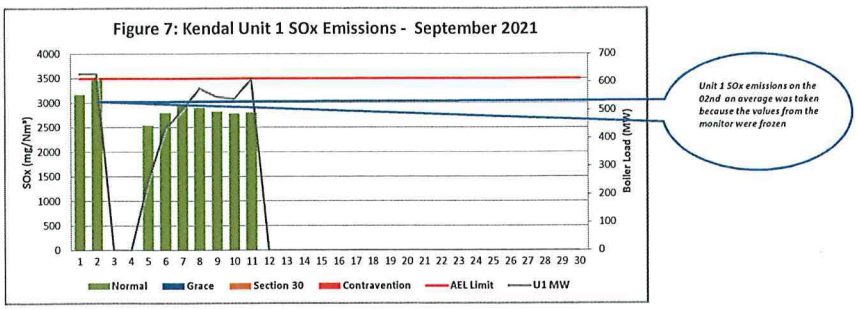


Figure 7: Kendal Unit 1 SOx Emissions - September 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW
Unit 1 SOx emissions on the 02nd an average was taken because the values from the monitor were frozen

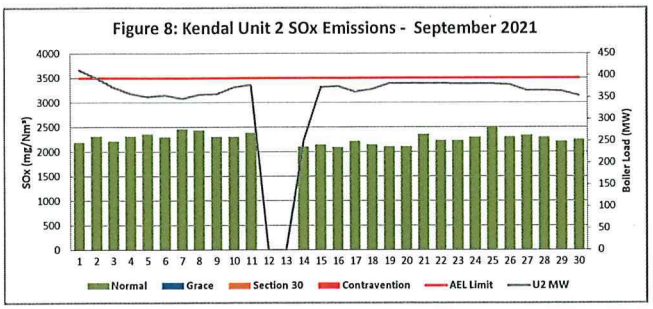


Figure 8: Kendal Unit 2 SOx Emissions - September 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

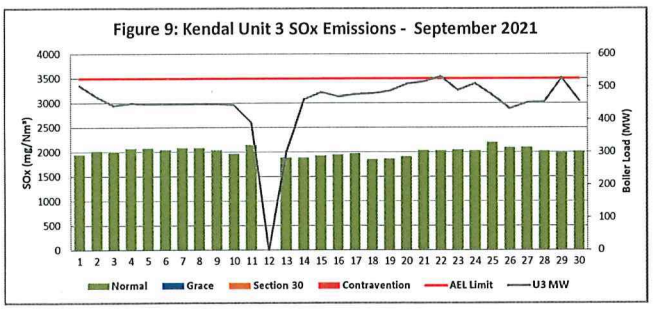


Figure 9: Kendal Unit 3 SOx Emissions - September 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

Figure 10: Kendal Unit 4 SOx Emissions - September 2021

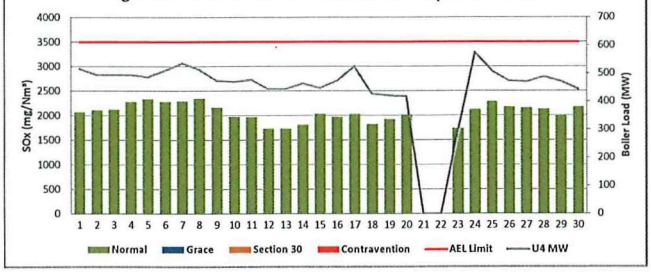


Figure 11: Kendal Unit 5 SOx Emissions - September 2021

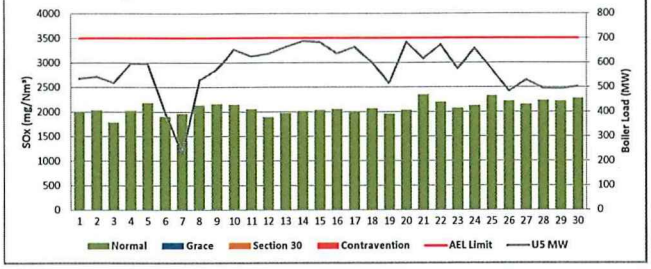


Figure 12: Kendal Unit 6 SOx Emissions - September 2021

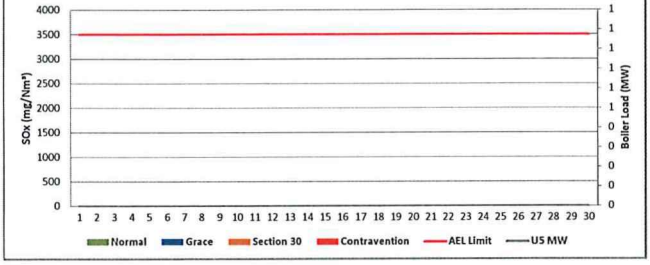
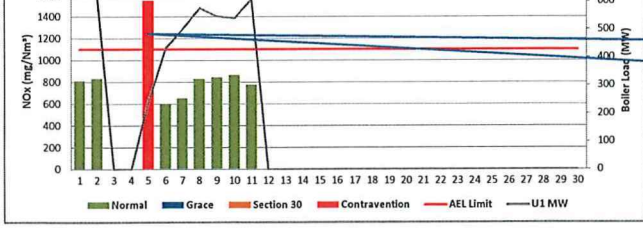
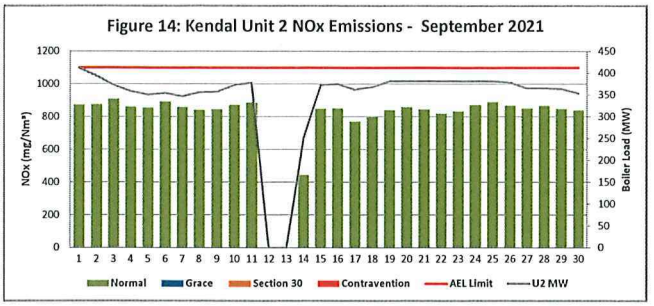
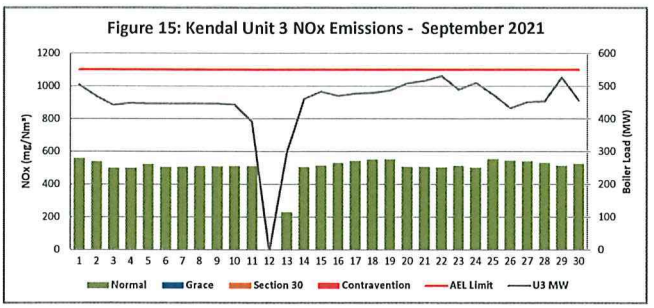


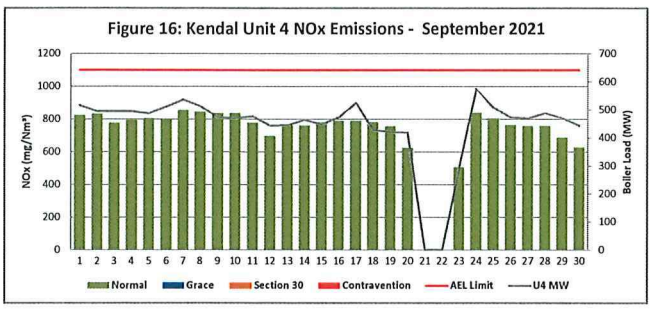
Figure 13: Kendal Unit 1 NOx Emissions - September 2021

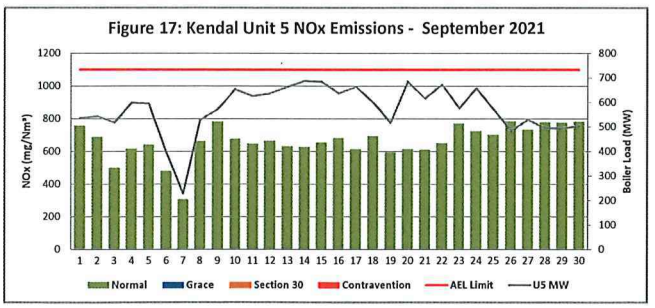


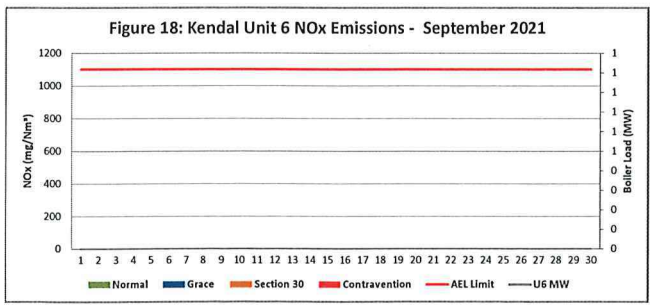
Unit 1 NOx emissions exceedance investigation still in progress











7 COMPLAINTS

There were no complaints for this months

Source Code / Name	Root Cause Analysis	Calculation of Impacts / emissions associated	Dispersion modeling of pollutants where applicable	Measures implemented to prevent reoccurrence

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

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

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

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 & 5 due to defective CEMS monitors and velocity correction factors were set M=1 and C=0
- Avarage emissions for Unit 2 & Unit 3 pressure was used from the QAL2 parallel report due to defective analysers
- Unit 6 was still offload during this month for repairs to address emissions issues

Unit 2
Findings The high emissions can be attributed to left hand draught group tripping , SO3 plant trip and precip chain conveyor 12 kept on tripping
Resolution SO3 plant was restored back to service

Unit 3
Findings High PM emissions can be attributed to SO3 plant tripping on burner outlet temperature high and Dust Handling Plant tripped due to compartment levels false high alarm Four precip fields that kept on tripping on CE rapper fault & UV, Dust Handling Plant tripping due to high comaprtment level, SO3 plant trippig on burner outlet temperature high, precip conveyors 21 to 24 tripping

Resolution The plant was repaired

Unit 4
Findings High PM emissions can be attributed to ash backlogs as s result of tripped DHP due to full compartment levels, DHP off due to both streams not in service, precips conveyor 12&13 tripping, knife gates checked in, streams tripping, SO3 plant on hold mode due to sulphur flow low
Resolution The plant was repaired

Unit 5
Findings High PM emissions can be attributed to Electrostatic precipitators fields tripping due to wires breakages and fields misalignment, SCADA challenges and delayed fields optimisation as well as ash backlogs due Unavailability of the Dust handling plant