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Date
23 February 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 DECEMBER 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:

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ENVIRONMENTAL OFFICER- KENDAL

Date: 23/02/2022

Supported by:

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Date: 25/02/2022

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

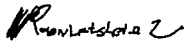
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Date 28/02/2022

Approved by:



Lukhanyo Ndube
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Date 22/03/2022

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 Dec-2021
	Coal	Tons	2 260 000	683 531
Fuel Oil	Tons	5 000	4978.42	

Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Dec-2021
	Energy	GWh(MW)	4360	10 854 443.70
Ash	Tons	770 000	222 694.4	
RE Ash	kg/MWh	not specified	0.420	

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0.840
Ash Content	%	40 (%)	32.580

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 Dec-2021	Technology Type	Utilization Dec-2021
Unit 1	ESP + SO ₂	Off-line	SO ₂	Off-line
Unit 2	ESP + SO ₂	99.4%	SO ₂	0.0%
Unit 3	ESP + SO ₂	100.0%	SO ₂	0.0%
Unit 4	ESP + SO ₂	99.8%	SO ₂	0.0%
Unit 5	ESP + SO ₂	99.9%	SO ₂	0.0%
Unit 6	ESP + SO ₂	99.5%	SO ₂	0.0%

Unit 1, 2, 3, 4 & 5 sulphur utilization readings not available because KEDATA04 and KEDATA05 failed. The hardware is being replaced

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	Off-line	Off-line	Off-line	Off-line
Unit 2	98.6	92.1	92.1	0.0
Unit 3	99.2	86.8	86.6	86.2
Unit 4	99.6	19.0	19.0	94.8
Unit 5	100.0	100.0	99.9	99.9
Unit 6	68.3	0.0	0.0	0.0

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO₂

Note: Unit 2 O₂; unit 4 SO₂ & NO and Unit 6 all monitor reliability was low because of the monitors that were defective

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of December 2021

Associated Unit/Stack	PM (tons)	SO ₂ (tons)	NO _x (tons)	CO ₂
Unit 1	Off-line	Off-line	Off-line	Off-line
Unit 2	138.1	2 279	811	148 761
Unit 3	14.4	2 694	598	243 567
Unit 4	58.2	1 976	678	128 380
Unit 5	96.7	3 943	1 313	410 919
Unit 6	57.7	980	406	76 452
SUM	365.05	11 873	3 807	1 008 079

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

Associated Unit/Stack	Normal	Grace	Section 30	Contra-vention	Total Exceedance	Average PM (mg/Nm ³)
Unit 1	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
Unit 2	6	8	0	6	14	239.5
Unit 3	21	1	0	9	10	50.7
Unit 4	16	2	0	1	3	69.9
Unit 5	31	0	0	0	8	49.2
Unit 6	0	4	0	4	8	286.6
SUM	74	15	0	20	43	

Table 6.3: Operating days in compliance to SO_x AEL Limit - December 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contra-vention	Total Exceedance	Average SO _x (mg/Nm ³)
Unit 1	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
Unit 2	20	0	0	0	0	2 185.6
Unit 3	31	0	0	0	0	2 004.5
Unit 4	21	0	0	0	0	2 189.0
Unit 5	31	0	0	0	0	2 042.7
Unit 6	10	0	0	0	0	2 441.1
SUM	113	0	0	0	0	

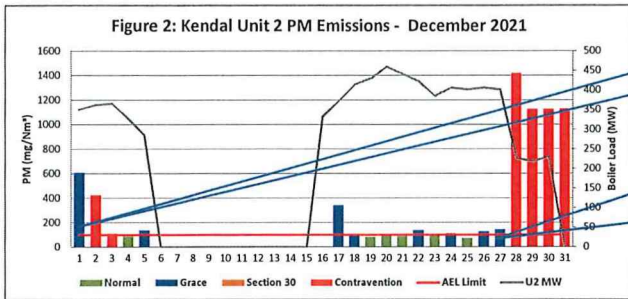
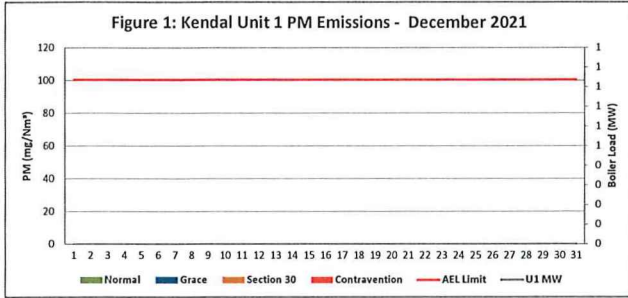
Table 6.4: Operating days in compliance to NOx AEL Limit - December 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contra-vention	Total Exceedance	Average NOx (mg/Nm ³)
Unit 1	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
Unit 2	20	0	0	0	0	748.9
Unit 3	31	0	0	0	0	444.8
Unit 4	21	0	0	0	0	752.4
Unit 5	31	0	0	0	0	669.6
Unit 6	10	0	0	0	0	1 011.4
SUM	113	0	0	0	0	

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO₂

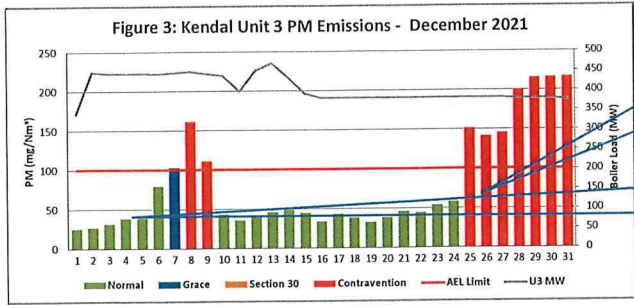
Table 6.5: Legend Description

Condition	Colour	Description
Normal	Green	Emissions below Emission Limit Value (ELV)
Grace	Blue	Emissions above the ELV during grace period
Section 30	Orange	Emissions above ELV during a NEMA S30 incident
Contra-vention	Red	Emissions above ELV but outside grace or S30 incident conditions



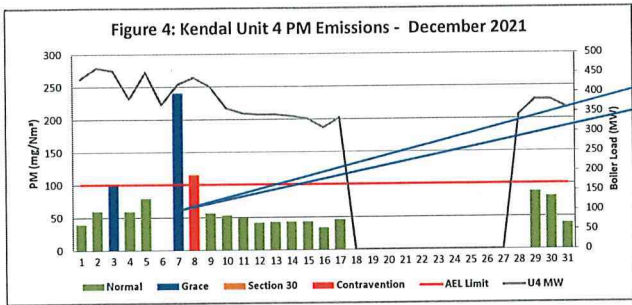
Unit 2 dust emissions can be attributed to Primary Air heater leakage, ESP fields performance deteriorated.

Unit 2 dust emissions can be attributed Primary Air heater leakage, SO3 plant off to replace google flange, ESP fields performance deteriorated.

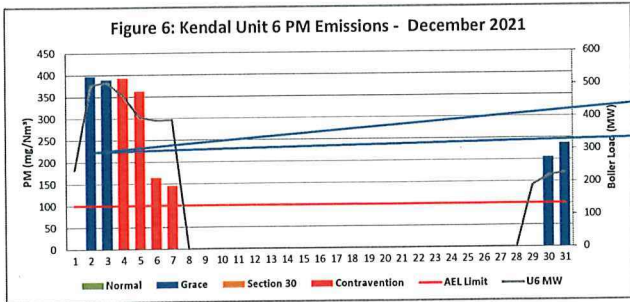
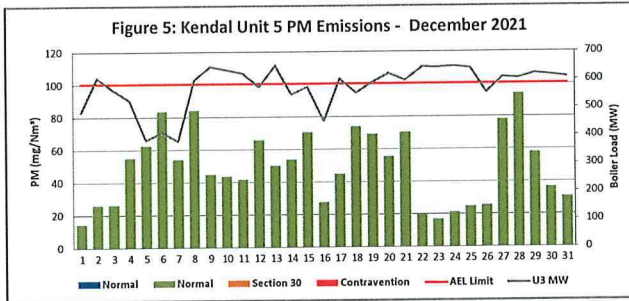


High PM emissions can be attributed worn out secondary air heater, ash backlogs, DHP off due to comp 10 and comp 30 full

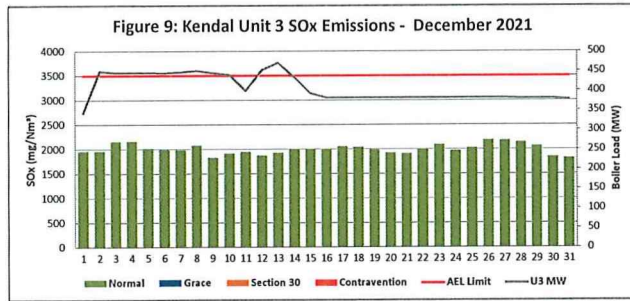
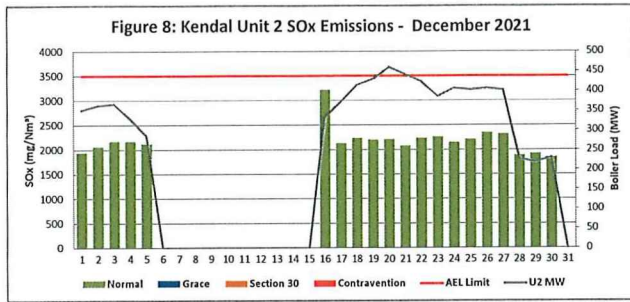
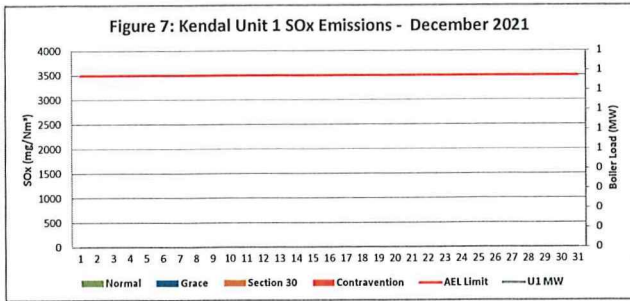
The high PM emissions can attributed to DHP off due to high level on compartment 10. All precip conveyor knife gates fully closed. So3 plant tripped due to steam temp low, So3 plant tripping on Burner outlet temperature high - injection setpoint reduced to 12 ppm.

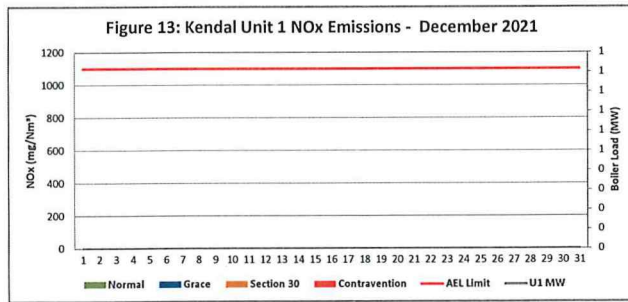
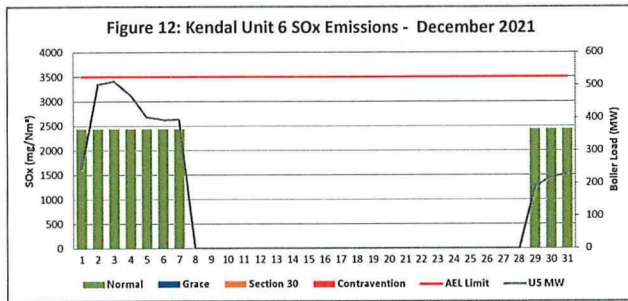
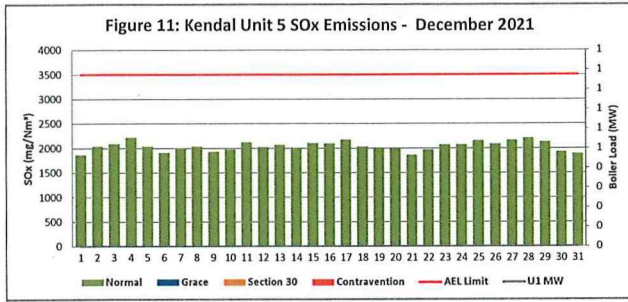
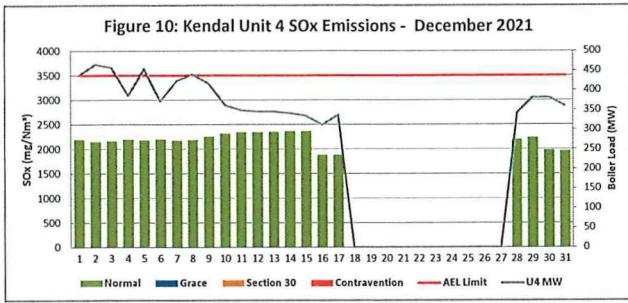


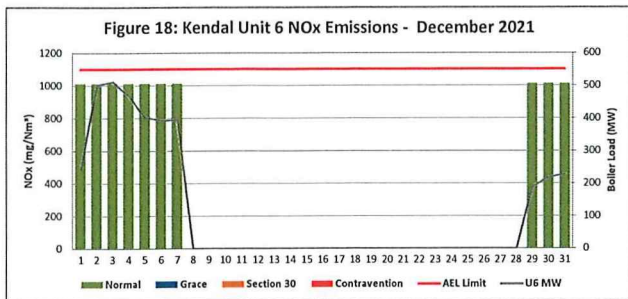
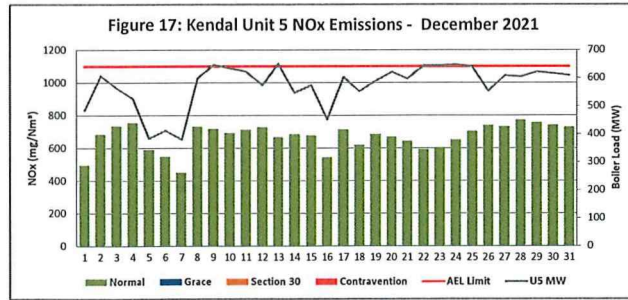
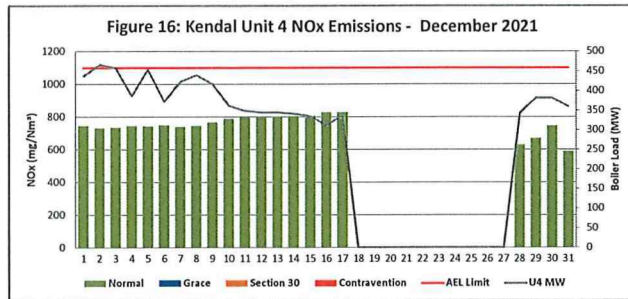
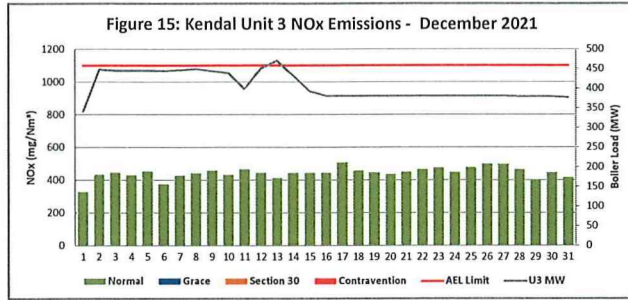
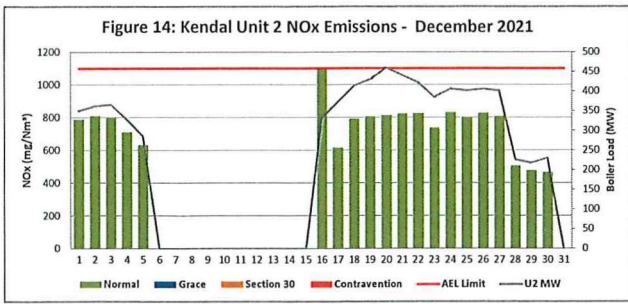
High PM emissions can be attributed to light up conditions



The high PM emissions can attributed to light up conditions, blocked hoppers (11/3; 12/1; 13/1 & 14/4,5,6&7); precip conveyor 11 knife gates closed. DHP standing, compartment levels high.







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

ADDENDUM TO MONTHLY EMISSIONS REPORT

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

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

$$\eta = 1 - \frac{(\text{Dust Emission}) \times (\text{omAQR Report Dust Monitor (tons)}) \times 100}{(\text{Coal Burnt (tons)} \times \% \text{Ash Content} \times 80\%)}$$

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. 24 hours.

The formula is as follows

$$= (1 - (\text{count hours above 98\%/24 hours})) \times 100$$

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
- Average emissions for Unit 2 O₂ was used from the QAL2 parallel report because the monitor was out of calibration
- Note Average emissions were used from the QAL2 parallel report for unit 4 SO₂ & NO. Unit 6 all gaseous monitors reliability were also low because of the monitors that were defective, average emissions were also used from the QAL2 parallel report
- Unit 3 new dust correlations tests results conducted in December 2021 is implemented
- Unit 1 was offload

Unit 2

Findings Unit 2 dust emissions can be attributed to Primary Air heater leakage and poor 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

Note Unit 3 correlations test were done in December 2021, awaiting report. December report will be resubmitted after implementation of the new correlation curves

Unit 6

Findings The Unit 6 high PM emissions can be attributed to light up conditions blocked hoppers (11/3, 12/1, 13/1 & 14/4 5 6&7, precip conveyor 11 knife gates closed. DHP standing, compartment levels high

Resolution The unit was shut down for repairs