Eskom

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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 JANUARY 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: 23/02/2022

Supported by:

Solly Chokoe
ENVIRONMENTAL MANAGER- KENDAL

Date: 25/02/2022

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

Verified by:

Date: 23/02/2022

Fulufhelo Nganke
BOILER ENGINEERING: SYSTEM ENGINEER- KENDAL

Validated by:

Date 25/02/2022

Tendani Rasivhetshele
ACTING BOILER ENGINEERING MANAGER-KENDAL

Supported by:

Date 28/02/2022

Malibongwe Mabizela
ENGINEERING MANAGER-KENDAL

Approved by:

Date 22/03/2022

Lukhanyo Ndube
GENERAL MANAGER-KENDAL

Eskom JANUARY 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 Jan-2022
	Coal	Tons	*2 260 000*	*802 986*
	Fuel Oil	Tons	*5 000*	*4373.89*
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Jan-2022
	Energy	GWh(MW)	*4380*	*1276262*
	Ash	Tons	*770 000*	*264 744.5*
	RE Ash	kg/MWh	*not specified*	*2.280*

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	*<1 (%)*	*0.750*
Ash Content	%	*40 (%)*	*32.970*

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 Jan-2022	Technology Type	Utlization Jan-2022
Unit 1	ESP + SO_3	99.7%	SO_3	0.0%
Unit 2	ESP + SO_3	97.8%	SO_3	0.0%
Unit 3	ESP + SO_3	100.0%	SO_3	0.0%
Unit 4	ESP + SO_3	99.8%	SO_3	0.0%
Unit 5	ESP + SO_3	99.9%	SO_3	0.0%
Unit 6	ESP + SO_3	99.2%	SO_3	0.0%

Unit 1, 2,3,4 & 5 sulphur utilization readings not available because KEPDATA04 and KEPDATA05 failed. The hardware need to be replaced. Procurement processes taking longer than anticipated.

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	80.4	70.7	69.7	70.7
Unit 2	39.6	100.0	100.0	0.0
Unit 3	100.0	100.0	98.1	98.7
Unit 4	91.8	70.6	0.0	93.0
Unit 5	99.8	98.6	98.2	34.6
Unit 6	83.3	0.0	0.0	0.0

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

Note: Unit 1, 4, 5 & 6 gaseous monitors reliability was low because of the monitors that were defective

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of January 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)	CO_2
Unit 1	166.9	3 285	1 080	249 708
Unit 2	26.0	0	0	0
Unit 3	8.8	1 489	370	133 660
Unit 4	85.8	2 583	884	176 071
Unit 5	68.5	3 834	1 340	414 662
Unit 6	184.1	1 802	746	140 582
SUM	540.03	12 993	4 421	1 114 683

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	14	6	0	7	13	105.5
Unit 2	0	2	0	0	2	1 708.3
Unit 3	19	1	0	0	1	44.3
Unit 4	26	4	0	1	5	68.0
Unit 5	25	0	0	0	12	40.8
Unit 6	2	8	0	4	12	246.9
SUM	86	21	0	12	45	

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm³)
Unit 1	29	0	0	0	0	2 924.5
Unit 2	0	0	0	0	0	
Unit 3	21	0	0	0	0	1 927.1
Unit 4	31	0	0	0	0	2 158.3
Unit 5	27	0	0	0	0	2 170.7
Unit 6	18	0	0	0	0	2 558.6
SUM	126	0	0	0	0	

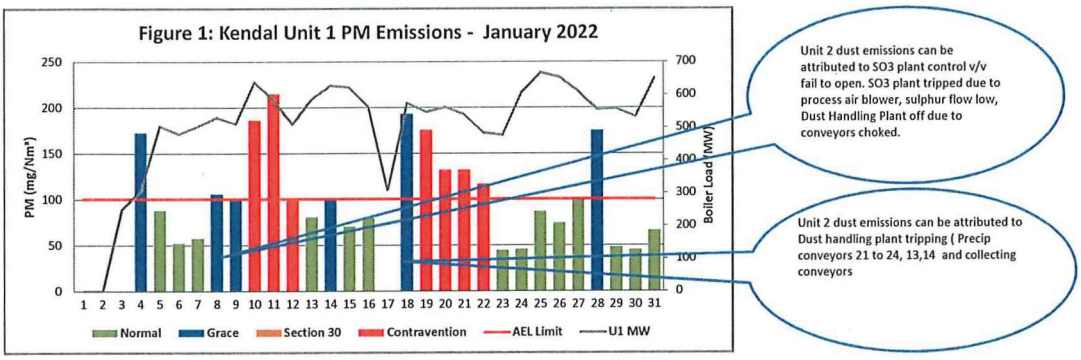
Table 6.4: Operating days in compliance to NOx AEL Limit - January 2022

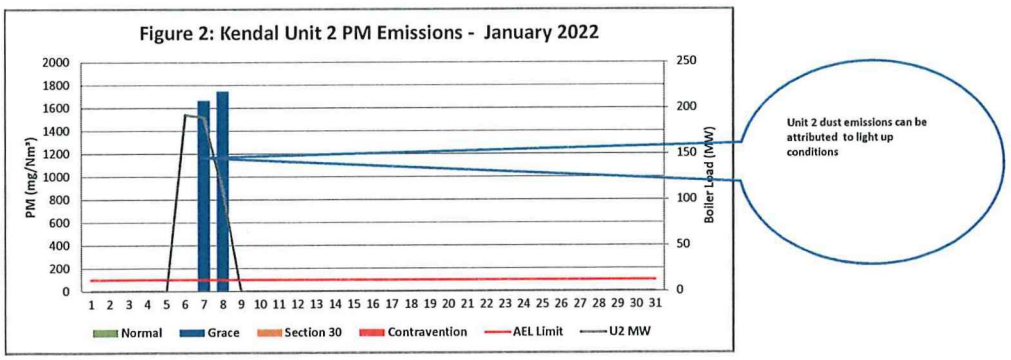
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	29	0	0	0	0	960.1
Unit 2	0	0	0	0	0	
Unit 3	21	0	0	0	0	477.5
Unit 4	31	0	0	0	0	732.1
Unit 5	27	0	0	0	0	746.2
Unit 6	18	0	0	0	0	1 060.1
SUM	126	0	0	0	0	

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





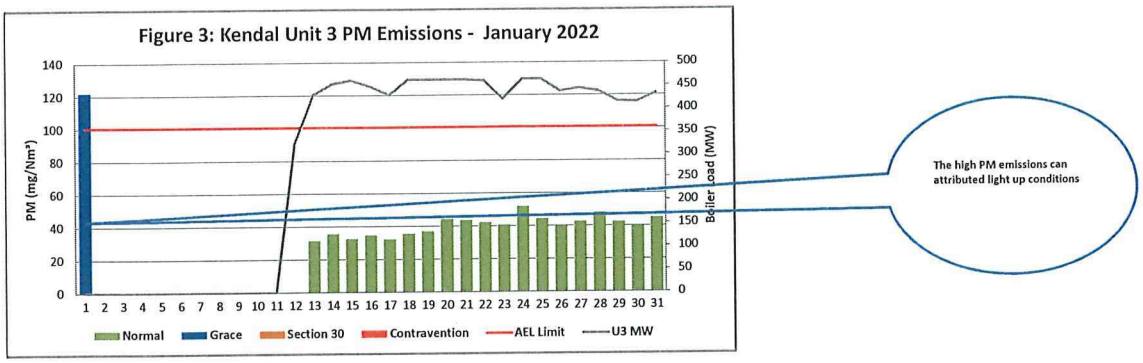


Figure 3: Kendal Unit 3 PM Emissions - January 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW
The high PM emissions can attributed light up conditions

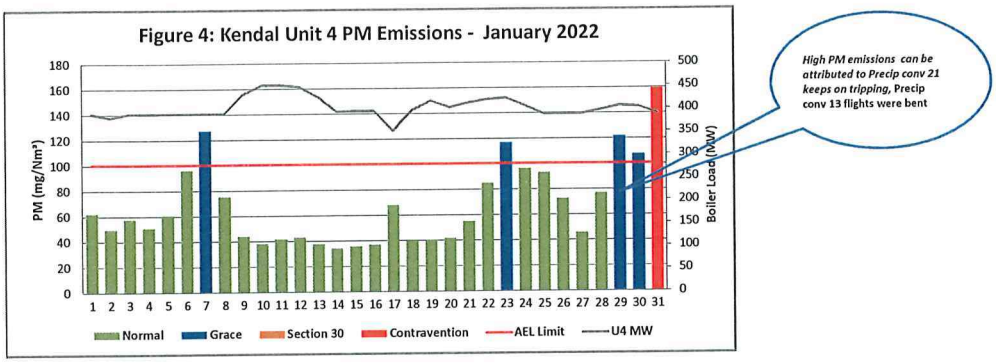


Figure 4: Kendal Unit 4 PM Emissions - January 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW
High PM emissions can be attributed to Precip conv 21 keeps on tripping, Precip conv 13 flights were bent

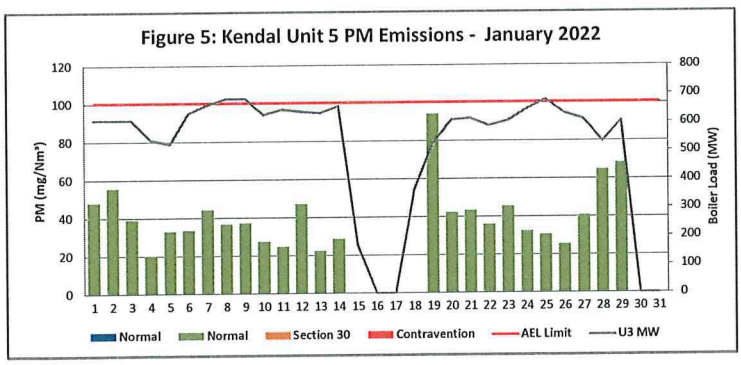


Figure 5: Kendal Unit 5 PM Emissions - January 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Normal
Section 30
Contravention
AEL Limit
U3 MW

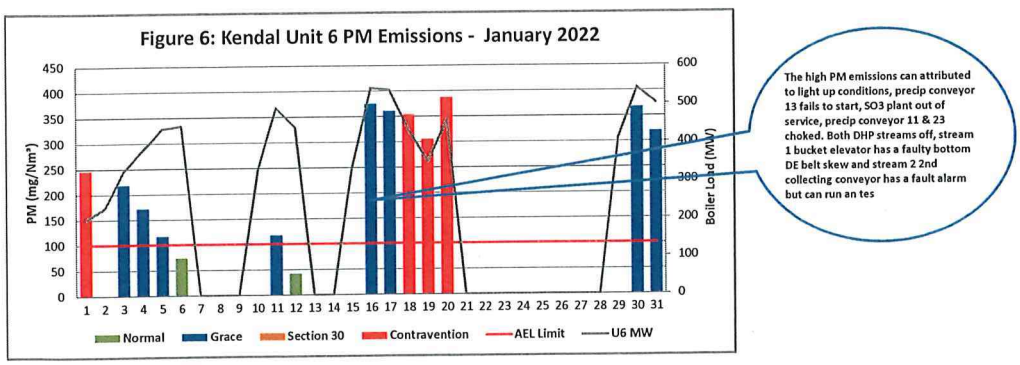


Figure 6: Kendal Unit 6 PM Emissions - January 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U6 MW
The high PM emissions can attributed to light up conditions, precip conveyor 13 fails to start, SO3 plant out of service, precip conveyor 11 & 23 choked. Both DHP streams off, stream 1 bucket elevator has a faulty bottom DE belt skew and stream 2 2nd collecting conveyor has a fault alarm but can run an tes

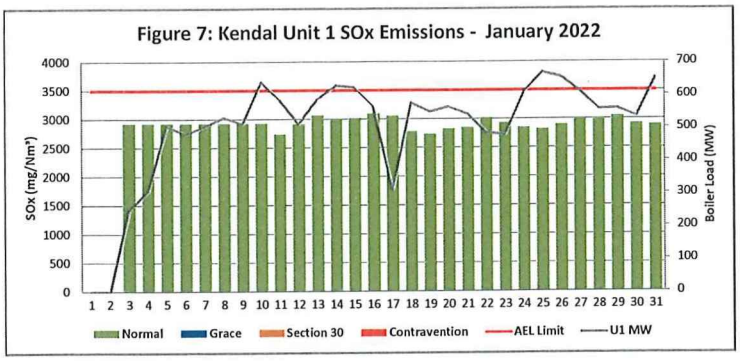


Figure 7: Kendal Unit 1 SOx Emissions - January 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

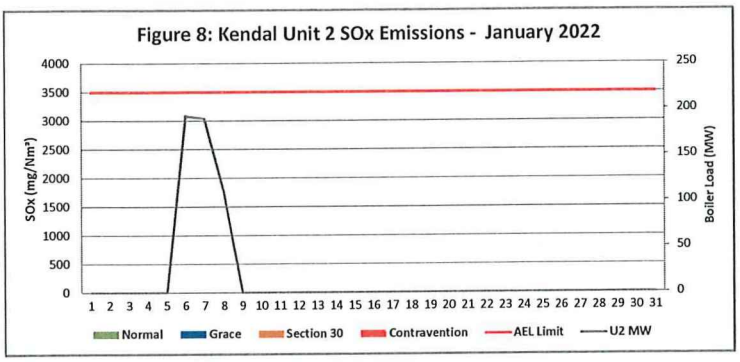


Figure 8: Kendal Unit 2 SOx Emissions - January 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

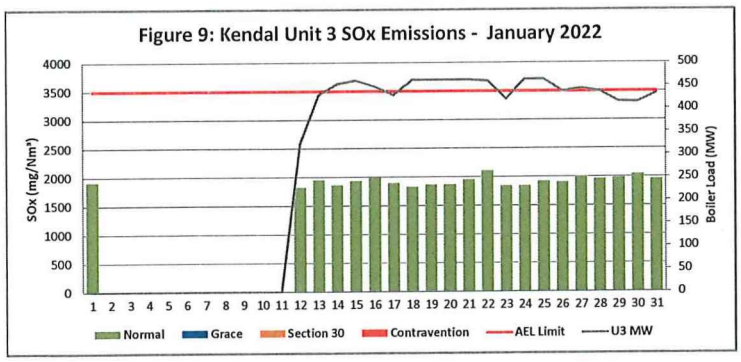


Figure 9: Kendal Unit 3 SOx Emissions - January 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

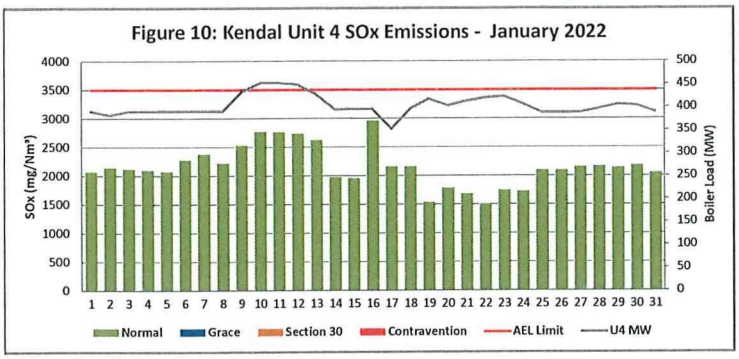


Figure 10: Kendal Unit 4 SOx Emissions - January 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

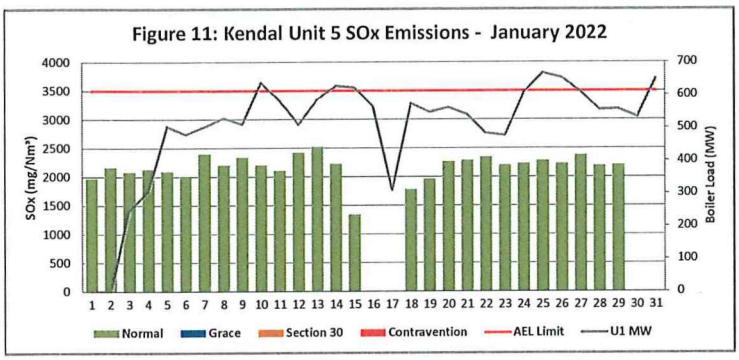


Figure 11: Kendal Unit 5 SOx Emissions - January 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

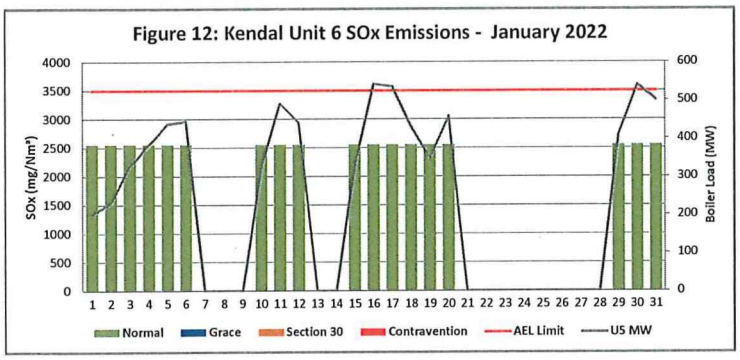


Figure 12: Kendal Unit 6 SOx Emissions - January 2022
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

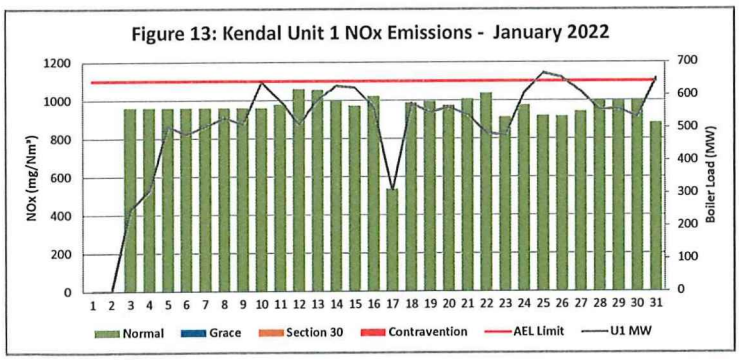


Figure 13: Kendal Unit 1 NOx Emissions - January 2022
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

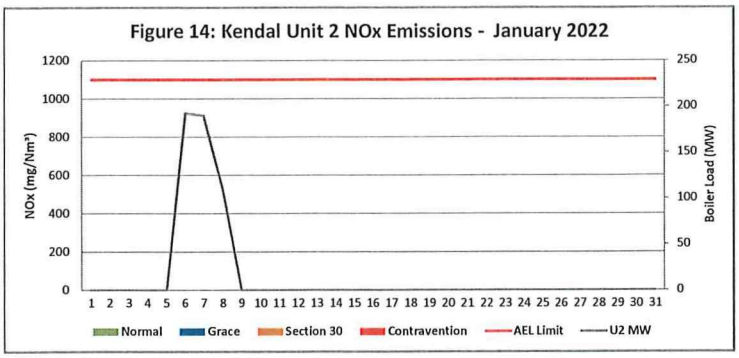


Figure 14: Kendal Unit 2 NOx Emissions - January 2022
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

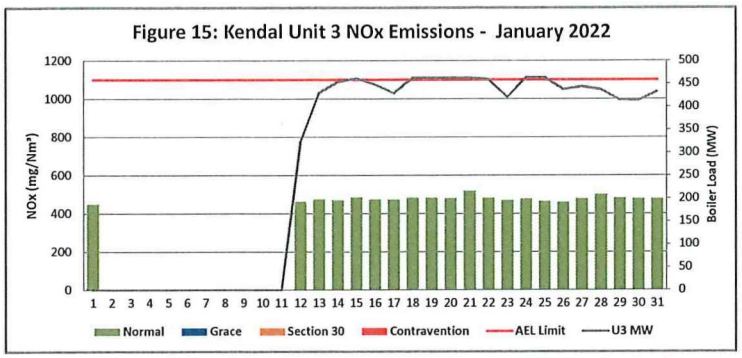


Figure 15: Kendal Unit 3 NOx Emissions - January 2022
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

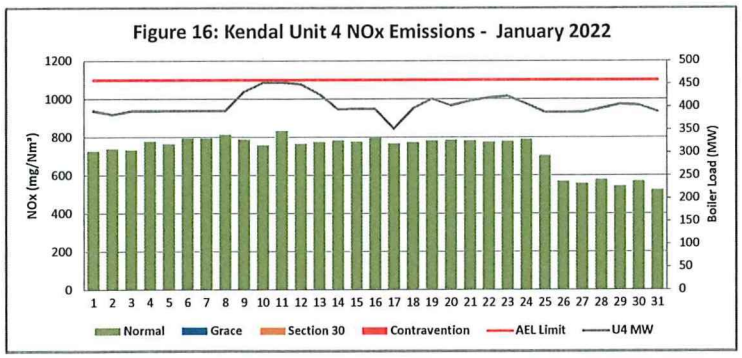


Figure 16: Kendal Unit 4 NOx Emissions - January 2022
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

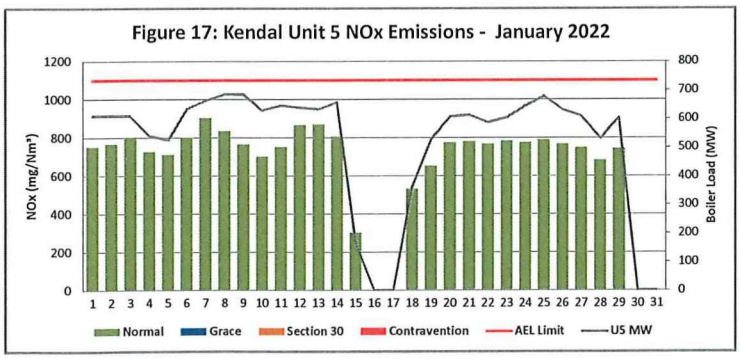
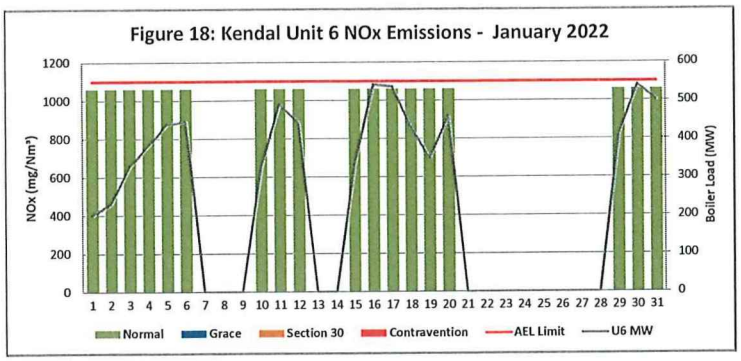


Figure 17: Kendal Unit 5 NOx Emissions - January 2022
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW



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

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

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

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 4 NO was used from the QAL2 parallel report because the monitor was defective
- Note Avarage emissions were used from the QAL2 parallel report for unit 4 SO_2 & NO and units 1, &, 5 Unit 6 all 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 1
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 2 dust emissions can be attributed to SO3 plant control v/v fail to open SO3 plant tripped due to process air blower, sulphur flow low, Dust Handling Plant off due to conveyors choked
Resolution The DHP and SO3 plant was returned back to service after repairs

Unit 4
Findings High PM emissions can be attributed to Precip conv 21 keeps on tripping, Precip conv 13 flights were bent

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

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

Unit 6
Findings The Unit 6 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 kinfe gates closed DHP standing, compartment levels high

Resolution The unit was shut down for repairs