Eskom

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By email: nembilwim@nkangaladm.gov.za'

Date:
15 November 2022

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 AUGUST 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:

Irene Motswenyane
ENVIRONMENTAL OFFICER- KENDAL

Date: 15/11/2022

Supported by:

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Date: 15/11/2022

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

Verified by:

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Validated by:

Date: 2022/11/17

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Date: 22/11/2022

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GENERAL MANAGER-KENDAL

Eskom

AUGUST 2022

KENDAL POWER STATION MONTHLY EMISSIONS REPORT

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

1 RAW MATERIALS AND PRODUCTS

	Raw Material Type	Units	Maximum Permitted Consumption Rate	Consumption Rate Aug-2022
Raw Materials and Products	Coal	Tons	2 260 000	967 999
	Fuel Oil	Tons	5 000	3291.77
	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Aug-2022
Production Rates	Energy	GWh(MW)	(3,153,600)4380	1 625 059.00
	Ash	Tons	770 000	303 080.5
	RE Ash	kg/MWh	not specified	1.930

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0.720
Ash Content	%	40 (%)	31.310

3 EMISSION LIMITS (mg/Nm³)

Associated Unit/Stack	PM	SO_2	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 ABATEMENT TECHNOLOGY (%)

Associated Unit/Stack	Technology Type	Efficiency Aug-2022	Technology Type	SO_3 Utlization Aug-2022
Unit 1	$ESP + SO_3$	97.993%	SO_3	0.0%
Unit 2	$ESP + SO_3$	96.220%	SO_3	0.0%
Unit 3	$ESP + SO_3$	99.813%	SO_3	0.0%
Unit 4	$ESP + SO_3$	99.847%	SO_3	0.0%
Unit 5	$ESP + SO_3$	99.527%	SO_3	0.0%
Unit 6	$ESP + SO_3$	98.176%	SO_3	0.0%

Unit 1 -6 sulphur utilization readings not available because CAPDATAA04 and CAPDATAA05 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	99.2	84.0	72.1	98.5
Unit 2	77.0	40.1	41.0	97.0
Unit 3	96.9	99.7	82.5	83.4
Unit 4	100.0	100.0	100.0	90.9
Unit 5	100.0	86.3	84.7	55.4
Unit 6	92.6	64.2	55.0	98.5

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

Note: Unit 2 PM monitor reliability is low due to monitors maxing out and readings frozen.Unit 2 SOx, NOx, Unit 5 O2 and Unit 6 SOx &NOx monitor reliability is low due to defective monitors.

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of August 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	911.9	3 769	1 308
Unit 2	1 113.2	1 234	491
Unit 3	52.7	1 599	544
Unit 4	61.4	2 185	643
Unit 5	264.1	3 033	1 049
Unit 6	789.1	2 672	1 072
SUM	3 192.26	14 493	5 107

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	11	7	0	8	15	605.3
Unit 2	8	3	0	9	12	690.3
Unit 3	17	4	0	0	4	54.6
Unit 4	30	1	0	0	1	54.1
Unit 5	16	7	0	8	15	134.7
Unit 6	14	2	0	15	17	203.5
SUM	96	24	0	40	64	

Table 6.3: Operating days in compliance to SO_2 AEL Limit - August 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm³)
Unit 1	27	0	0	0	0	2 682.2
Unit 2	21	0	0	0	0	1 516.3
Unit 3	23	0	0	0	0	1 631.0
Unit 4	31	0	0	0	0	1 988.8
Unit 5	31	0	0	0	0	1 813.5
Unit 6	31	0	0	0	0	1 952.7
SUM	164	0	0	0	0	

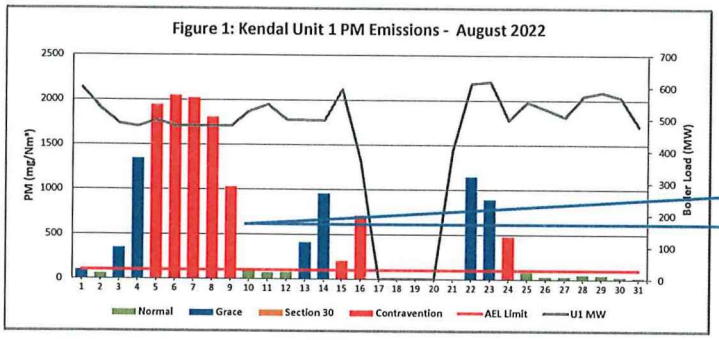
Table 6.4: Operating days in compliance to NOx AEL Limit - August 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	27	0	0	0	0	935.0
Unit 2	21	0	0	0	0	601.8
Unit 3	23	0	0	0	0	546.7
Unit 4	31	0	0	0	0	596.4
Unit 5	31	0	0	0	0	626.9
Unit 6	31	0	0	0	0	777.6
SUM	164	0	0	0	0	

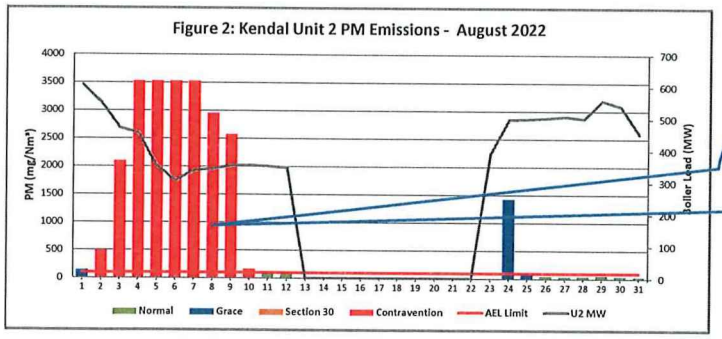
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

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



Unit 1 dust emissions can be attributted to DHP stopped due to bucket elevator speed switch immersed in ash, DHP stopped due to ash leak on stream 2 bucket elevator. DHP standing due to compartment 10 level indicator faulty, DHP trip due to second collector chocked. Precip conveyor 22 chocked



High emissions can be attributted all precip conveyor off due to stream 2 bucket elevator flopper gates switching to chute site, stream 2 bucket elevator flopper gate faulty. SO3 plant on hold mode due to flue gas temp low, DHP off due to ash leaks, stream 2 second collecting conveyor choked, DHP off due to compartments full. precip conveyor 24 chocked, precip conveyor 24 tripped, DHP stopped to repair ash leak, DHP stopped due to bucket elevator drive end inspection door open and leaking.

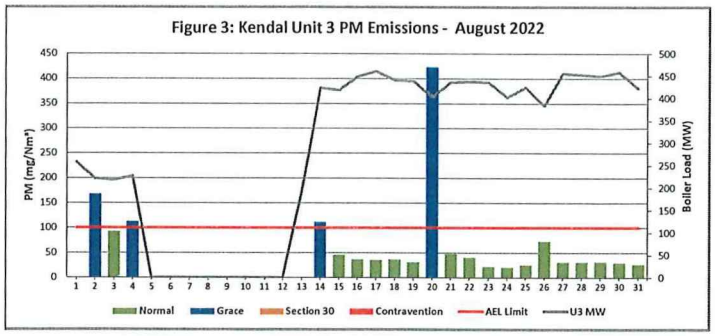


Figure 3: Kendal Unit 3 PM Emissions - August 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

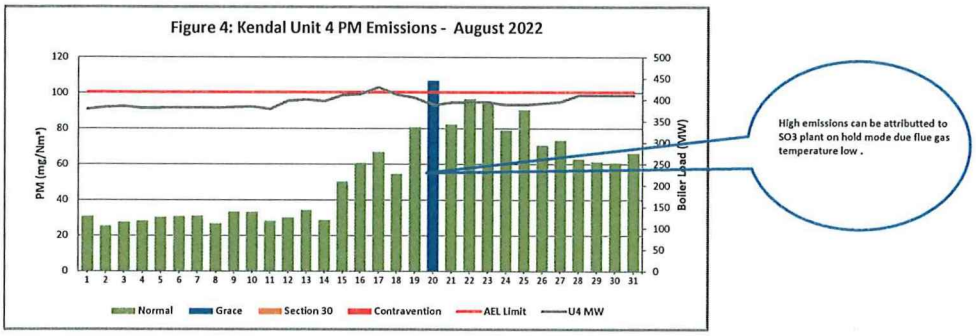


Figure 4: Kendal Unit 4 PM Emissions - August 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW
High emissions can be attributted to SO3 plant on hold mode due flue gas temperature low .

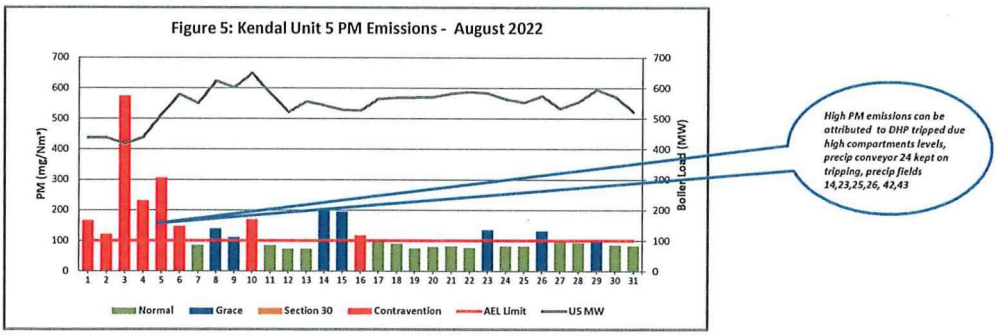


Figure 5: Kendal Unit 5 PM Emissions - August 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW
High PM emissions can be attributed to DHP tripped due high compartments levels, precip conveyor 24 kept on tripping, precip fields 14,23,25,26, 42,43

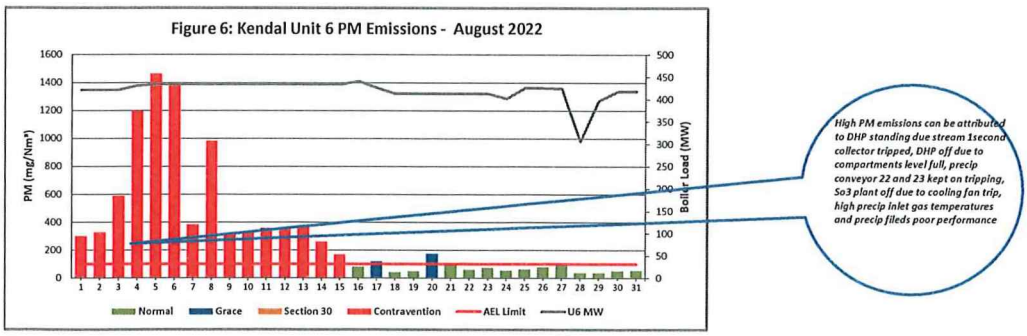


Figure 6: Kendal Unit 6 PM Emissions - August 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U6 MW
High PM emissions can be attributed to DHP standing due stream 1second collector tripped, DHP off due to compartments level full, precip conveyor 22 and 23 kept on tripping, So3 plant off due to cooling fan trip, high precip inlet gas temperatures and precip fileds poor performance

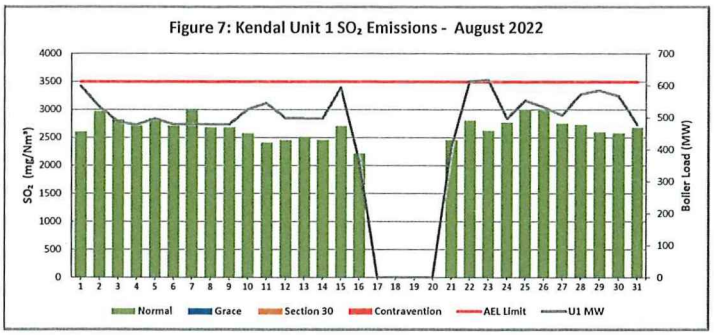


Figure 7: Kendal Unit 1 SO_2 Emissions - August 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

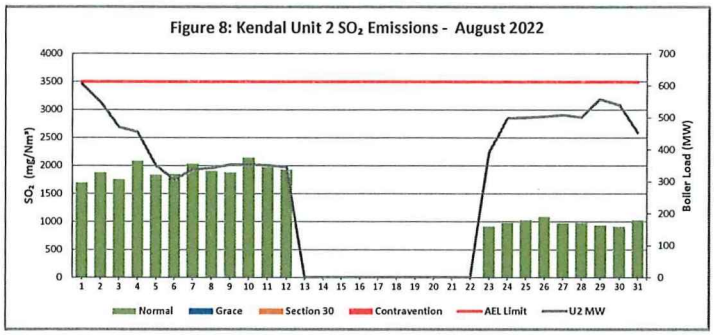


Figure 8: Kendal Unit 2 SO_2 Emissions - August 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

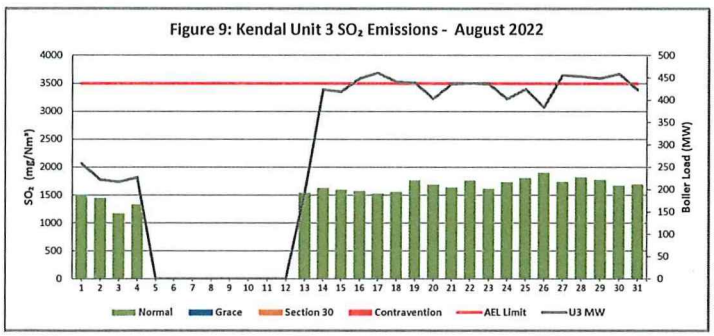


Figure 9: Kendal Unit 3 SO_2 Emissions - August 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

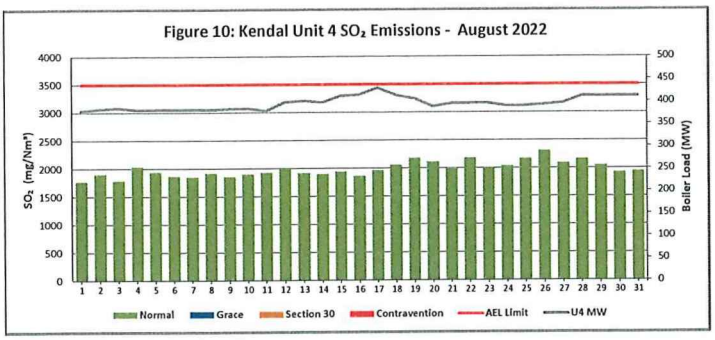


Figure 10: Kendal Unit 4 SO_2 Emissions - August 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

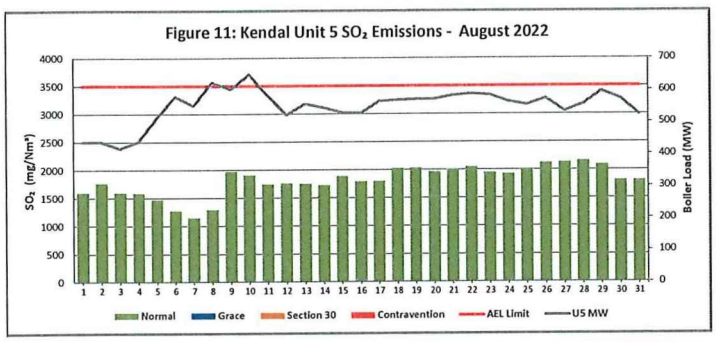


Figure 11: Kendal Unit 5 SO_2 Emissions - August 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

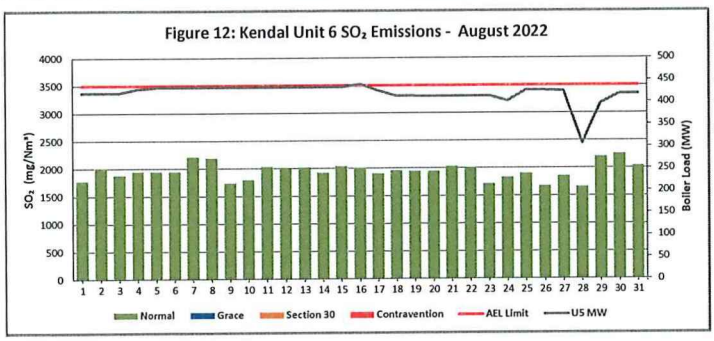


Figure 12: Kendal Unit 6 SO_2 Emissions - August 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

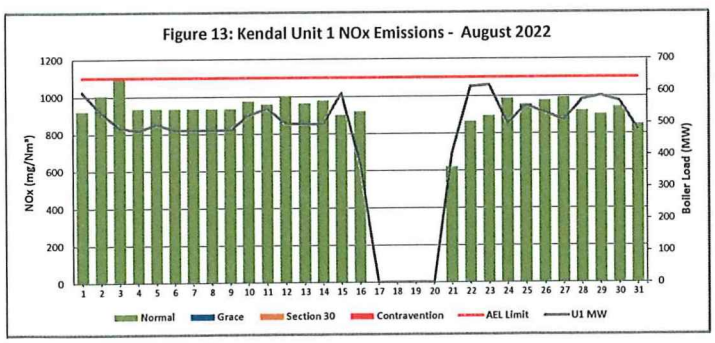


Figure 13: Kendal Unit 1 NOx Emissions - August 2022
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

Figure 14: Kendal Unit 2 NOx Emissions - August 2022

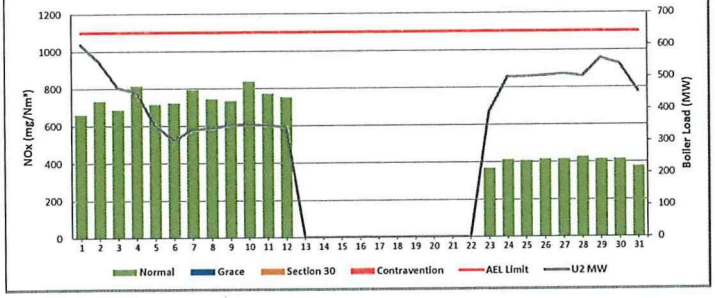


Figure 15: Kendal Unit 3 NOx Emissions - August 2022

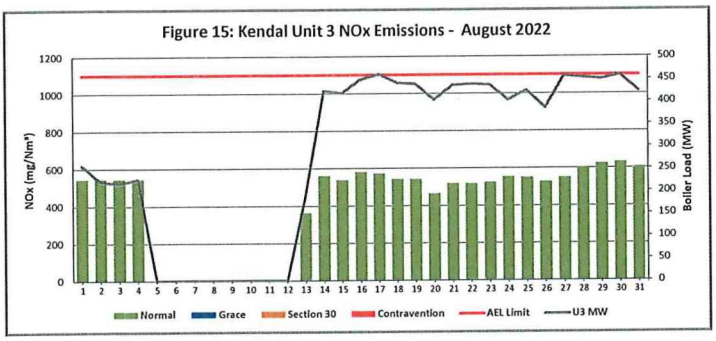


Figure 16: Kendal Unit 4 NOx Emissions - August 2022

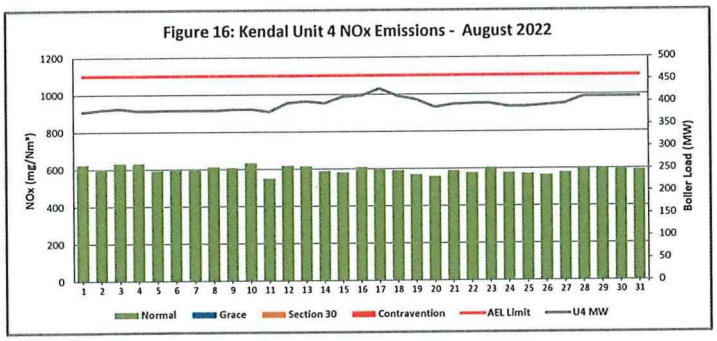


Figure 17: Kendal Unit 5 NOx Emissions - August 2022

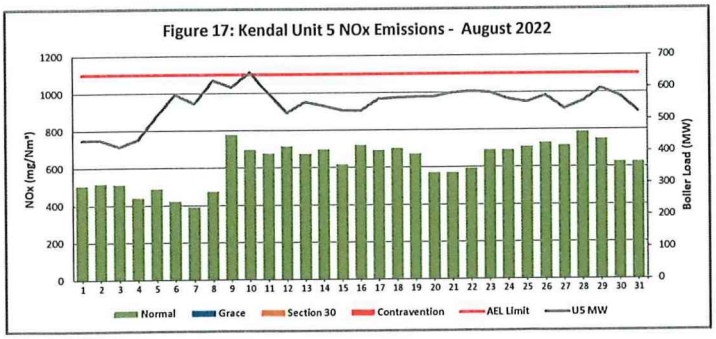
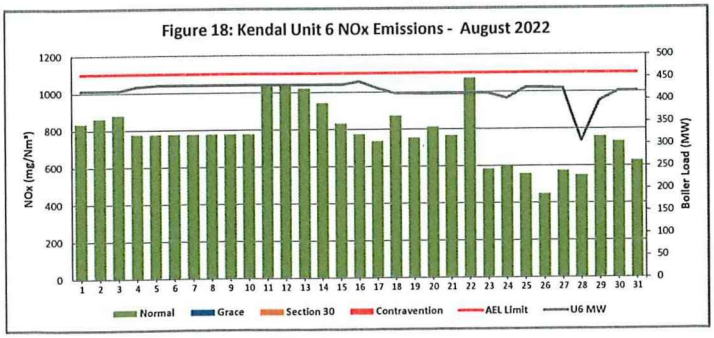


Figure 18: Kendal Unit 6 NOx Emissions - August 2022



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 99.325% reliability is compared to the dust concentration signal. If the dust concentration signal is above 99.325% 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 99.325%/24hours))x 100

Emissions Performance:

- Average velocity values from the latest correlation report were used on the gaseous emissions on Unit 1, 2,4,5 &6 due to defective CEMS monitors and velocity correction factors were set M=1 and C=0
- Unit 4 dust monitor Output 2 is faulty. Where Output 1 was greater than or equal to 87.5, the raw data for Output 1 was copied to Output 2.
- Average emisions for Unit 1 SOx and NOx on the 4th and the 10th, Unit 5 SOX and NOx on the 08th to 09th and 28th to 31st, Unit 6 SOx and NOx on the 03rd, 16th to 23rd were used from the available data, as the monitors were giving frozen values and Unit 5 O2 that was not reading from the 18th to the 31st.
- Average emisions from the QAL2 reports were used for Unit 2 SOx, NOx and moisture from the 1st to the 12th as the monitors were giving frozen values.
- Average values for Unit 4 flow was used on the 22nd where the monitor was giving zero values.
- Average emissions for Unit 6 NOx from the 4th to the 10th were used from the available data as the monitors signal was frozen.

- Unit 1
- Findings: Unit 1 dust emissions can be attributted to DHP stopped due to bucket elevator speed switch immersed in ash, DHP stopped due to ash leak on stream 2 bucket elevator. DHP standing due to compartment 10 level indicator faulty, DHP trip due to second collector chocked and Precip conveyor 22 chocked.
- Resolution: Plant repaired

- Unit 2
- Findings: High emissions can be attributted all precip conveyor off due to stream 2 bucket elevator flopper gates switching to chute site, stream 2 bucket elevator floppers gate faulty, SO3 plant on hold mode due to flue gas temp low, DHP off due to ash leaks, stream 2 second collecting conveyor choked, DHP off due compartments full. precip conveyor 24 chocked, DHP stopped to repair ash leak and DHP stopped due to bucket elevator drive end inspection door open and leaking ash.
- Resolution: Plant repaired.

- Unit 3
- Findings: The high PM emissions can be attributed to light up conditions.
- Resolution:

- Unit 4
- Findings: High PM emissions can be attributed to SO3 plant on hold mode to flue gas temperatue low.
- Resolution: The plant was repaired.

- Unit 5
- Findings: High PM emissions can be attributed to DHP tripped due high compartments levels, precip conveyor 24 kept on tripping, and precip fields 14,23,25,26, 42,43&46 faulty.
- Resolution: The plant was repaired.

- Unit 6
- Findings: High PM emissions can be attributed to DHP standing due stream 1second collector tripped, DHP off due to compartments level full, precip conveyor 22 and 23 kept on tripping, SO3 plant off due to cooling fan trip, high precip inlet gas temperatures and precip fileds poor performance.
- Resolution: The plant was repaired.