Eskom

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Date:
13 May 2024

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Dear Ms. Nompumelelo Simelane

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

SUBMISSION OF KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF APRIL 2024.

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:

Tsakani Holeni
ENVIRONMENTAL SENIOR ADVISOR- KENDAL POWER STATION
Date: 13.05.2024

Supported by:

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ENVIRONMENTAL MANAGER- KENDAL POWER STATION
Date: 14.05.2024

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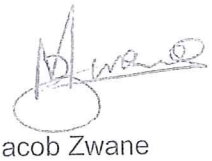
KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF APRIL 2024

Verified by:



Jacob Zwane
BOILER ENGINEERING: SENIOR SYSTEM ENGINEER- KENDAL POWER STATION
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Validated by:

Tendani Rasivhetshele
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Date: 15/05/2024

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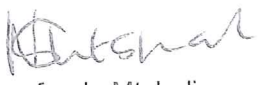

Nomfundo Mtshali
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Approved by:

Tshepiso Temo
GENERAL MANAGER-KENDAL POWER STATION
Date: 2024/05/24

Eskom

APRIL 2024

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 Apr-2024
	Coal	Tons	2 260 000	722 721
	Fuel Oil	Tons	5 000	10114.660
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Indicative Production Rate Apr-2024
	Energy	GWh	2 963.520	1 236.551
	Ash	Tons	770 000	241 605.630
	RE Ash	kg/MWh	not specified	2.181

Note: Maximum energy rate is as per the maximum capacity stated in the AEL: [4 116 MW] x 24 hrs x days in Month/1000 to convert to GWh

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
CV Content	MJ/kg	16-24 (MJ/kg)	18.580
Sulphur Content	%	<1 (%)	0.770
Ash Content	%	40 (%)	33.430

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 Apr-2024	Technology Type	SO_3 Utlization Apr-2024
Unit 1	$ESP + SO_3$	95.375%	SO_3	0.0%
Unit 2	$ESP + SO_3$	99.229%	SO_3	0.0%
Unit 3	$ESP + SO_3$	99.828%	SO_3	0.0%
Unit 4	$ESP + SO_3$	99.450%	SO_3	0.0%
Unit 5	$ESP + SO_3$	97.672%	SO_3	0.0%
Unit 6	$ESP + SO_3$	Off-line	SO_3	Off-line

There is no value for SO3 utilization due to switch failure on the server, however Kendal Sulfur utilization database will be ready once we have commissioned the new PI system.

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	69.6	100.0	100.0	20.3
Unit 2	86.2	94.2	95.0	81.0
Unit 3	97.8	100.0	100.0	97.2
Unit 4	100.0	100.0	100.0	0.0
Unit 5	100.0	80.3	87.5	0.0
Unit 6	Off	Off	Off	Off

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2
Unit 1,4 and 5 O2 monitor was defective

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of April 2024

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	1 399.8	2 068	848
Unit 2	350.9	3 876	1 808
Unit 3	96.9	4 271	1 767
Unit 4	177.9	2 155	910
Unit 5	671.2	995	556
Unit 6	Off	Off	Off
SUM	2 696.57	13 364	5 890

Table 6.2: Operating days in compliance to PM AEL Limit - April 2024

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	0	0	0	15	15	1 388.1
Unit 2	0	0	0	29	29	234.4
Unit 3	0	0	0	3	3	58.6
Unit 4	1	6	0	7	13	175.3
Unit 5	0	0	0	3	3	796.3
Unit 6	Off	Off	Off	Off	Off	Off
SUM	1	6	0	57	63	

Table 6.3: Operating days in compliance to SO_2 AEL Limit - April 2024

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm³)
Unit 1	22	0	0	0	0	1 736.3
Unit 2	30	0	0	0	0	2 453.1
Unit 3	30	0	0	0	0	2 579.2
Unit 4	21	0	0	0	0	2 055.2
Unit 5	20	0	0	0	0	1 010.0
Unit 6	Off	Off	Off	Off	Off	Off
SUM	123	0	0	0	0	

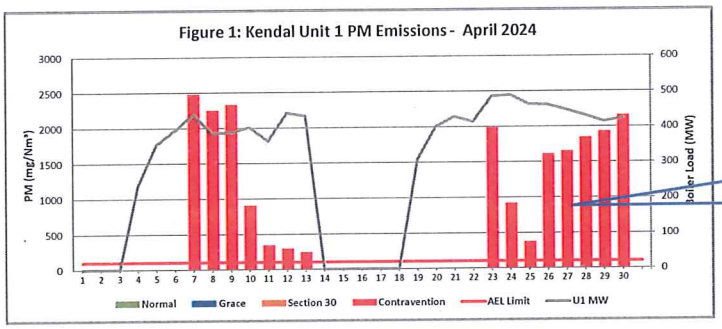
Table 6.4: Operating days in compliance to NOx AEL Limit - April 2024

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	22	0	0	0	0	701.1
Unit 2	16	0	0	14	14	1 120.4
Unit 3	19	0	0	11	11	1 068.7
Unit 4	21	0	0	0	0	852.2
Unit 5	20	0	0	0	0	572.2
Unit 6	Off	Off	Off	Off	Off	Off
SUM	98	0	0	25	25	

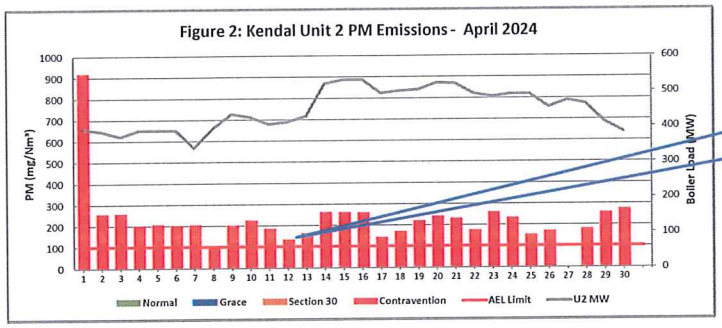
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

Table 6.5: Legend Description

Condition	Colour	Description
Normal	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
Contravention	RED	Emissions above ELV but outside grace or S30 incident conditions



High emissions can be attributed to the unit on start up (cold start), Precipt field no 24,33 and 35 had communication buss fault and
Precipt field no 21 circuit breaker was faulty, Precipt chain conveyor 23 kept tripping and SO3 failed to start due steam inlet temperature tha was low. DHP also tripped due to compartmens high level.



High emissions can be attributed to the SO3 plant that was on hold mode dueto low steam temperature, poor precip fields performance, DHP off due to bucket elevator flopper gate that lost open limit. The DHP also tripped due to compartment levels that were high.

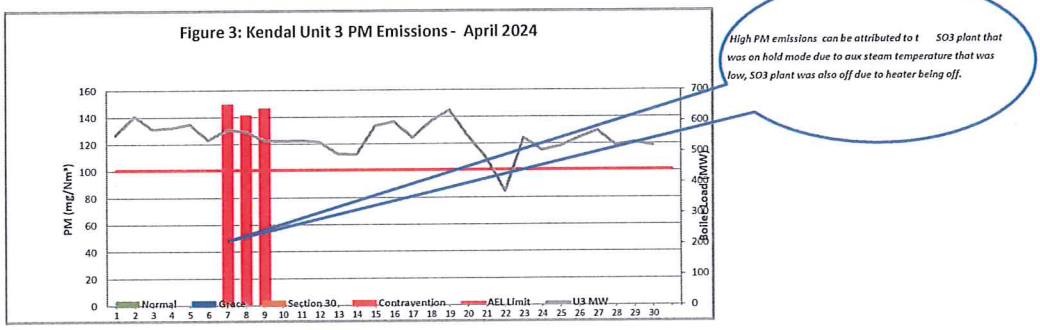


Figure 3: Kendal Unit 3 PM Emissions - April 2024
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW
High PM emissions can be attributed to t SO3 plant that was on hold mode due to aux steam temperature that was low, SO3 plant was also off due to heater being off.

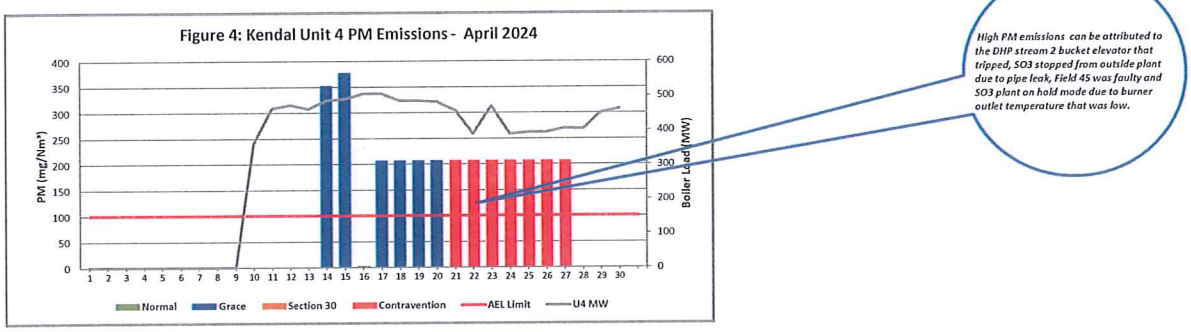


Figure 4: Kendal Unit 4 PM Emissions - April 2024
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW
High PM emissions can be attributed to the DHP stream 2 bucket elevator that tripped, SO3 stopped from outside plant due to pipe leak, Field 45 was faulty and SO3 plant on hold mode due to burner outlet temperature that was low.

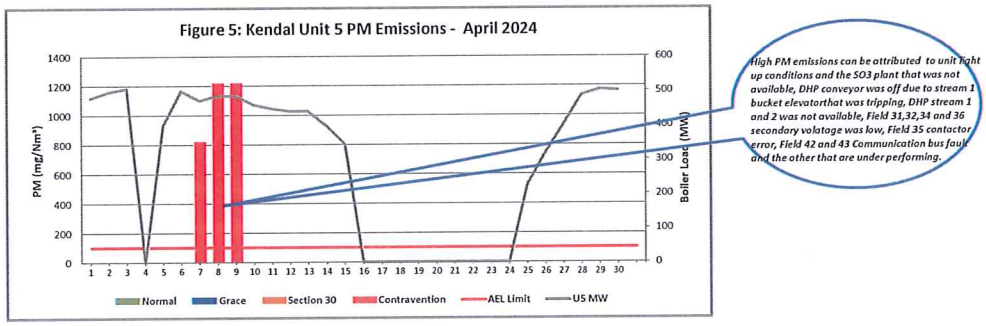


Figure 5: Kendal Unit 5 PM Emissions - April 2024
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW
High PM emissions can be attributed to unit light up conditions and the SO3 plant that was not available, DHP conveyor was off due to stream 1 bucket elevatorthat was tripping, DHP stream 1 and 2 was not available, Field 31,32,34 and 36 secondary volatage was low, Field 35 contactor error, Field 42 and 43 Communication bus fault and the other that are under performing.

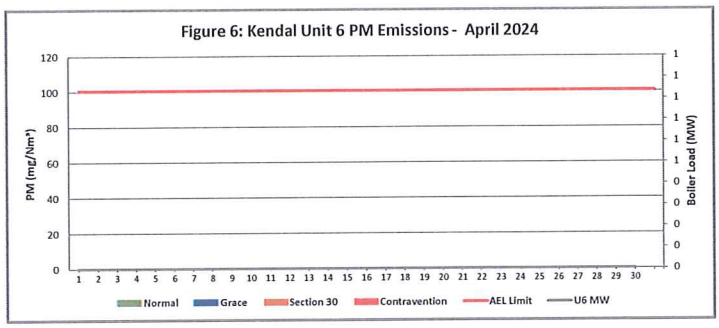


Figure 6: Kendal Unit 6 PM Emissions - April 2024
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U6 MW

Figure 7: Kendal Unit 1 SO_2 Emissions - April 2024

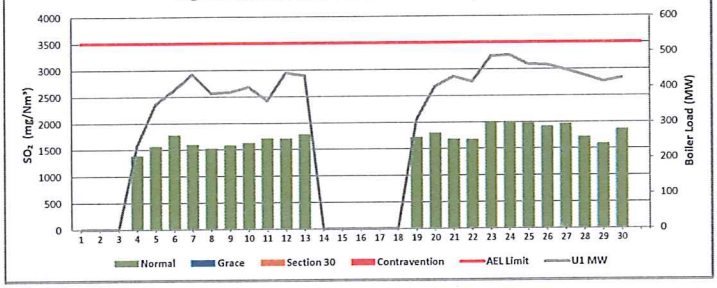


Figure 8: Kendal Unit 2 SO_2 Emissions - April 2024

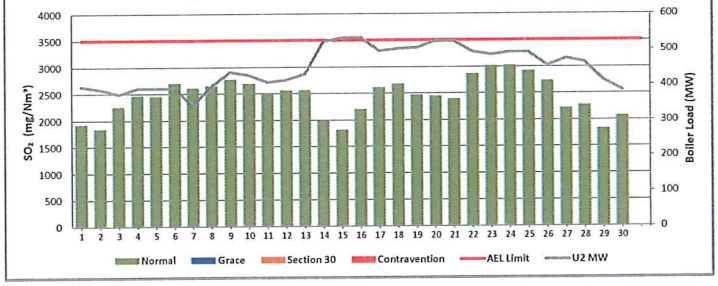


Figure 9: Kendal Unit 3 SO_2 Emissions - April 2024

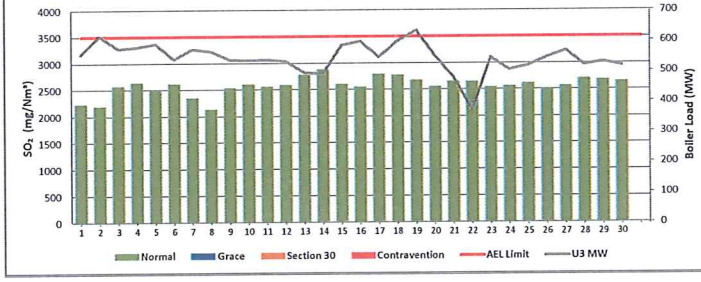


Figure 10: Kendal Unit 4 SO_2 Emissions - April 2024

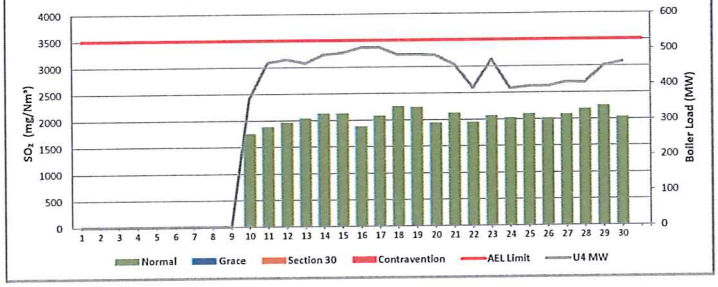


Figure 11: Kendal Unit 5 SO_2 Emissions - April 2024

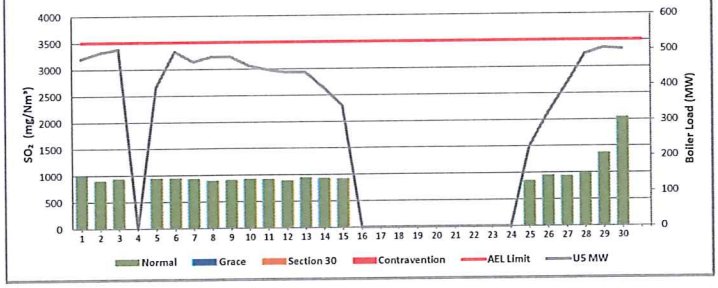


Figure 12: Kendal Unit 6 SO_2 Emissions - April 2024

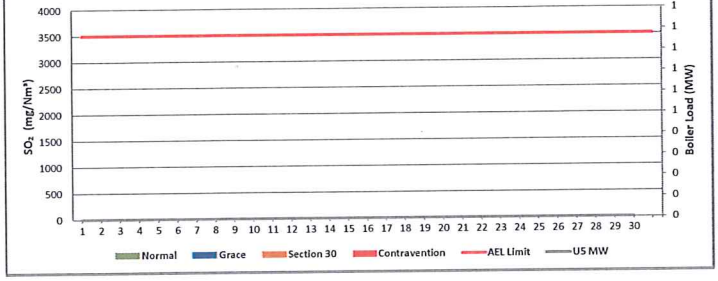


Figure 13: Kendal Unit 1 NOx Emissions - April 2024

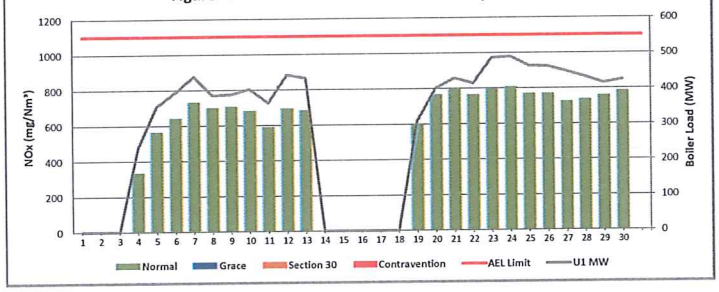


Figure 14: Kendal Unit 2 NOx Emissions - April 2024

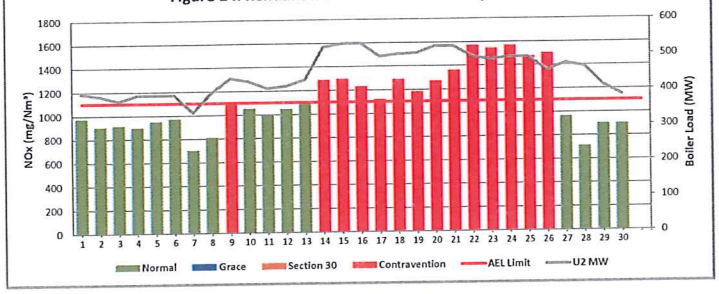


Figure 15: Kendal Unit 3 NOx Emissions - April 2024

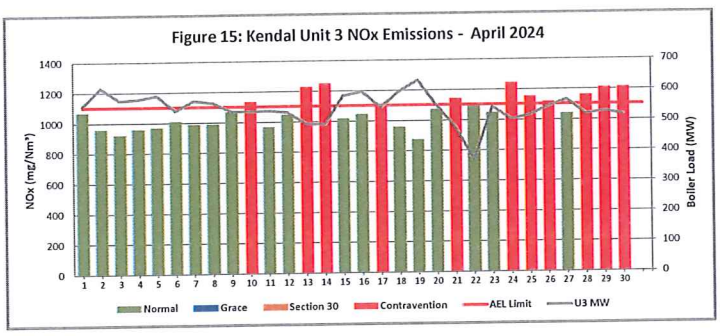


Figure 16: Kendal Unit 4 NOx Emissions - April 2024

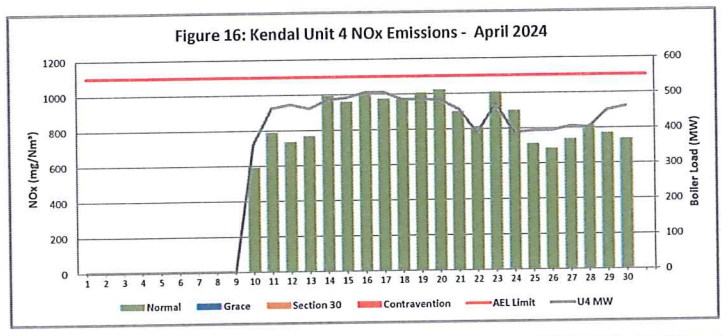


Figure 17: Kendal Unit 5 NOx Emissions - April 2024

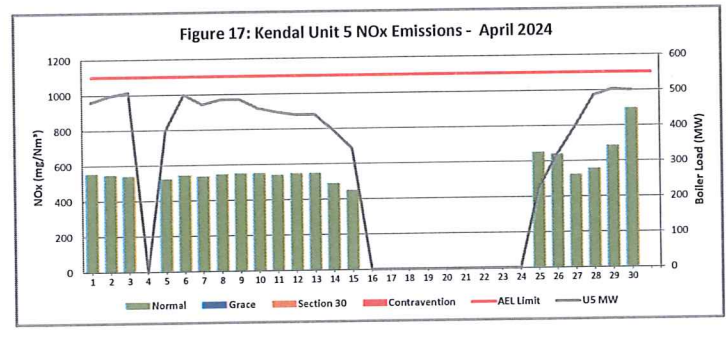
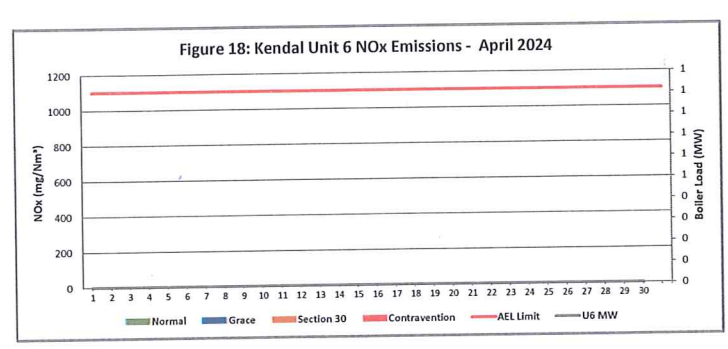


Figure 18: Kendal Unit 6 NOx Emissions - April 2024



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 read ing 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
- Avarage emeissions for unit 1 NOx from the the 1st to the 3rd were used from the available data as the monitor was defective.
- Average emissions for Unit 1 O2 from the 1st to the 9th were used from the available data as the monitor was defective.

- Unit 1

Findings: The high emissions can be attributed to the unit on start up (cold start), Precipt field no 24,33 and 35 had communication buss fault and Precipt field no 21 circuit breaker was faulty, Precipt chain conveyor 23 kept tripping and SO3 failed to start due steam inlet temperature tha was low. DHP also tripped due to compartmens high level.
- Resolution: Plant repaired

- Unit 2

Findings: The high emissions can be attributed to the SO3 plant that was on hold mode due to low steam temperature, poor precip fields performance, DHP off due to bucket elevator flopper gate that lost open limit. The DHP also tripped due to compartment levels that were high.
- Resolution: Plant repaired.

- Unit 3
- Findings: The high PM emissions can be attributed to SO3 plant that was on hold mode due to aux steam temperature that was low, SO3 plant was off due to the heater that was off.
- Resolution: Palnt repaired.

- Unit 4

Findings: High PM emissions can be attributed to the DHP stream 2 bucket elevator that tripped, SO3 that stopped from outside plant due to pipe leak, Field 45 was faulty and SO3 plant that was on hold mode due to burner outlet temperature that was low.
- Resolution: Plant repaired.

- Unit 5

Findings: High PM emissions can be attributed to unit light up conditions and the SO3 plant that was not available, DHP conveyor was off due to stream 1 bucket elevatorthat was tripping, DHP stream 1 and 2 was not available, Field 31,32,34 and 36 secondary volatage was low, Field 35 contactor error, Field 42 and 43 Communication bus fault and the other that are under performing.
- Resolution: Plant repaired.

- Unit 6- Unit off.