Eskom

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By email: nembilwim@nkangaladm.gov.za'

Date:
28 November 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 OCTOBER 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: 28/11/2022

Supported by:

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Date: 28/11/2022

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

Verified by:

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Date: 28/11/2022

Validated by:

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BOILER ENGINEERING MANAGER-KENDAL

Date: 29/11/2022

Supported by:

Malibongwe Mabizela
ENGINEERING MANAGER-KENDAL

Date: 01/12/2022

Approved by:

Kobus Steyn
GENERAL MANAGER-KENDAL

Date: 1 Dec 2022

Eskom

OCTOBER 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 Oct-2022
	Coal	Tons	2 260 000	687 892
	Fuel Oil	Tons	5 000	11735
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Oct-2022
	Energy	GWh(MW)	(3,153,600)4380	1 161 009.00
	Ash	Tons	770 000	211 870.7
	RE Ash	kg/MWh	not specified	1.370

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0.720
Ash Content	%	40 (%)	30.800

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 Oct-2022	Technology Type	SO_3 Utlization Oct-2022
Unit 1	$ESP + SO_3$	98.401%	SO_3	51.3%
Unit 2	$ESP + SO_3$	98.727%	SO_3	43.1%
Unit 3	$ESP + SO_3$	99.379%	SO_3	0.0%
Unit 4	$ESP + SO_3$	99.718%	SO_3	68.8%
Unit 5	$ESP + SO_3$	98.910%	SO_3	81.4%
Unit 6	$ESP + SO_3$	99.498%	SO_3	71.5%

Note: ESP plant does not have bypass mode operation, hence plant 100% Utilised.

Unit 1, 2,4,5 & 6: SO3 utilization is less than 100% due to SO3 plant off due to OPCR pumps that are faulty.
- SO3 plant off due to low steam temperature.
- SO3 plant on hold mode due to RH flue gas temperature low.

Unit 3: Faulty server with no readings for the month of October.

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO_2	NO	O_2
Unit 1	91.7	99.8	84.9	99.0
Unit 2	87.5	40.4	27.3	98.6
Unit 3	99.0	100.0	99.9	77.8
Unit 4	99.6	99.7	48.4	32.5
Unit 5	99.5	62.1	62.1	99.9
Unit 6	80.9	22.9	1.0	0.0

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

Note: Unit 2 SO2 and NO, Unit3 O2 and Unit4 NO and O2, Unit 5 SO2 and NO, Unit 6 SO2,NO and O2 monitor realiabilitys is low due to defective monitors.

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of October 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	606.5	3 020	998
Unit 2	142.7	321	154
Unit 3	218.0	1 960	646
Unit 4	70.8	1 479	393
Unit 5	461.0	2 562	896
Unit 6	89.2	1 713	766
SUM	1 588.30	11 055	3 853

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	8	6	0	9	15	376.6
Unit 2	3	2	0	3	5	483.1
Unit 3	25	4	0	0	4	65.2
Unit 4	16	2	0	8	10	250.9
Unit 5	4	13	0	11	24	409.6
Unit 6	7	2	0	6	8	162.5
SUM	63	29	0	37	66	

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm³)
Unit 1	24	0	0	0	0	2 719.4
Unit 2	9	0	0	0	0	1 030.0
Unit 3	31	0	0	0	0	1 745.0
Unit 4	29	0	0	0	0	1 922.3
Unit 5	29	0	0	0	0	1 537.1
Unit 6	20	0	0	0	0	1 734.9
SUM	142	0	0	0	0	

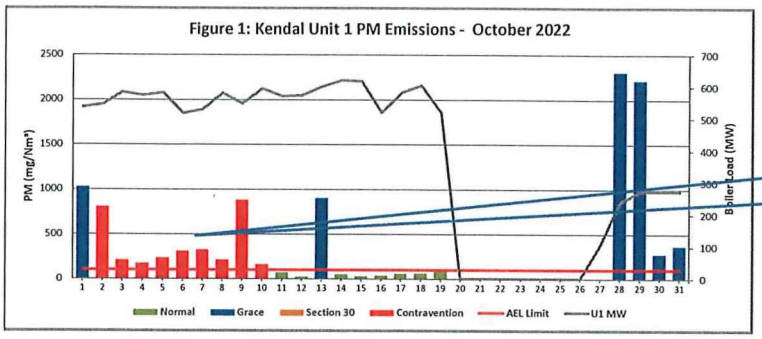
Table 6.4: Operating days in compliance to NOx AEL Limit - October 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	24	0	0	0	0	883.4
Unit 2	9	0	0	0	0	489.0
Unit 3	31	0	0	0	0	573.7
Unit 4	29	0	0	0	0	539.6
Unit 5	29	0	0	0	0	537.4
Unit 6	20	0	0	0	0	775.6
SUM	142	0	0	0	0	

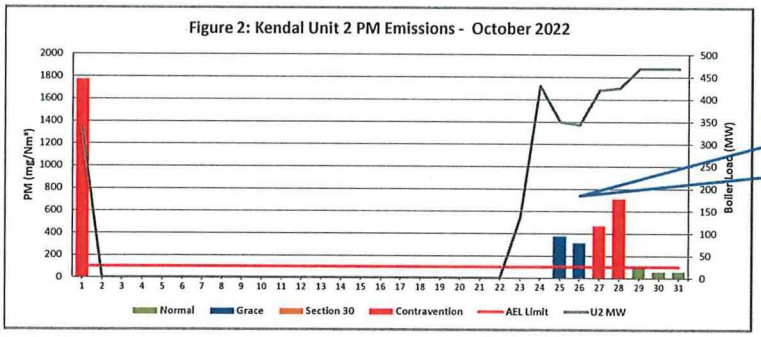
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

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



High emissions can be attributed to SO3 plant off due to no Sulphur flow. ESP conveyor 11,12,13,14,21,22,23 &24 checked in, ESP conveyor 11 chocked, SO3 plant on hold mode due to low temperature, SO3 plant off due to OPCR pumps that are faulty, DHP off due to compartments level high.



High emissions can be attributed to SO3 plant off due to low steam temperature, and DHP tripped due to Stream 2 bucket elevator flopper gate which had two limits for bunker and chute.

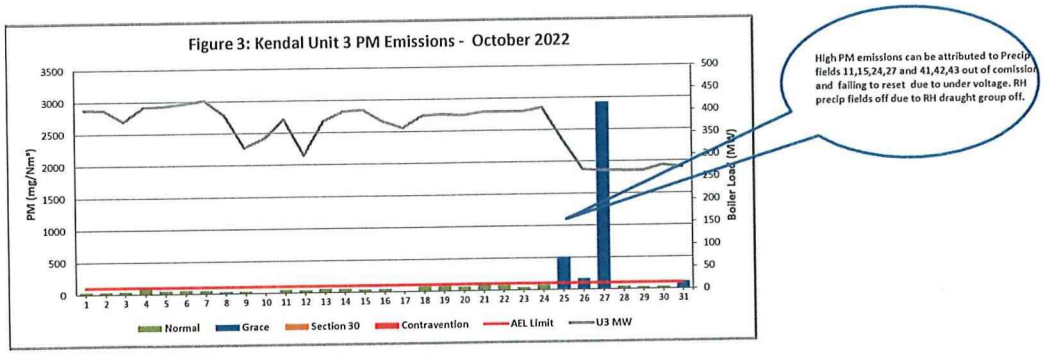


Figure 3: Kendal Unit 3 PM Emissions - October 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW
High PM emissions can be attributed to Precip fields 11,15,24,27 and 41,42,43 out of comission and failing to reset due to under voltage. RH precip fields off due to RH draught group off.

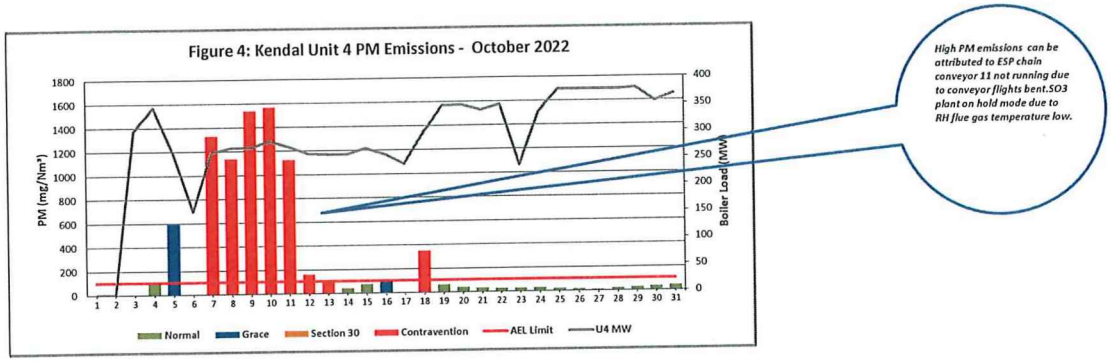


Figure 4: Kendal Unit 4 PM Emissions - October 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW
High PM emissions can be attributed to ESP chain conveyor 11 not running due to conveyor flights bent.SO3 plant on hold mode due to RH flue gas temperature low.

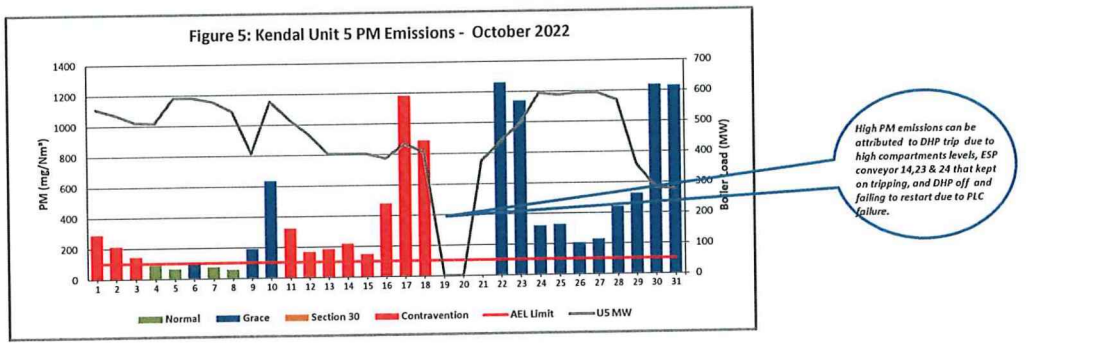


Figure 5: Kendal Unit 5 PM Emissions - October 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW
High PM emissions can be attributed to DHP trip due to high compartments levels, ESP conveyor 14,23 & 24 that kept on tripping, and DHP off and failing to restart due to PLC failure.

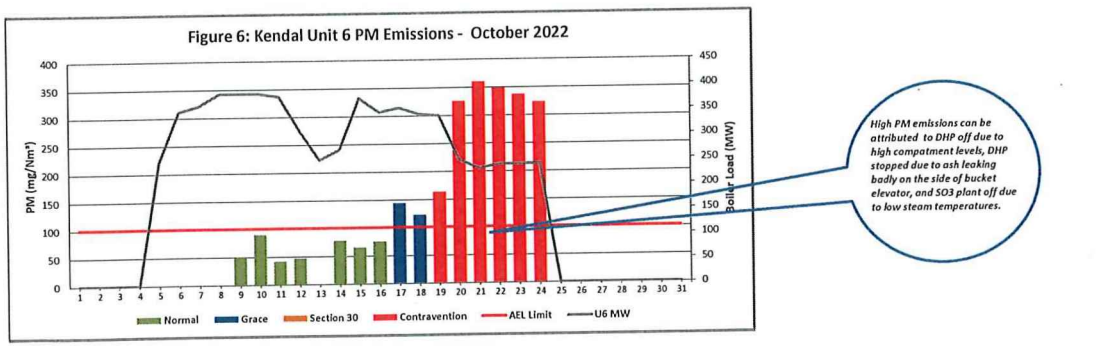


Figure 6: Kendal Unit 6 PM Emissions - October 2022
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U6 MW
High PM emissions can be attributed to DHP off due to high compatment levels, DHP stopped due to ash leaking badly on the side of bucket elevator, and SO3 plant off due to low steam temperatures.

Figure 7: Kendal Unit 1 SO_2 Emissions - October 2022

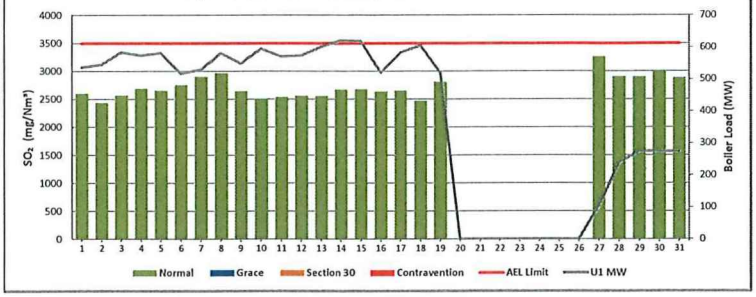


Figure 8: Kendal Unit 2 SO_2 Emissions - October 2022

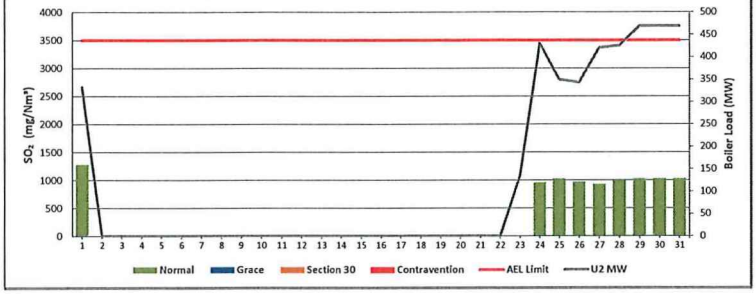


Figure 9: Kendal Unit 3 SO_2 Emissions - October 2022

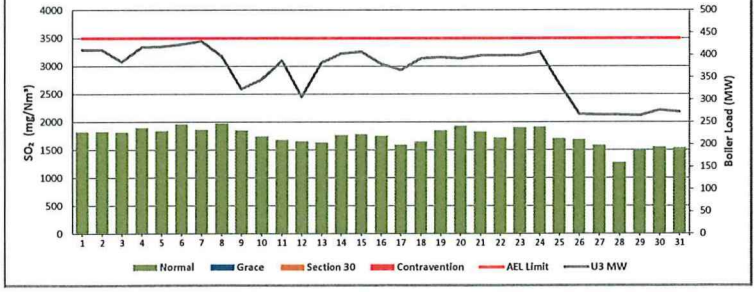


Figure 10: Kendal Unit 4 SO_2 Emissions - October 2022

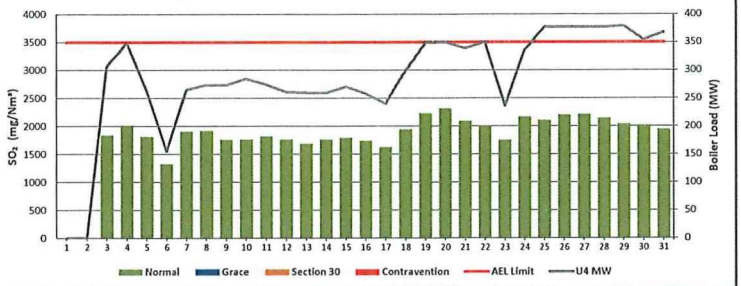


Figure 11: Kendal Unit 5 SO_2 Emissions - October 2022

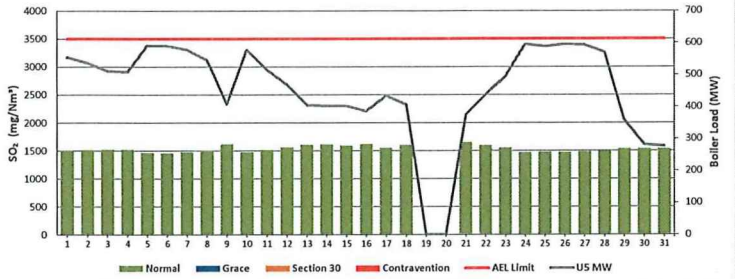


Figure 12: Kendal Unit 6 SO_2 Emissions - October 2022

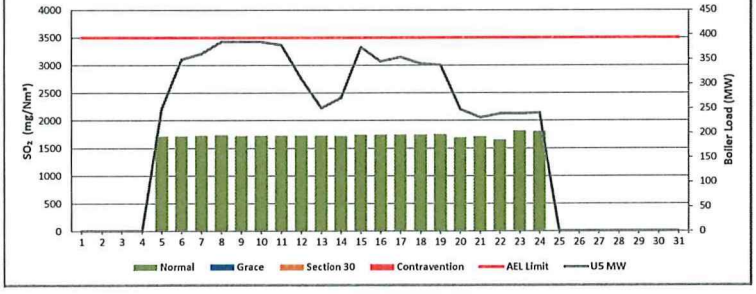


Figure 13: Kendal Unit 1 NOx Emissions - October 2022

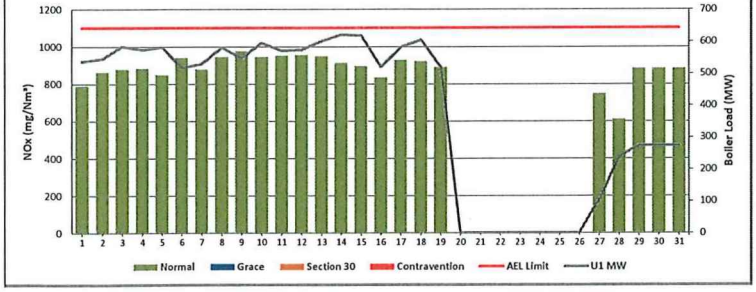


Figure 14: Kendal Unit 2 NOx Emissions - October 2022

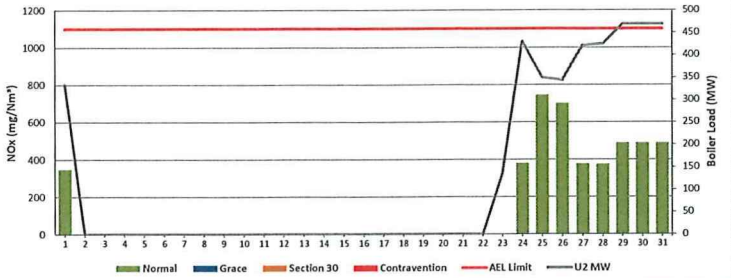


Figure 15: Kendal Unit 3 NOx Emissions - October 2022

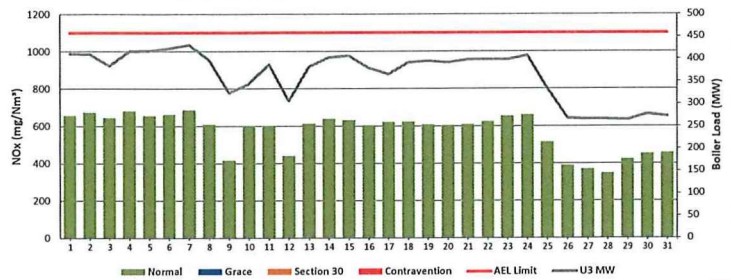


Figure 16: Kendal Unit 4 NOx Emissions - October 2022

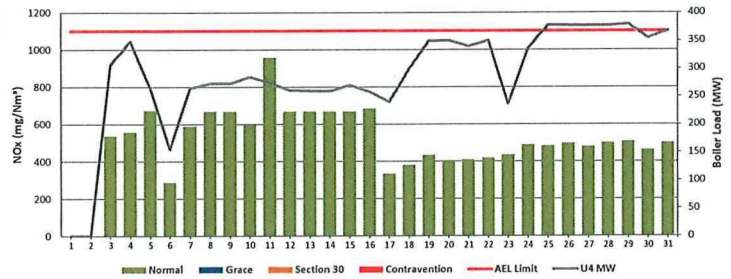


Figure 17: Kendal Unit 5 NOx Emissions - October 2022

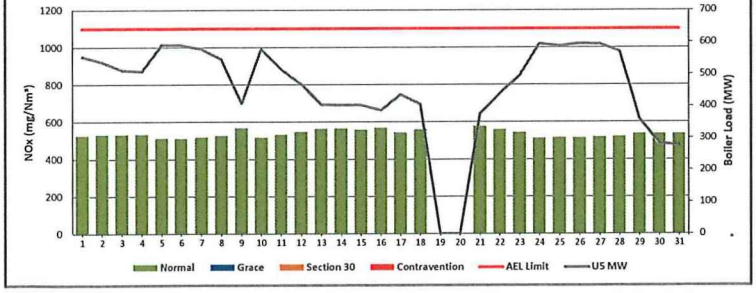
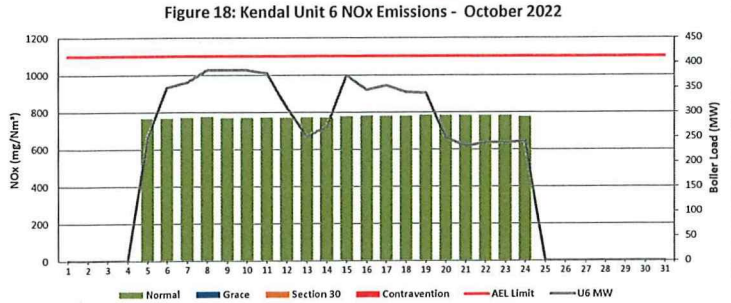


Figure 18: Kendal Unit 6 NOx Emissions - October 2022



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 5 Monitor still using the old monitor correlation. After new correlations are done, new correlation factors will be implemeted and backfitted to the date of monitor installation.
- Unit 4 dust monitor output 2 is faulty. where output 1 is greater or equal to 87.5, output 1 readings were copied to output 2.
- Average values for Unit 1 NOx from the 28th to the 31st and moisture from the 26th to the 31st were used from the available data as the monitors were defective.
- Avarage emeissions for Unit 5 SOx and NOx for the whole month were use from the QAL 2 report as the monitors were deffective
- Avarage emeissions for Unit 6 SOx from the the 1st until the 20th, NOx and O2 for the whole month were use from the QAL 2 report as the monitors were deffective.
- avarage emissions for Unit 6 dust from the 07th to the 08th, 12th to 14th was used where the monitor was defective.
-
- Unit 1
- Findings: The high emissions can be attributed to SO3 plant off due to no Sulphur flow. ESP conveyor 11,12,13,14,21,22,23 &24 checked in, ESP conveyor 11 chocked, SO3 plant on hold mode due to low temperature, SO3 plant off due to OPCR pumps that are faulty and DHP off due to compartments level high..
- Resolution: Plant repaired

- Unit 2
- Findings: The high emissions can be attributed to SO3 plant off due to low steam temperature, and DHP tripped due to Stream 2 bucket elevator flopper gate which had two limit for bunker and chute.
- Resolution: Plant repaired.

- Unit 3
- Findings: High PM emissions can be attributed to ESP chain conveyor 11 not running due to conveyor flights bent.SO3 plant on hold mode due to RH flue gas temperature low.
- Resolution: Plant repaired.

- Unit 4
- Findings: High PM emissions can be attributed to ESP chain conveyor 11 not running due to conveyor flights bent.SO3 plant on hold mode due to RH flue gas temperature low.
- Resolution: Plant repaired.

- Unit 5
- Findings: High PM emissions can be attributed to DHP trip due to high compartments levels, ESP conveyor 14,23 & 24 that kept on tripping, and DHP off and failing to restart due to PLC failure.
- Resolution: Plant repaired.

- Unit 6
- Findings: High PM emissions can be attributed to DHP off due to high compatment levels high, DHP stopped due to ash leaking badly on the side of bucket elevator, and SO3 plant off due to low steam temperatures.
- Resolution: Plant repaired.