Eskom

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Date
12 January 2021

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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 2020

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: 12/01/2021

Supported by:

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Date: 19/01/2021

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KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF OCTOBER 2020

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Date 23/02/2021

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Yangaphe Ngcashi
~~ACTING~~ **GENERAL MANAGER-KENDAL**

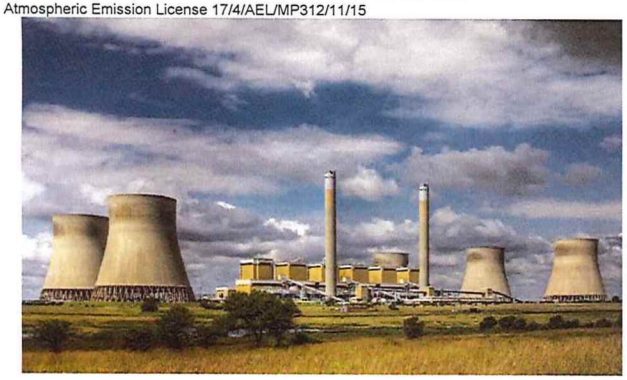
Date 2021.03.01

Eskom

OCTOBER 2020 REV 01

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-2020
	Coal	Tons	*2 260 000*	*913 434*
	Fuel Oil	Tons	*5 000*	*1607,29*
Production Rates	Product / By-Product Name	Units		Production Rate Oct-2020
	Energy	GWh	*4380*	*1465.95400*
	Ash	Tons	*Not specified*	*314 221,3*
	RE Ash	kg/MWh	*Not specified*	*1,260*

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	*< 3 (%)*	*0,780*
Ash Content	%	*40 (%)*	*34,400*

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 Oct-2020	Technology Type	Utlization Oct-2020
Unit 1	ESP + SO_3	99,8%	SO_3	99,8%
Unit 2	ESP + SO_3	99,7%	SO_3	99,7%
Unit 3	ESP + SO_3	98,7%	SO_3	Data not available
Unit 4	ESP + SO_3	98,9%	SO_3	99,7%
Unit 5	ESP + SO_3	Unit off	SO_3	Unit off
Unit 6	ESP + SO_3	99,4%	SO_3	Data not available

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	99,4	0,0	0,0	0,0
Unit 2	97,8	0,0	0,0	0,0
Unit 3	98,1	0,0	0,0	0,0
Unit 4	88,8	0,0	0,0	0,0
Unit 5	Unit off	Unit off	Unit off	Unit off
Unit 6	94,8	0,0	0,0	0,0

Note: The QAL 2 parallel tests results have been used to calculate the gaseous emissions hence monitor relaibility is zero

6 EMISSION PERFORMANCE

Table 6 1 Monthly tonnages for the month of October 2020

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	116 2	4 059	1 442
Unit 2	104 5	2 966	1 311
Unit 3	666 0	2 831	1 069
Unit 4	657 2	0	1 762
Unit 5	Unit off	Unit off	Unit off
Unit 6	305 6	5 169	2 142
SUM	1 849 66	15 026	7 726

Table 6 2 Operating days in compliance to PM AEL Limit - October 2020

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	23	5	0	0	5	75 8
Unit 2	10	9	0	3	12	102 5
Unit 3	0	4	0	21	25	446 6
Unit 4	2	3	0	25	28	448 0
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	4	5	0	16	21	209,1
SUM	39	26	0	65	91	

Table 6 3 Operating days in compliance to SOx AEL Limit - October 2020

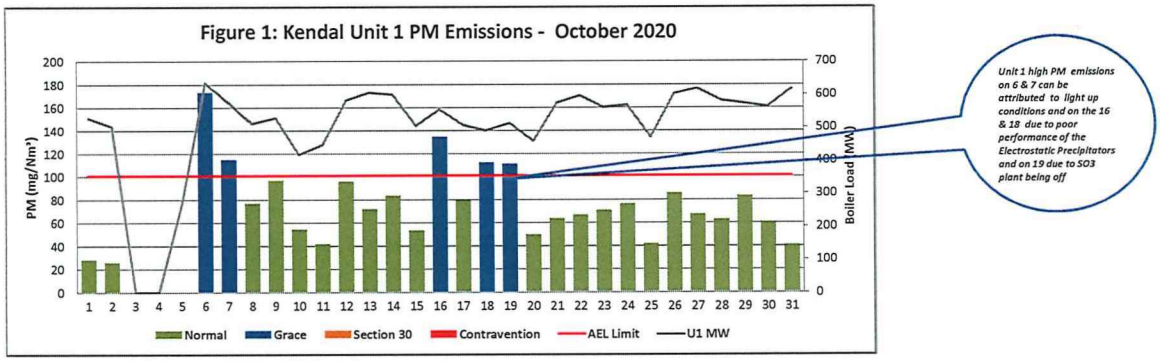
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm³)
Unit 1	29	0	0	0	0	1 920 2
Unit 2	24	0	0	0	0	2 458 1
Unit 3	26	0	0	0	0	1 627 9
Unit 4	0	0	0	0	0	
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	31	0	0	0	0	2 441 1
SUM	110	0	0	0	0	

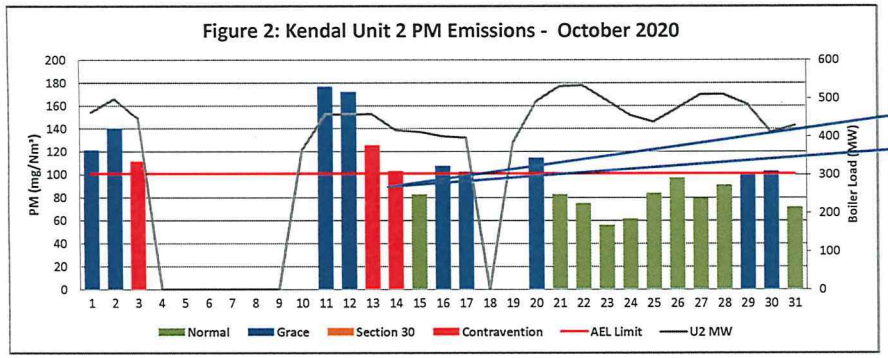
Table 6.4: Operating days in compliance to NOx AEL Limit - October 2020

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	29	0	0	0	0	682,1
Unit 2	24	0	0	0	0	1 086,3
Unit 3	26	0	0	0	0	614,8
Unit 4	31	0	0	0	0	935,0
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	27	0	0	0	0	1 011,4
SUM	137	0	0	0	0	

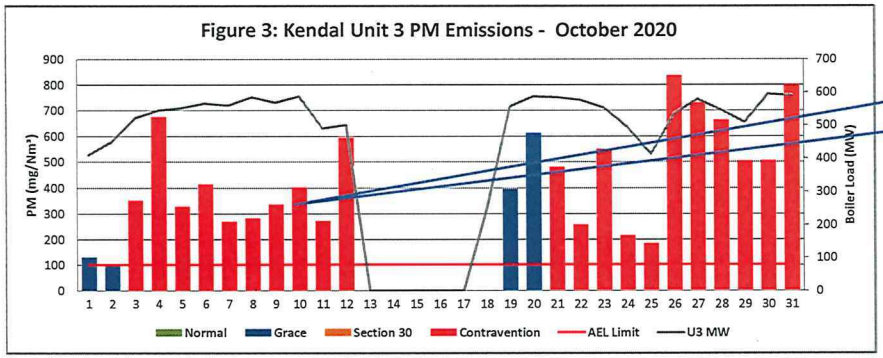
Table 6.5: Legend Description

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 PM emissions on 01,02,03,13,14 can be attributed to Dust Handling Plant standing/off and resulting to poor performance of the electrostatic



Unit 3 high PM emissions can be attributed to poor availability of Dust Handling Plant resulting to ash backlogs causing poor performance of the electrostatic precipitators fields.

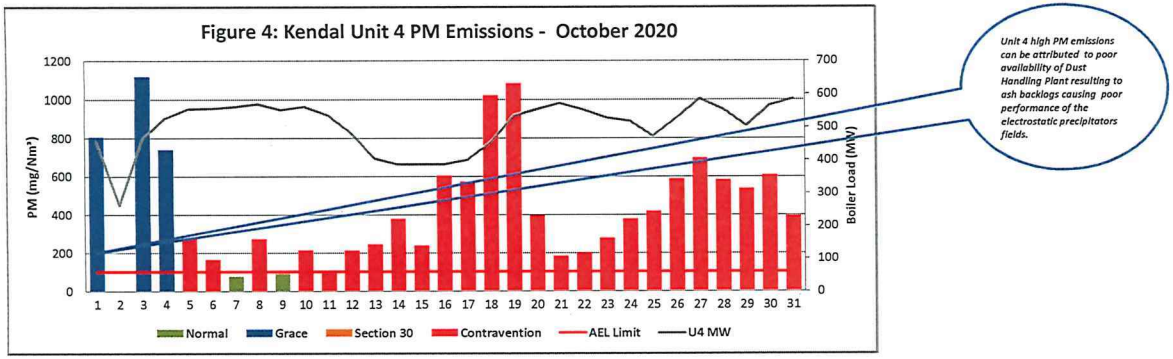


Figure 4: Kendal Unit 4 PM Emissions - October 2020
PM (mg/Nm³)
Boiler Load (MW)
1200
1000
800
600
400
200
0
700
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW
Unit 4 high PM emissions can be attributed to poor availability of Dust Handling Plant resulting to ash backlogs causing poor performance of the electrostatic precipitators fields.

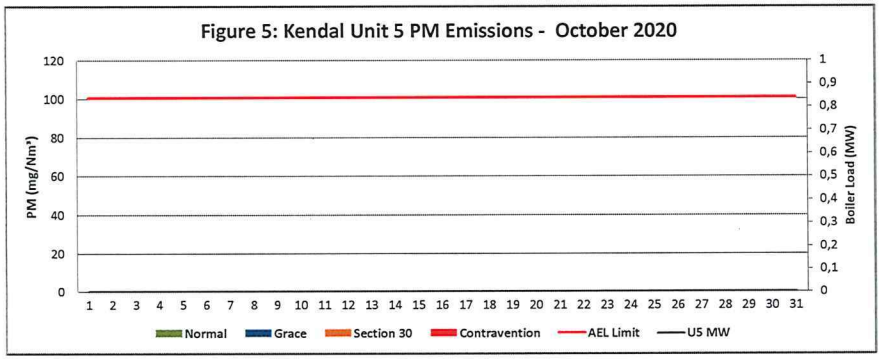
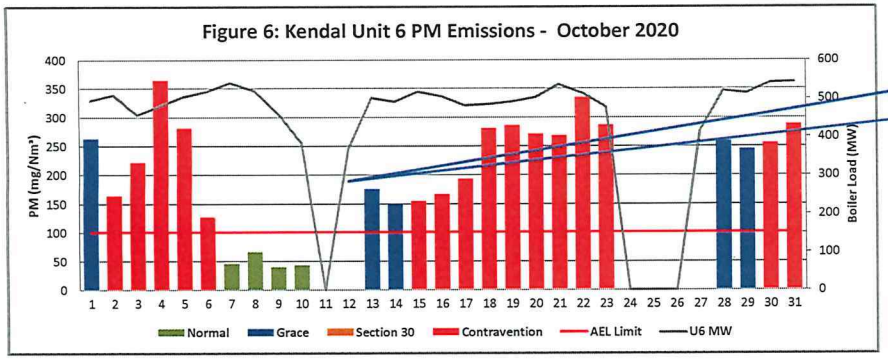
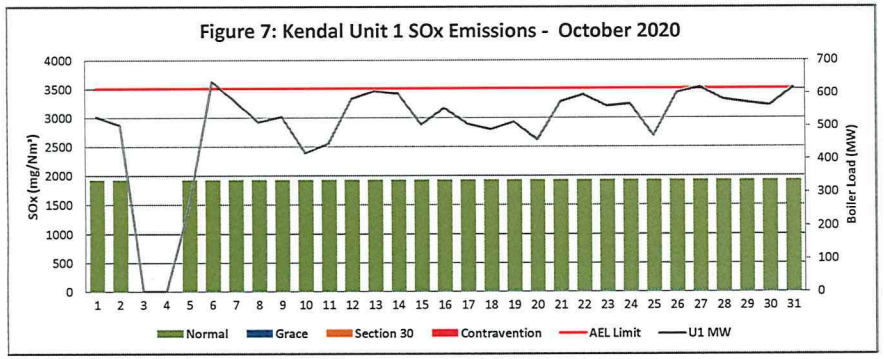


Figure 5: Kendal Unit 5 PM Emissions - October 2020
PM (mg/Nm³)
Boiler Load (MW)
120
100
80
60
40
20
0
1
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW



Unit 6 high PM emissions can be attributed to poor availability of Dust Handling Plant resulting to ash backlogs causing poor performance of the electrostatic precipitators fields.



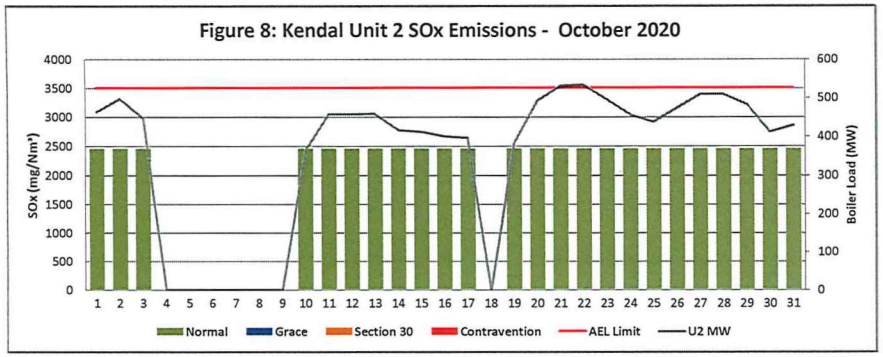


Figure 8: Kendal Unit 2 SOx Emissions - October 2020
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

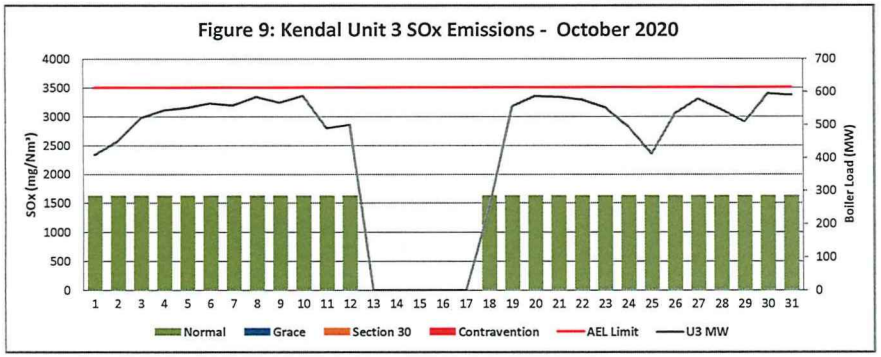


Figure 9: Kendal Unit 3 SOx Emissions - October 2020
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

Figure 10: Kendal Unit 4 SOx Emissions - October 2020

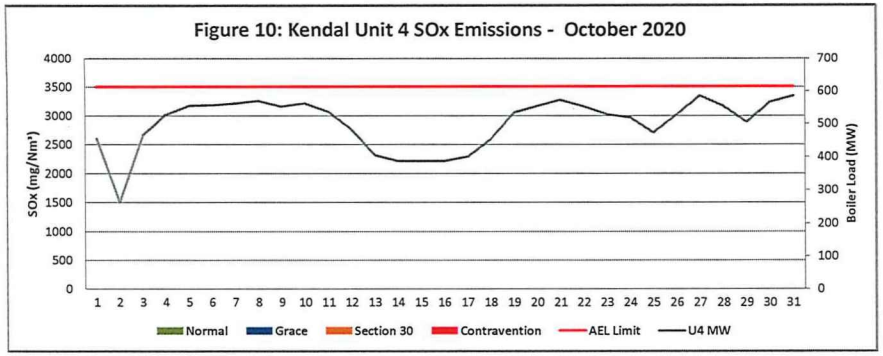


Figure 11: Kendal Unit 5 SOx Emissions - October 2020

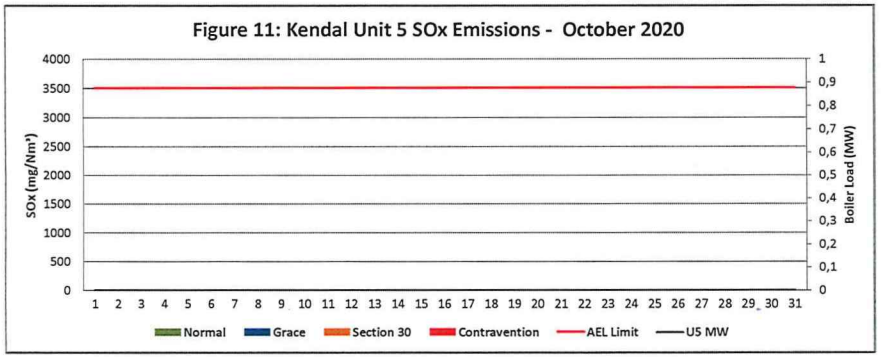


Figure 12: Kendal Unit 6 SOx Emissions - October 2020

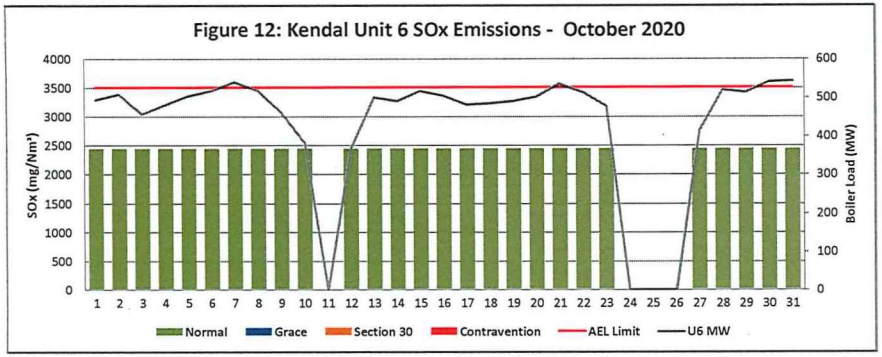


Figure 13: Kendal Unit 1 NOx Emissions - October 2020

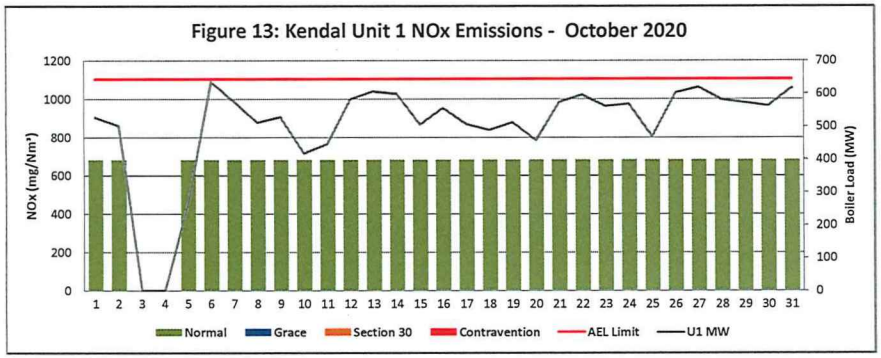


Figure 14: Kendal Unit 2 NOx Emissions - October 2020

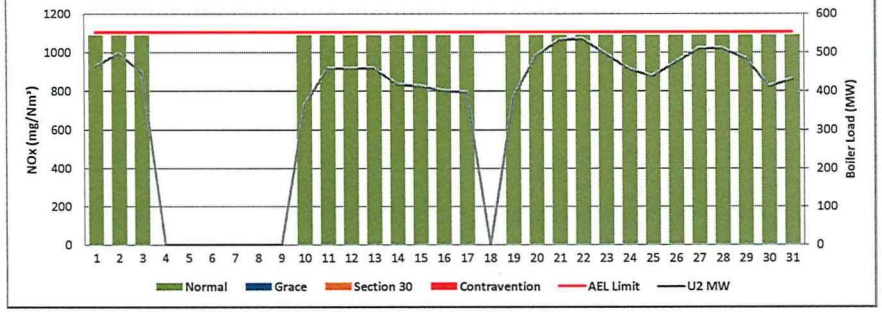
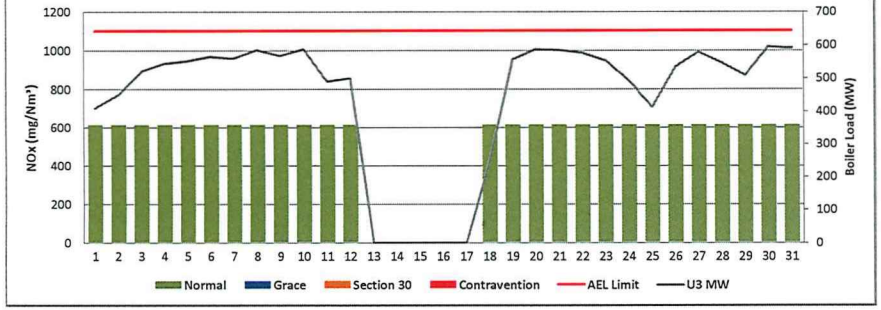


Figure 15: Kendal Unit 3 NOx Emissions - October 2020



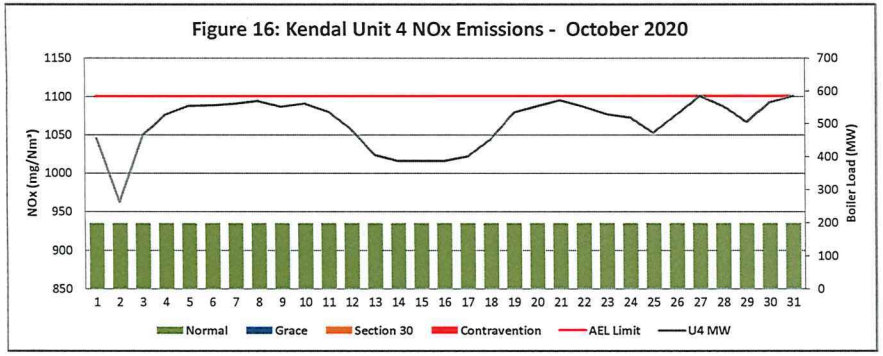


Figure 16: Kendal Unit 4 NOx Emissions - October 2020
NOx (mg/Nm³)
Boiler Load (MW)
1150
1100
1050
1000
950
900
850
700
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

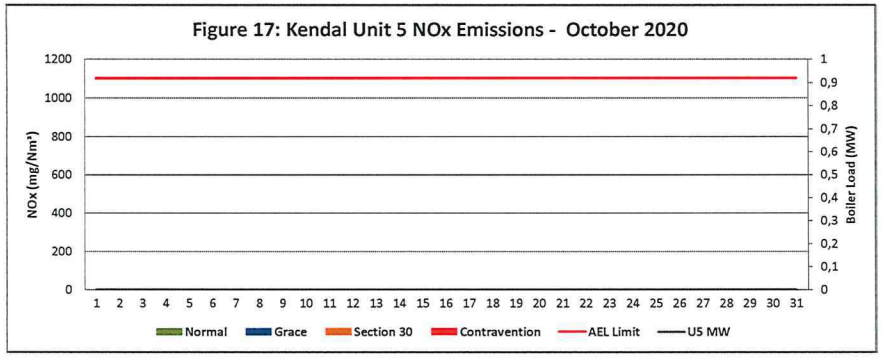
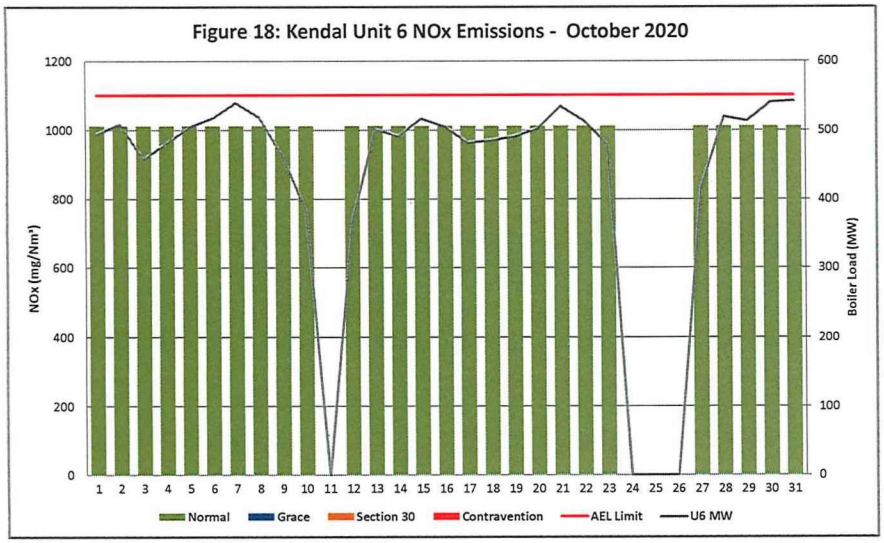


Figure 17: Kendal Unit 5 NOx Emissions - October 2020
NOx (mg/Nm³)
Boiler Load (MW)
1200
1000
800
600
400
200
0
1
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW



7 COMPLAINTS

There were no complaints for the months of October 2020

Source Code / Name	Root Cause Analysis	Calculation of impacts / emissions associated with the incident	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

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

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

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** reffers 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

- Note that gaseous emissions were manually entered using Independant third party QAL2 parallel test reports due to the unreliability of the CEMS monitors data

- 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 velocity values from December 2019 correlation report were used for the gaseous emissions on unit 6 with the velocity correction factors

- Unit 5 was still offload during the whole months of October 2020

Unit 1
Findings
Unit 1 high PM emissions on 6 & 7 can be attributed to light up conditions and on the 16 & 18 due to poor performance of the Electrostatic Precipitators and on 19 due to SO3 plant being off
Resolution Electrostatic Precipitators (ESP) were during opportunity maitenance and SO3 plant was returned back to service after repairs

Unit 2
Findings
High PM emissions on 01,02,03,13,14 can be attributed to Dust Handling Plant standing/off and resulting to poor performance of the electrostatic precipitators and on the 11,12 & 20 was due to light up conditions , 16 & 17 was due to low fuel factor and 29th and 30th was due to
Resolution The Dust handling Plant was returned abck to service after repairs and ESP were optimised to improve performance Better coal quality was burnt to improve fuel factor

Unit 3
Unit 3 high PM emissions can be attributed to poor availability of Dust Handling Plant resulting to ash backlogs causing poor performance of the electrostatic precipitators fields
Resolution The Dust handling plant was repaired, ash backlogs were cleared and ESP fields were also fixed during opportunity maintenance

Unit 4
Unit 4 high PM emissions can be attributed to poor availability of Dust Handling Plant resulting to ash backlogs causing poor performance of the electrostatic precipitators fields
Resolution The Dust handling plant was repaired, ash backlogs were cleared and ESP fields were also fixed during opportunity maintenance

Unit 4 PM Emissions
The monitor maxes out at 1135mg/Nm3 and for month of october the monitor reliability was at 88 8% because of the monitor maxing out at 98% of the data signal

Unit 6 high PM emissions can be attributed to poor availability of Dust Handling Plant resulting to ash backlogs causing poor performance of the electrostatic precipitators fields
Resolution The Dust handling plant was repaired, ash backlogs were cleared and ESP fields were also fixed during opportunity maintenance