Eskom

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Date
24 February 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 NOVEMBER 2020 TO JANUARY 2021.

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: 24/02/2021

Supported by:

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Date: 25/02/2021

KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTHS OF NOVEMBER 2020 TO JANUARY 2021.

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Eskom

JANUARY 2021 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 Consumpti	Consumption Rate Jan-2021
	Coal	Tons	*2 260 000*	*558 653*
	Fuel Oil	Tons	*5 000*	*5546,38*
Production Rates	Product / By-Product Name	Units		Production Rate Jan-2021
	Energy	GWh	*4380*	*9 683,82*
	Ash	Tons	*Not specified*	*170 724,5*
	RE Ash	kg/MWh	*Not specified*	*0,240*

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units		Stipulated Range	Monthly Average Content
Sulphur Content	%		*0.7 TO >1 (%)*	*0,660*
Ash Content	%		*30 TO >40 (%)*	*30,560*

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-2021	Technology Type	Utlization Jan-2021
Unit 1	ESP + SO_3	99,9%	SO_3	88,9%
Unit 2	ESP + SO_3	99,7%	SO_3	91,1%
Unit 3	ESP + SO_3	99,8%	SO_3	82,5%
Unit 4	ESP + SO_3	Unit off	SO_3	Unit off
Unit 5	ESP + SO_3	Unit off	SO_3	Unit off
Unit 6	ESP + SO_3	Unit off	SO_3	Unit off

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	100,0	0,0	0,0	0,0
Unit 2	99,9	0,0	0,0	0,0
Unit 3	100,0	0,0	0,0	0,0
Unit 4	Unit off	Unit off	Unit off	Unit off
Unit 5	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off

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 January 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	30 3	1 554	766
Unit 2	107 0	1 840	1 134
Unit 3	97 9	1 669	878
Unit 4	Unit off	Unit off	Unit off
Unit 5	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off
SUM	235 30	5 063	2 779

Table 6 2 Operating days in compliance to PM AEL Limit - January 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contraventi on	Total Exceedance		Average PM (mg/Nm³)
Unit 1	27	0	0	0	0		19,9
Unit 2	25	3	0	0	3		73,9
Unit 3	30	1	0	0	1		62,3
Unit 4	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
SUM	82	4	0	0	4		

Table 6 3 Operating days in compliance to SOx AEL Limit - January 2021

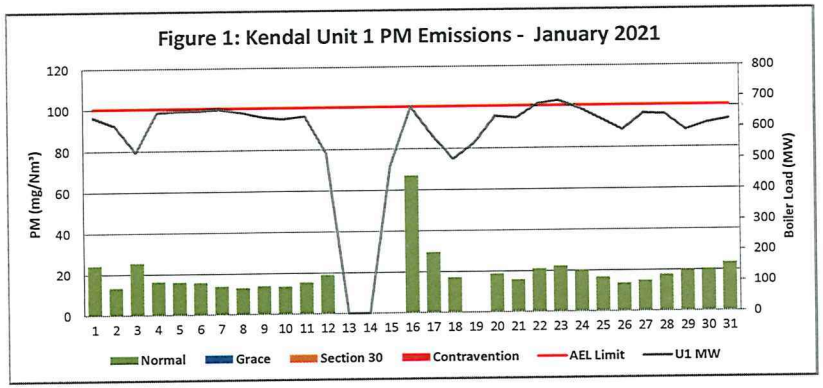
Associated Unit/Stack	Normal	Grace	Section 30	Contraventi on	Total Exceedance	Average SOx (mg/Nm³)
Unit 1	29	0	0	0	0	800,9
Unit 2	31	0	0	0	0	808,6
Unit 3	31	0	0	0	0	619,6
Unit 4	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
SUM	91	0	0	0	0	

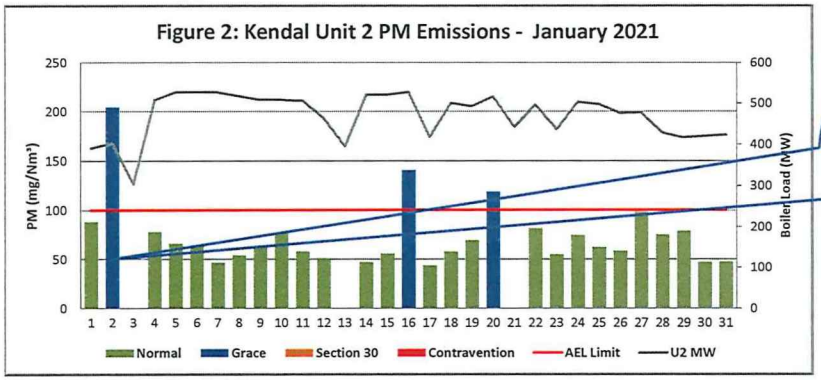
Table 6.4: Operating days in compliance to NOx AEL Limit - January 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	29	0	0	0	0	395,0
Unit 2	31	0	0	0	0	498,3
Unit 3	31	0	0	0	0	326,0
Unit 4	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
SUM	91	0	0	0	0	

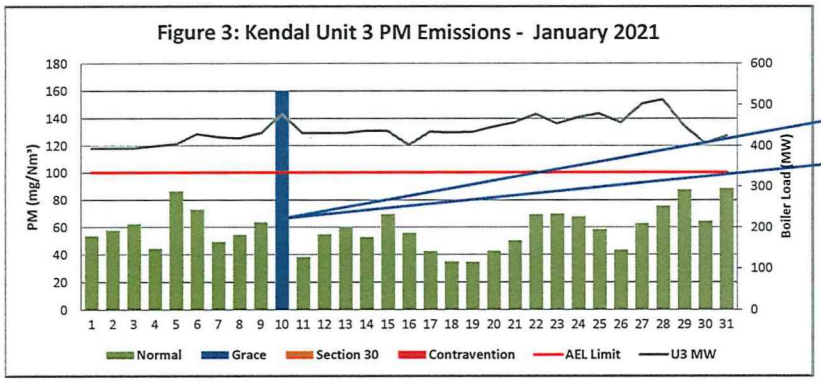
Table 6.5: Legend Description

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



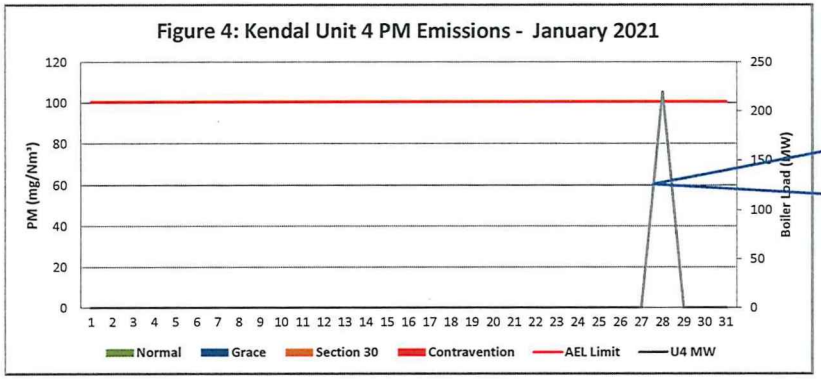


High PM emissions on the 02nd and 20th can be attributed to shutdown and on the 16 was due to due poor ESP performance.



Unit 3 high PM emissions on the 10th can be attributed poor performance of the electrostatic precipitators fields.

Figure 4: Kendal Unit 4 PM Emissions - January 2021



Unit only ran for 7 hours after sysnchronisation hence no PM emissions recorded

Figure 5: Kendal Unit 5 PM Emissions - January 2021

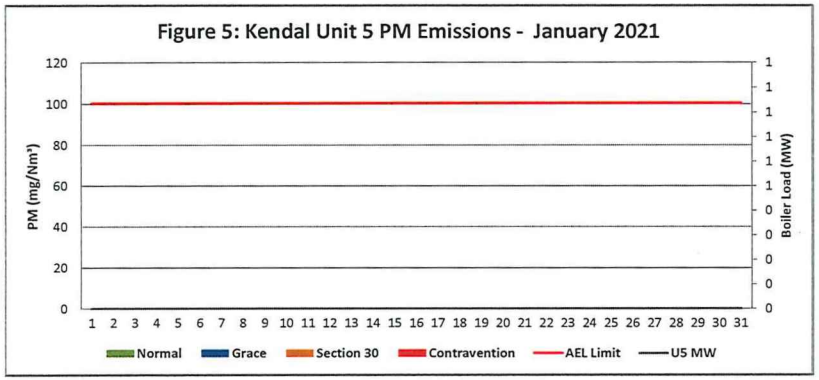


Figure 6: Kendal Unit 6 PM Emissions - January 2021

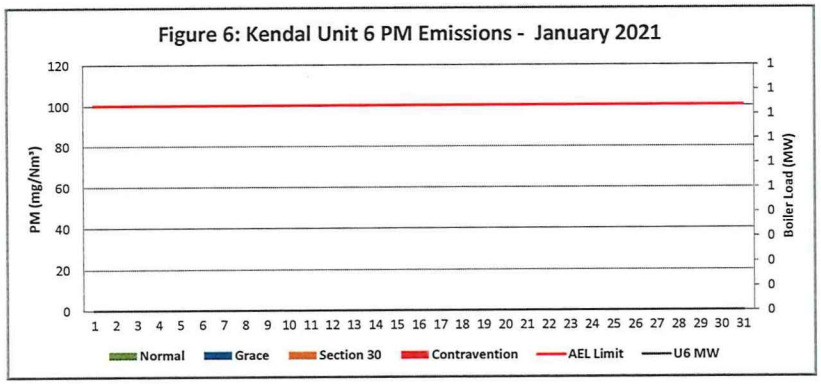
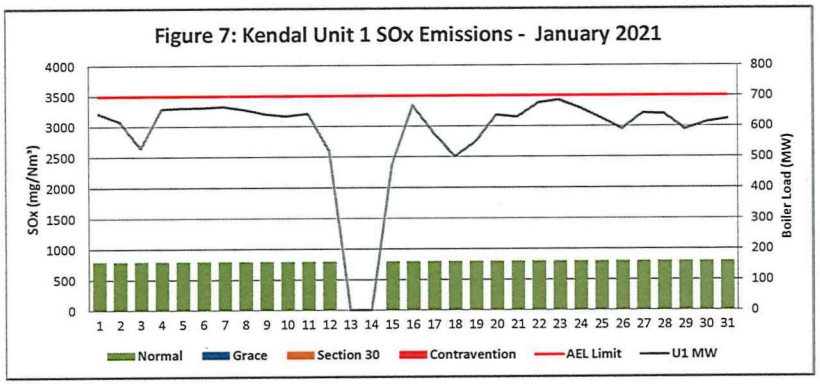


Figure 7: Kendal Unit 1 SOx Emissions - January 2021



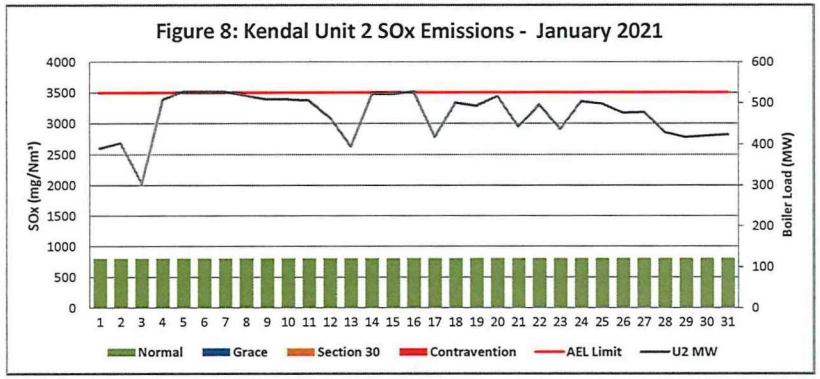


Figure 8: Kendal Unit 2 SOx Emissions - January 2021
SOx (mg/Nm³)
Boiler Load (MW)
4000
3500
3000
2500
2000
1500
1000
500
0
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

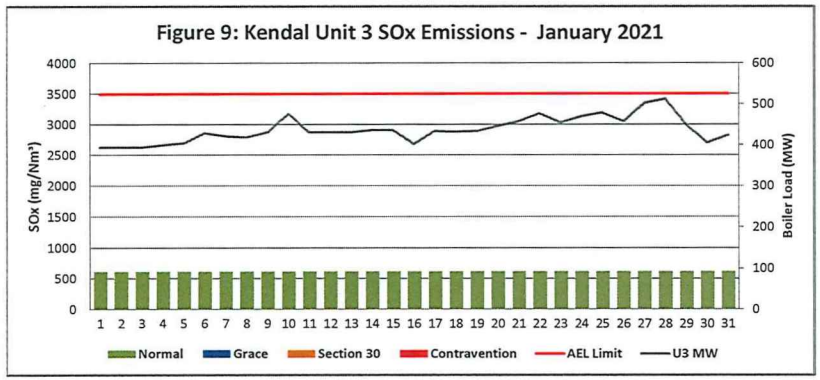


Figure 9: Kendal Unit 3 SOx Emissions - January 2021
SOx (mg/Nm³)
Boiler Load (MW)
4000
3500
3000
2500
2000
1500
1000
500
0
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

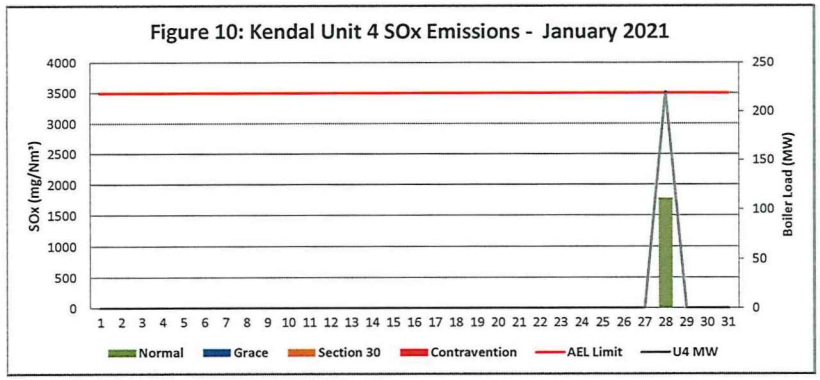


Figure 10: Kendal Unit 4 SOx Emissions - January 2021
SOx (mg/Nm³)
Boiler Load (MW)
4000
3500
3000
2500
2000
1500
1000
500
0
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

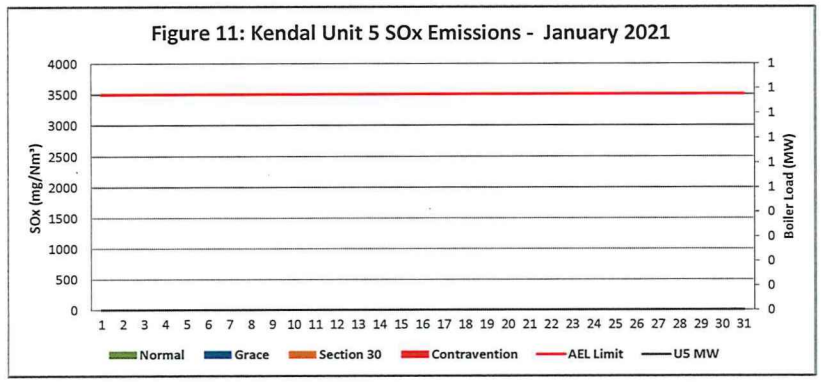


Figure 11: Kendal Unit 5 SOx Emissions - January 2021
SOx (mg/Nm³)
Boiler Load (MW)
4000
3500
3000
2500
2000
1500
1000
500
0
1
1
1
1
1
1
0
0
0
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

Figure 12: Kendal Unit 6 SOx Emissions - January 2021

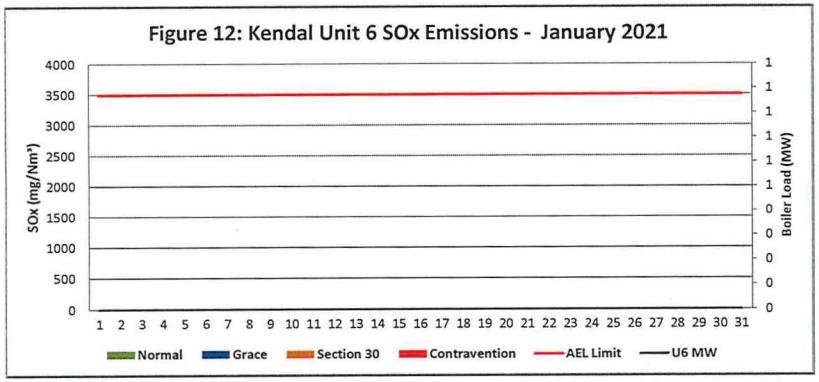
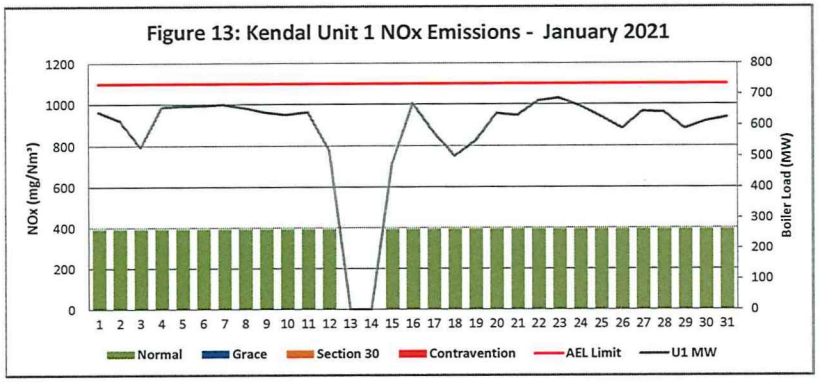


Figure 13: Kendal Unit 1 NOx Emissions - January 2021



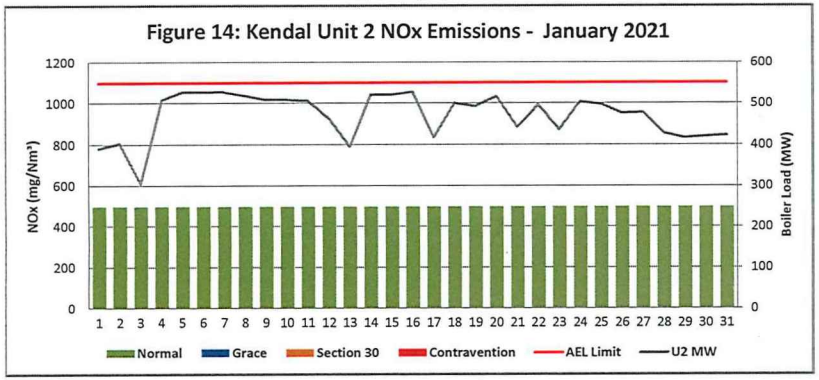


Figure 14: Kendal Unit 2 NOx Emissions - January 2021
NOx (mg/Nm³)
Boiler Load (MW)
1200
1000
800
600
400
200
0
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

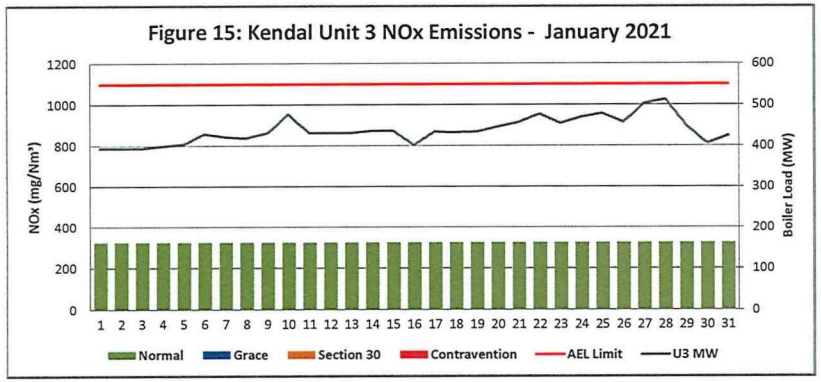


Figure 15: Kendal Unit 3 NOx Emissions - January 2021
NOx (mg/Nm³)
Boiler Load (MW)
1200
1000
800
600
400
200
0
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

Figure 16: Kendal Unit 4 NOx Emissions - January 2021

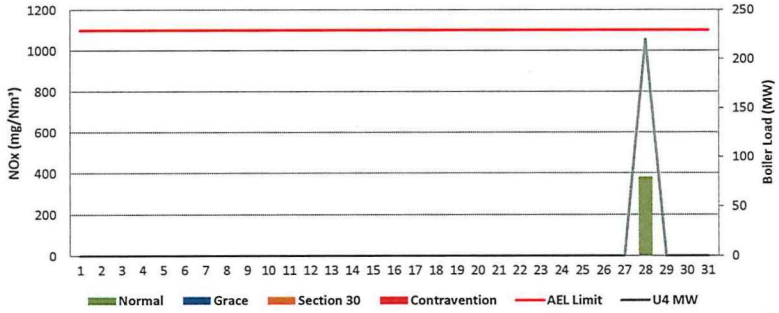
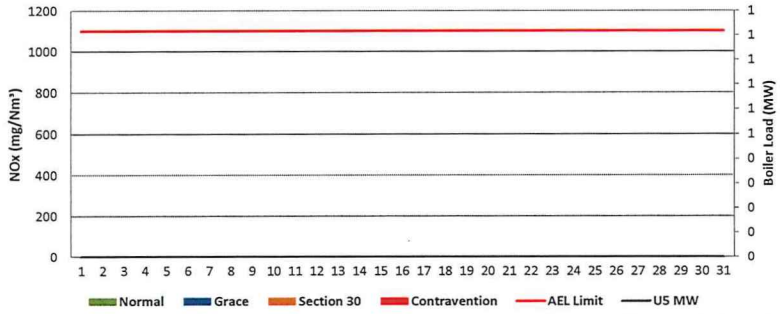
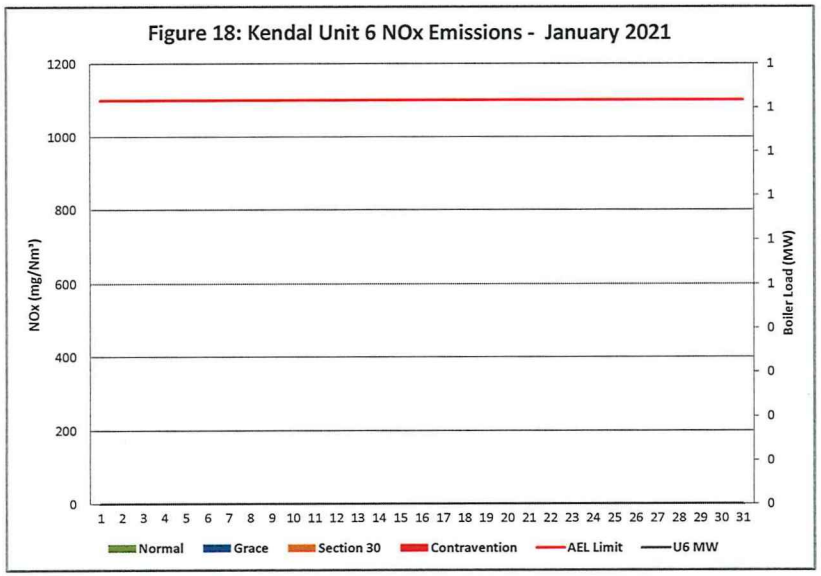


Figure 17: Kendal Unit 5 NOx Emissions - January 2021





7 COMPLAINTS

There were no complaints for this months

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

η = (1 – ($Output/Input$))x 100

η = 1 - $\frac{(DustEmissionFromAQR\ ReportDustMonitor(tons)}{(CoalBurnt(tons)*\%AshContent*80\%)}$ X 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

- 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

- Units, 4, 5 & 6 was offload during this monthfor repairs to address emissions issues

Unit 2
Findings
High PM emissions on the 02nd and 20th can be attributed to shutdown and on the 16 was due poor fields performance
Resolution ESP to be repaired during opportunity maintenance

Unit 3
Unit 3 High PM emissions on the 10th was due poor fields performance
Resolution ESP to be repaired during opportunity maintenance