Eskom

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Date
29 July 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 JUNE 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: 29/07/2021

Supported by:

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ACTING ENVIRONMENTAL MANAGER- KENDAL

Date:29/07/2021

KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTHS OF JUNE 2021.

Verified by:

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SENIOR TECHNICIAN BOILER ENGINEERING- KENDAL

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Validated by:

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Date 29/07/2021

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Date 29/07/2021

Approved by:

Yangaphe Ngcashi
GENERAL MANAGER-KENDAL

Date 2021.08.03

Eskom

JUNE 2021 REV 02

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 Jun-2021
	Coal	Tons	*2 260 000*	*808 611*
	Fuel Oil	Tons	*2 000*	*2743,58*
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Jun-2021
	Energy	GWh(MW)	*2963,52*	*3 564 189,70*
	Ash	Tons	*770 000*	*263 283,7*
	RE Ash	kg/MWh	*not specified*	*0,410*

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	*<1 (%)*	*0,800*
Ash Content	%	*40 (%)*	*32,560*

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 Jun-2021	Technology Type	Utlization Jun-2021
Unit 1	*ESP + SO_3*	*99,9%*	*SO_3*	*85,0%*
Unit 2	*ESP + SO_3*	*99,7%*	*SO_3*	*93,7%*
Unit 3	*ESP + SO_3*	*99,5%*	*SO_3*	*58,5%*
Unit 4	*ESP + SO_3*	*99,6%*	*SO_3*	*82,8%*
Unit 5	*ESP + SO_3*	*97,4%*	*SO_3*	*SO3 server not available after unit was back to load*
Unit 6	*ESP + SO_3*	*Off-line*	*SO_3*	*Off-line*

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*	*100,0*	*100,0*	*99,9*
Unit 2	*99,7*	*100,0*	*100,0*	*99,9*
Unit 3	*99,6*	*100,0*	*99,0*	*98,8*
Unit 4	*100,0*	*100,0*	*98,3*	*98,0*
Unit 5	*71,4*	*100,0*	*94,3*	*100,0*
Unit 6	*Off-line*	*Off-line*	*Off-line*	*Off-line*

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of June 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	42,9	3 970	1 081
Unit 2	142,8	4 637	1 647
Unit 3	199,1	2 933	908
Unit 4	153,4	2 108	656
Unit 5	600,0	1 278	402
Unit 6	Off-line	Off-line	Off-line
SUM	1 138,08	14 925	4 695

Table 6.2: Operating days in compliance to PM AEL Limit - June 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	31	0	0	0	0	20,2
Unit 2	25	5	0	0	5	101,8
Unit 3	14	12	0	0	12	139,0
Unit 4	12	7	2	2	11	176,3
Unit 5	1	1	11	0	12	922,7
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	83	25	13	2	40	

Table 6.3: Operating days in compliance to SOx AEL Limit - June 2021

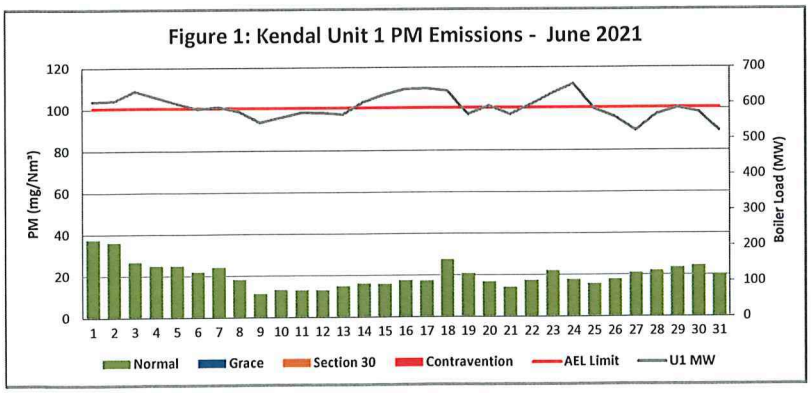
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm³)
Unit 1	31	0	0	0	0	2 933,6
Unit 2	31	0	0	0	0	2 370,8
Unit 3	28	0	0	0	0	2 046,5
Unit 4	26	0	0	0	0	2 088,2
Unit 5	16	0	0	0	0	1 807,8
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	132	0	0	0	0	

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	31	0	0	0	0	800,7
Unit 2	31	0	0	0	0	836,2
Unit 3	28	0	0	0	0	629,7
Unit 4	26	0	0	0	0	645,0
Unit 5	16	0	0	0	0	583,7
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	132	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



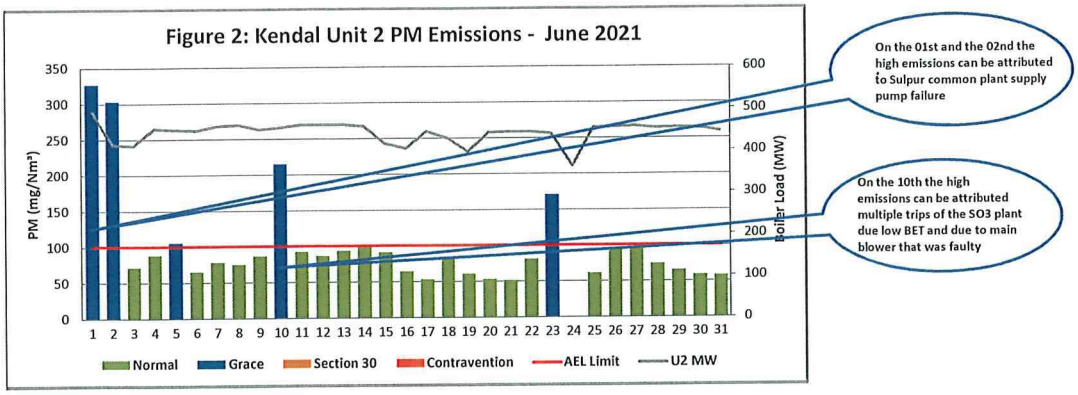


Figure 2: Kendal Unit 2 PM Emissions - June 2021
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW
On the 01st and the 02nd the high emissions can be attributed to Sulpur common plant supply pump failure
On the 10th the high emissions can be attributed multiple trips of the SO3 plant due low BET and due to main blower that was faulty

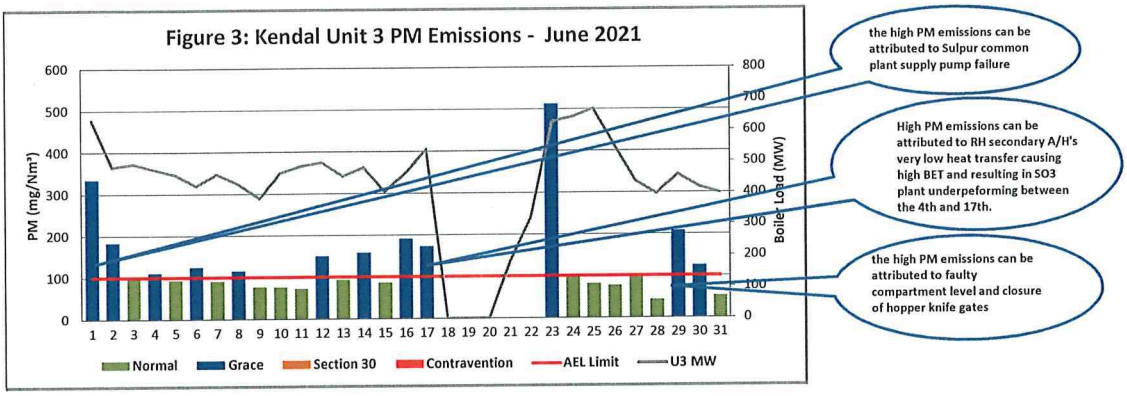


Figure 3: Kendal Unit 3 PM Emissions - June 2021
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW
the high PM emissions can be attributed to Sulpur common plant supply pump failure
High PM emissions can be attributed to RH secondary A/H's very low heat transfer causing high BET and resulting in SO3 plant underpeforming between the 4th and 17th.
the high PM emissions can be attributed to faulty compartment level and closure of hopper knife gates

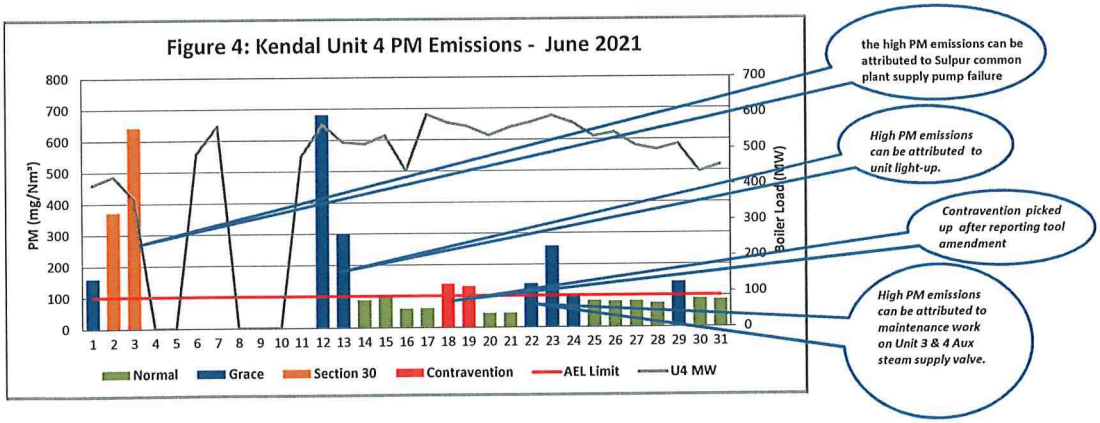
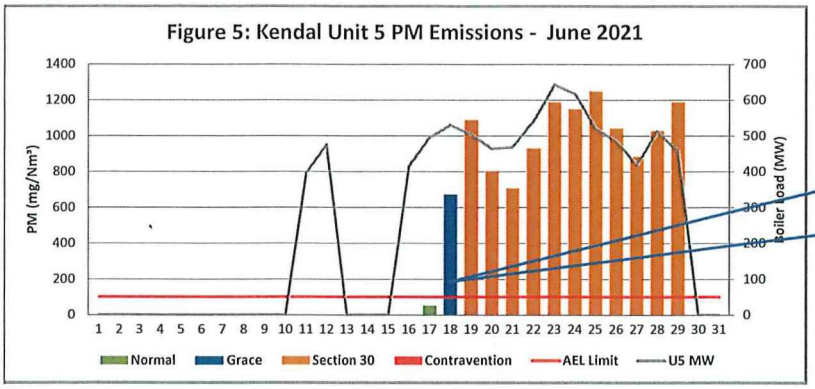
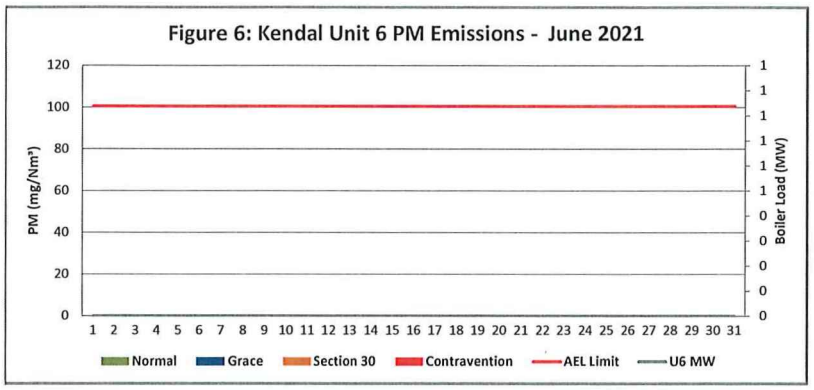
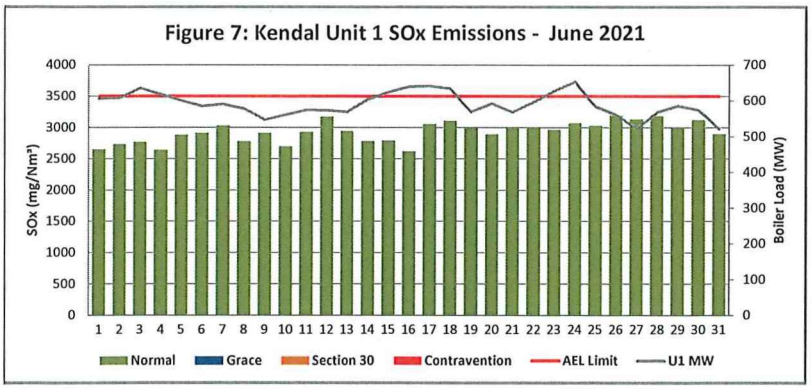


Figure 4: Kendal Unit 4 PM Emissions - June 2021
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW
the high PM emissions can be attributed to Sulpur common plant supply pump failure
High PM emissions can be attributed to unit light-up.
Contravention picked up after reporting tool amendment
High PM emissions can be attributed to maintenance work on Unit 3 & 4 Aux steam supply valve.



the high emissions can be attributted to poor performance of the ESP due to poor performance of the ESP fields due to some technical issues of the CE rapper system that must be tested while boiler is on load based on the plant monitoring system programme software





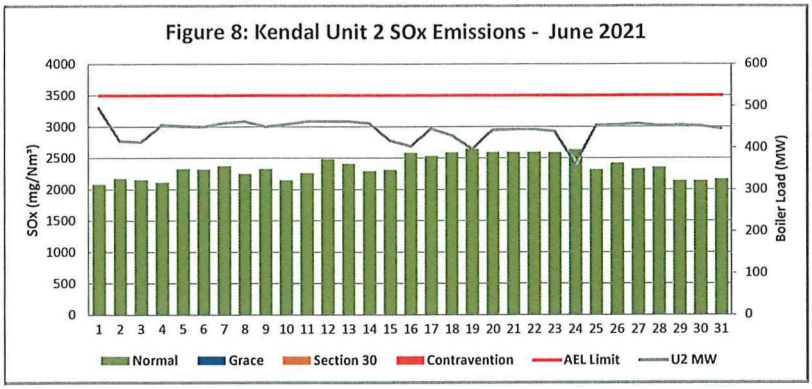


Figure 8: Kendal Unit 2 SOx Emissions - June 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

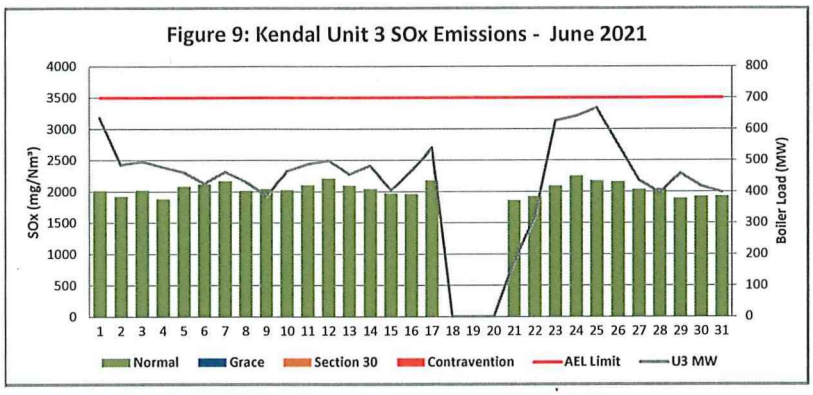


Figure 9: Kendal Unit 3 SOx Emissions - June 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

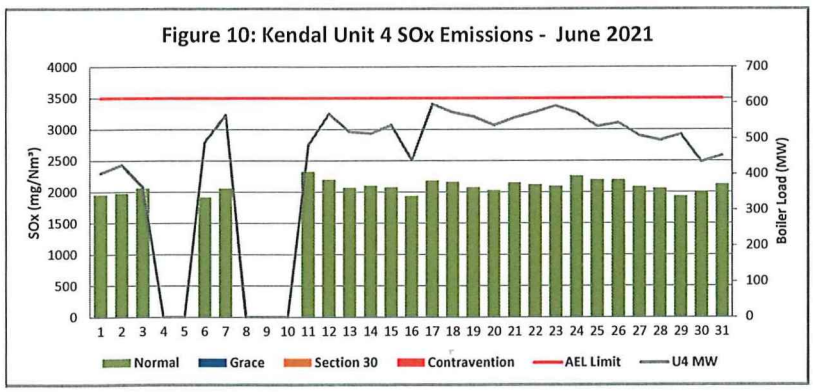


Figure 10: Kendal Unit 4 SOx Emissions - June 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

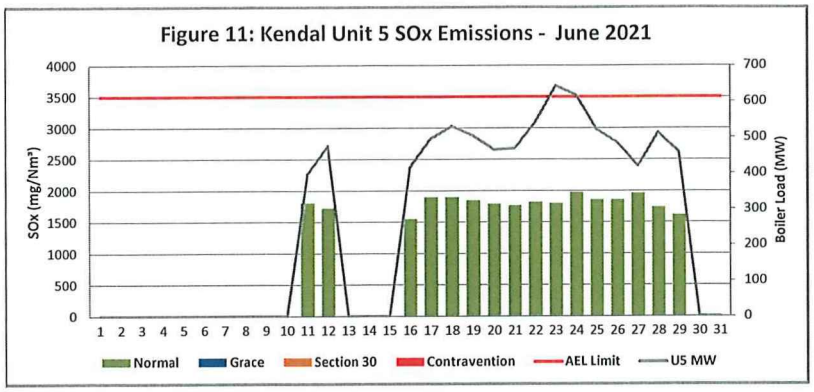


Figure 11: Kendal Unit 5 SOx Emissions - June 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

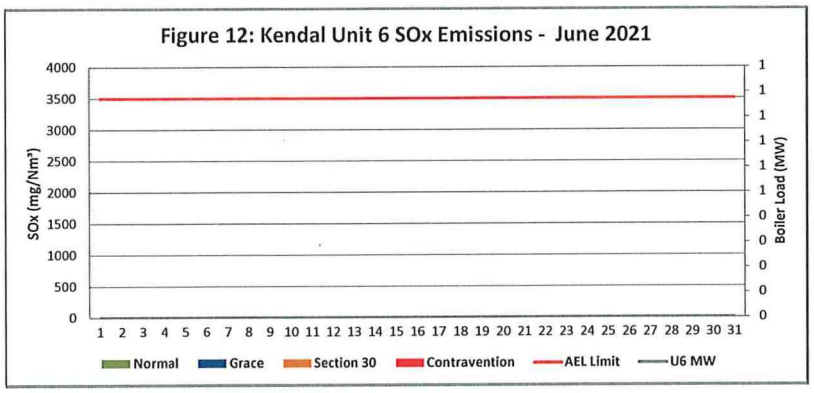


Figure 12: Kendal Unit 6 SOx Emissions - June 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U6 MW

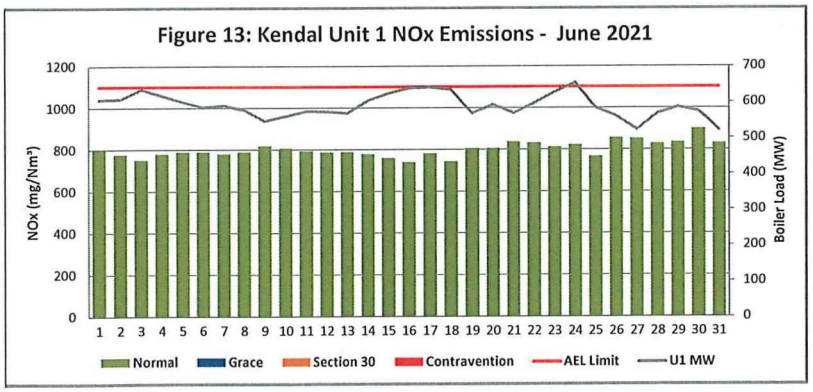


Figure 13: Kendal Unit 1 NOx Emissions - June 2021
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

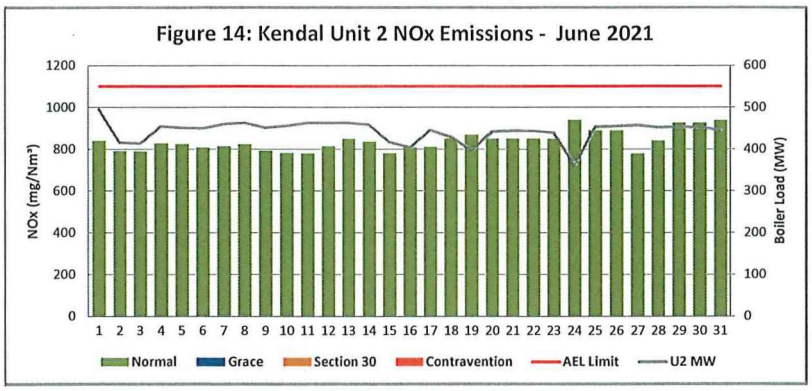


Figure 14: Kendal Unit 2 NOx Emissions - June 2021
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

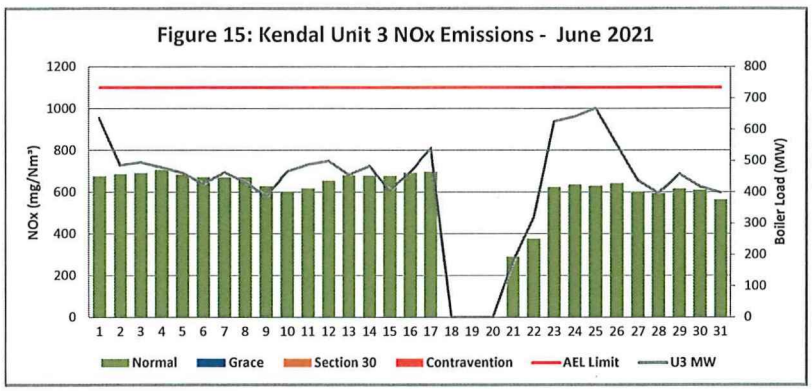


Figure 15: Kendal Unit 3 NOx Emissions - June 2021
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

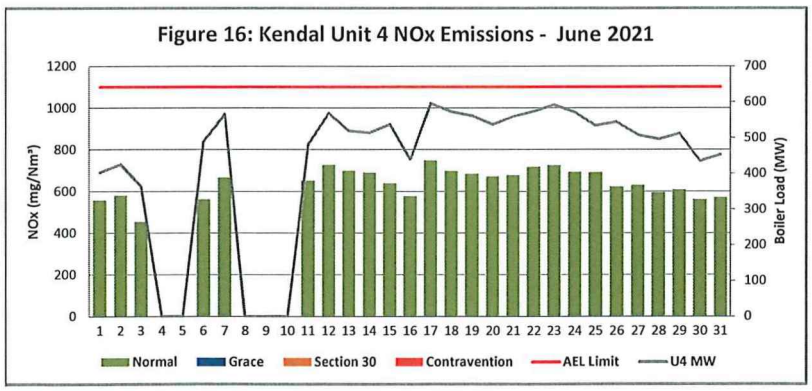
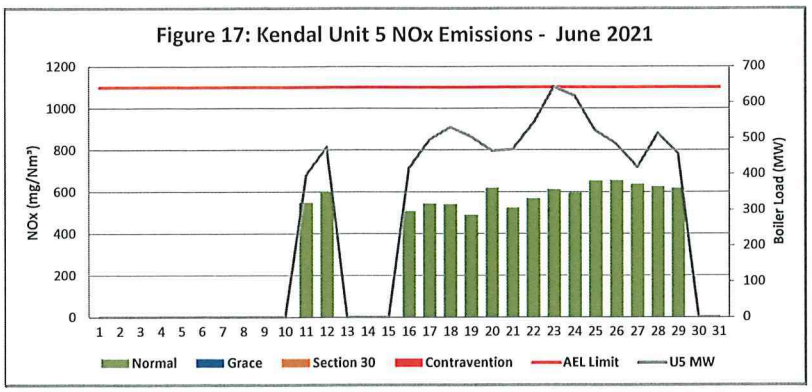
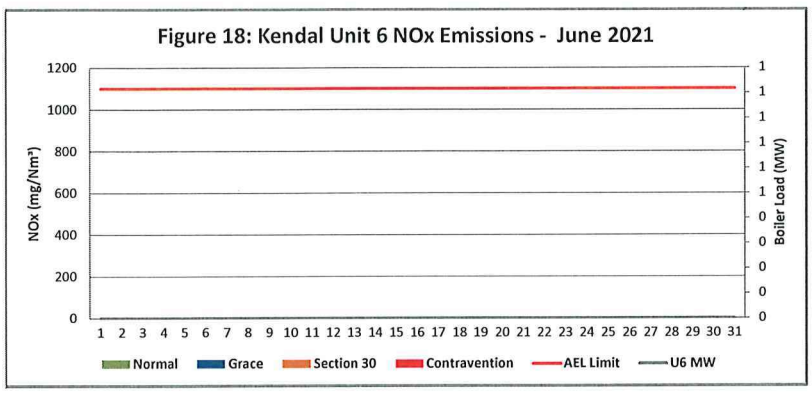


Figure 16: Kendal Unit 4 NOx Emissions - June 2021
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW





7 COMMENTS

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

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

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

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 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

- Average velocity values from the latest correlation report were used on the gaseous emissions on Unit 1, 2, 3, 4 & 5 due to defective CEMS monitors and velocity correction factors were set M=1 and C=0

- Unit 6 was still offload during this month for repairs to address emissions issues

Unit 2
Findings On the 01st and the 02nd the high emissions can be attributed to Sulphur common plant supply pump failure
On the 10th the high emissions can be attributed multiple trips of the SO3 plant due low BET and due to main blower that was faulty
Resolution
Sulphur common plant supply pump and SO3 plant blower were repaired

Unit 3
Findings On the 01st and the 02nd the high PM emissions can be attributed to Sulpur common plant supply pump failure
High PM emissions can be attributed to Right Hand secondary Air Heater which was very low heat transfer causing high back end temperatures and resulting in SO3 plant underpeforming between the 4th and 17th On 29th & 30th high PM emissions can be attributed to faulty compartment level and closure of hopper knife gates
Resolution
The common plant supply pumps were repaired

Unit 4
Findings On the 01st and the 02nd the high PM emissions can be attributed to Sulpur common plant supply pump failure On the 12th & 13th and on 18th & 19th High PM emissions can be attributed to unit light-up
On 22 to 24 High PM emissions can be attributed to maintenance work on Unit 3 & 4 Auxiliary steam supply valve
Resolution
The plant was repaired

Unit 5
Findings the high emissions can be attributted to poor performance of the ESP fields due to some technical issues of the CE rapper suystems that must be tested while the boiler is on load based on the plant monitoring system (PMS) programme software
Resolution
A decision is taken to keep fields in service at reduced power to avoid dislodging too much fly ash during ESP fields rapping so as to prevent choking of conveyors