Eskom

Ms Nompumelelo Simelane
Nkangala District
P.O Box 437
MIDDLEBERG
1050
By email: Simelanenl@nkangaladm.gov.za

Date:
30 April 2024

Enquiries: S Chokoe
Tel +27 13 647 6970

Dear Ms. Nompumelelo Simelane

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

RESUBMISSION OF KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF FEBRUARY 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.

The report is late due to the engineering's analysis that the station made on the reports to utilize Deutsch efficiency equation where monitors maxed out to get the surrogation value. The final decision to implement the surrogation exercise was made in February 2024 and the station had to implement the exercise on the April 2023 to March 2024 Air Quality reports.

Compiled by:

Tsakani Holeni
ENVIRONMENTAL SENIOR ADVISOR- KENDAL POWER STATION
Date: 30/04/2024

Supported by:

Solly Chokoe
ENVIRONMENTAL MANAGER- KENDAL POWER STATION
Date: 30/04/2024

Generation Division
(Kendal Power Station)
N12 Balmoral Off Ramp, Emalahleni
Private Bag x7272, Emalahlani 1035 SA
Tel +27 13 647 6970 Fax +27 13 647 6904 www.eskom.co.za

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

Verified by:

Jacob Zwane
BOILER ENGINEERING: SENIOR SYSTEM ENGINEER- KENDAL POWER STATION
Date: 30/04/2024

Validated by:

Tendani Rasivhetshele
BOILER ENGINEERING MANAGER-KENDAL POWER STATION
Date: 30/04/2024

Supported by:

Malibongwe Mabizela
ENGINEERING MANAGER-KENDAL POWER STATION
Date: 2024/05/02

Approved by:

Tshepiso Temo
GENERAL MANAGER-KENDAL POWER STATION
Date: 2024/05/08

Eskom

FEBRUARY 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 Feb-2024
	Coal	Tons	2 260 000	562 779
	Fuel Oil	Tons	5 000	10854.330
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Indicative Production Rate Feb-2024
	Energy	GWh	2 864.736	918.569
	Ash	Tons	770 000	189 262.544
	RE Ash	kg/MWh	not specified	2.163

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)	18.320
Sulphur Content	%	<1 (%)	0.760
Ash Content	%	40 (%)	33.630

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 Feb-2024	Technology Type	SO_3 Utlization Feb-2024
Unit 1	$ESP + SO_3$	96.920%	SO_3	0.0%
Unit 2	$ESP + SO_3$	98.517%	SO_3	0.0%
Unit 3	$ESP + SO_3$	99.514%	SO_3	0.0%
Unit 4	$ESP + SO_3$	99.397%	SO_3	0.0%
Unit 5	$ESP + SO_3$	98.806%	SO_3	0.0%
Unit 6	$ESP + SO_3$	Off-line	SO_3	Off-line

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

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

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO_2	NO	O_2
Unit 1	86.0	78.3	78.9	67.8
Unit 2	63.4	99.6	100.0	90.3
Unit 3	76.5	100.0	84.6	0.0
Unit 4	100.0	100.0	100.0	10.3
Unit 5	97.6	99.5	94.8	99.3
Unit 6	Exempt	0.0	0.0	0.0

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

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of February 2024

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	738.2	1 890	742
Unit 2	413.8	2 020	673
Unit 3	57.2	0	0
Unit 4	275.7	2 307	1 237
Unit 5	502.2	2 324	1 014
Unit 6	Exempt	0	0
SUM	1 987.08	8 541	3 667

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	0	0	0	15	15	1 503.5
Unit 2	0	0	0	21	21	434.7
Unit 3	0	0	0	5	5	215.5
Unit 4	0	7	0	3	10	188.3
Unit 5	0	0	0	10	10	341.5
Unit 6	Exempt	Exempt	Exempt	Exempt	Exempt	Exempt
SUM	0	7	0	54	61	

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm³)
Unit 1	21	0	0	0	0	1 599.5
Unit 2	22	0	0	0	0	1 958.7
Unit 3	0	0	0	0	0	
Unit 4	28	0	0	0	0	1 576.2
Unit 5	25	0	0	0	0	1 525.9
Unit 6	0	0	0	0	0	
SUM	96	0	0	0	0	

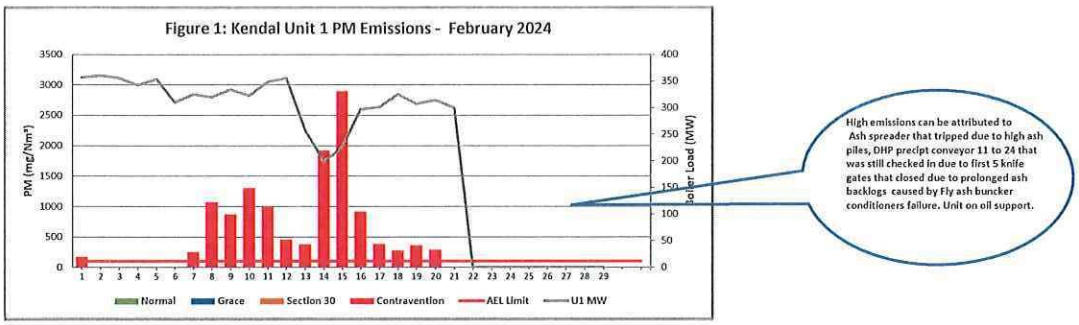
Table 6.4: Operating days in compliance to NOx AEL Limit - February 2024

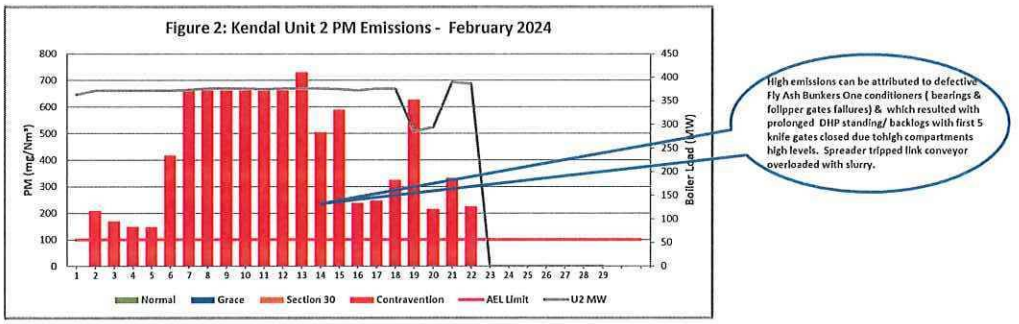
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	21	0	0	0	0	629.4
Unit 2	22	0	0	0	0	648.8
Unit 3	0	0	0	0	0	
Unit 4	28	0	0	0	0	838.1
Unit 5	25	0	0	0	0	662.4
Unit 6	0	0	0	0	0	
SUM	96	0	0	0	0	

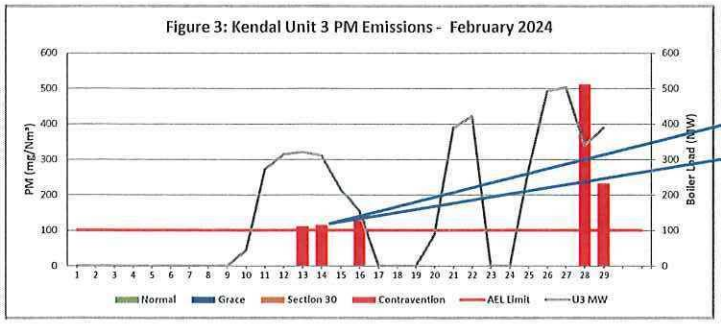
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

Table 6.5: Legend Description

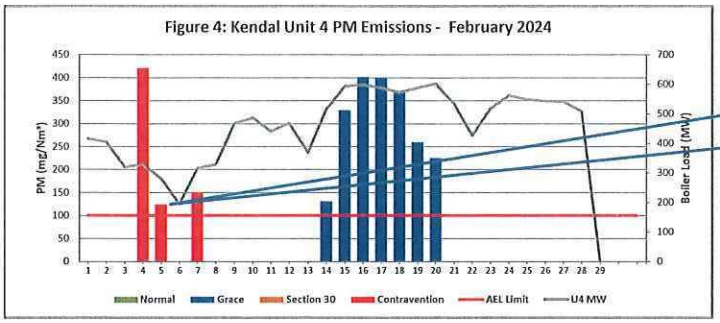
Condition	Colour	Description
Normal	GREEN	Emissions below Emission Limit Value (ELV)
Grace	BLUE	Emissions above the ELV during grace period
Section 30	ORANGE	Emissions above ELV during a NEMA S30 incident
Contravention	RED	Emissions above ELV but outside grace or S30 incident conditions



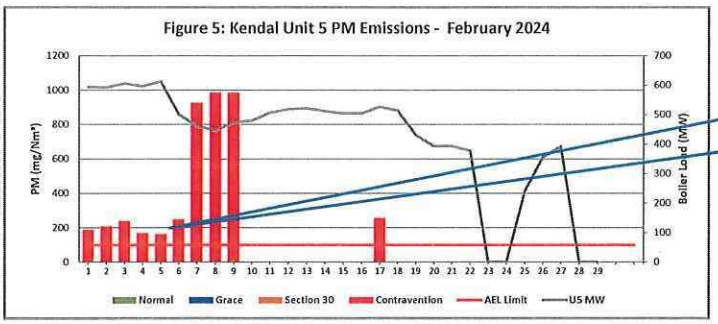




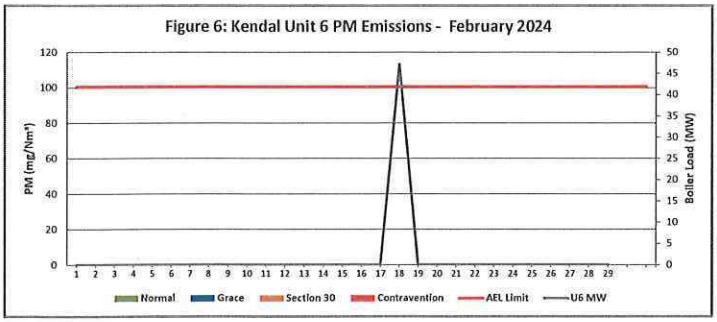
High emissions can be attributed to Unit light up, SO3 not available. DHP precipt 11 standing with all kg's closed
DHP standing with first 5 knife gates closed, Precipt 24 stopped running.



High PM emissions can be attributed to DHP standing with knife gates closed due to high compartments high levels. Low sulfur flow.



High PM emissions can be attributed to Spreader tripped on link conveyor gearbox & no power to run the motor, Top bunker conveyor tripped, DHP is stands due to compartments high levels.Knife gate closed on first collecting conveyor due to DHP Precipt 21-24 standing on U5. Unvailability of bucket elevator streams which resulted with DHP standing with knife gates closed due to high compartments high levels.



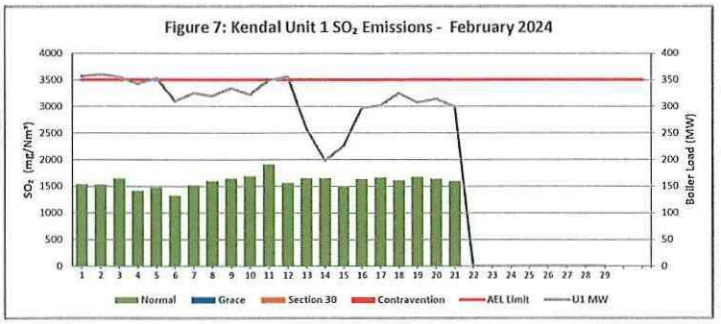


Figure 7: Kendal Unit 1 SO_2 Emissions - February 2024
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

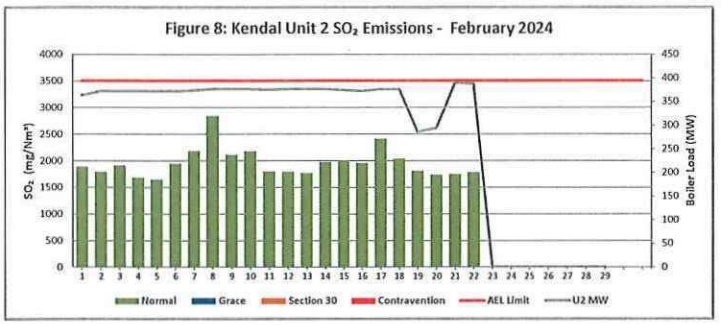


Figure 8: Kendal Unit 2 SO_2 Emissions - February 2024
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

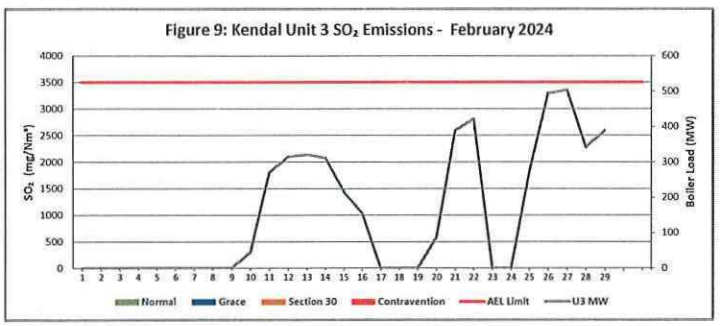


Figure 9: Kendal Unit 3 SO_2 Emissions - February 2024
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

Figure 10: Kendal Unit 4 SO_2 Emissions - February 2024

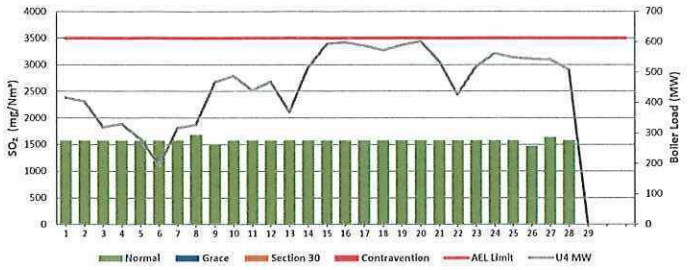


Figure 11: Kendal Unit 5 SO_2 Emissions - February 2024

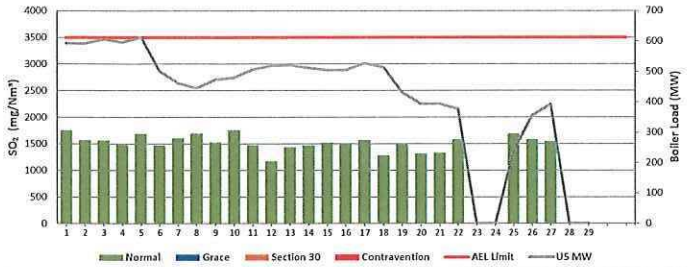


Figure 12: Kendal Unit 6 SO_2 Emissions - February 2024

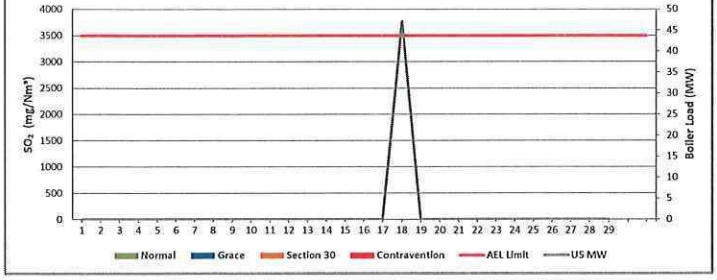


Figure 13: Kendal Unit 1 NOx Emissions - February 2024

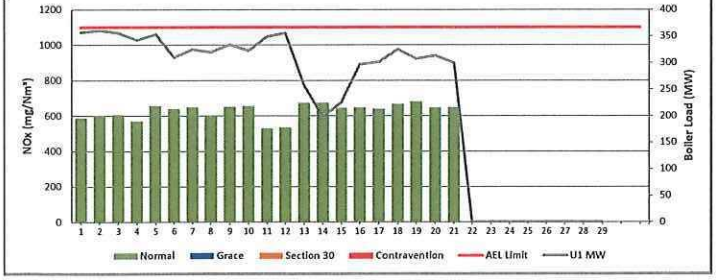


Figure 14: Kendal Unit 2 NOx Emissions - February 2024

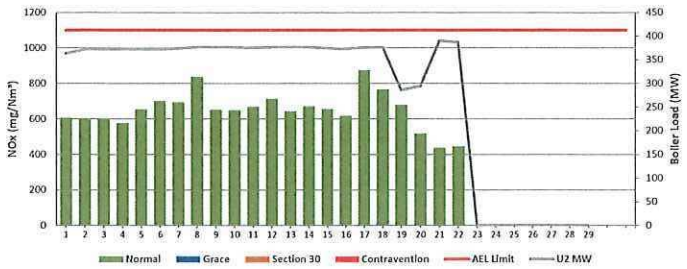


Figure 15: Kendal Unit 3 NOx Emissions - February 2024

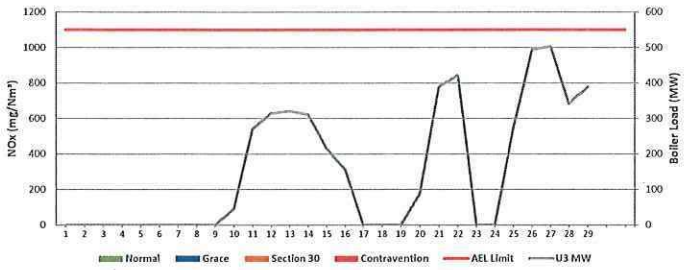


Figure 16: Kendal Unit 4 NOx Emissions - February 2024

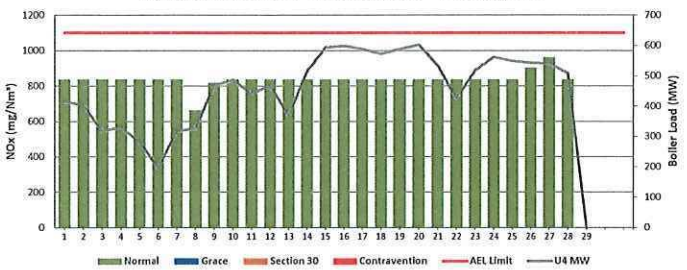


Figure 17: Kendal Unit 5 NOx Emissions - February 2024

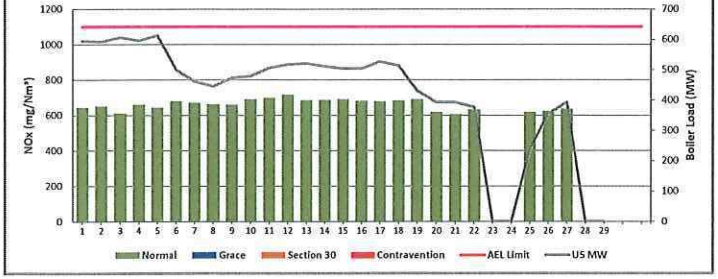
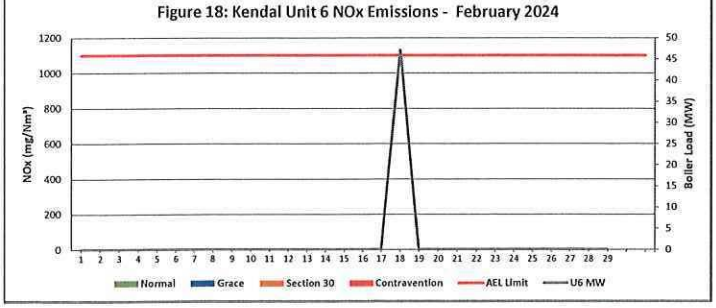


Figure 18: Kendal Unit 6 NOx Emissions - February 2024



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 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 is now using the new monitor correlation. New correlation factors were implemeted.
- Please note the reported figures in tonnage calculation are the figures after the station used the maxing out PM monitor quantification exercise which is the use of "surrogate values" on days when the monitor maxed out. The followign are the days when the monitor was maxing out. Unit 1 on the 4th & 5th, 8th to 11th and 14 & 16, Unit 2 6th to 21st, Unit 3 26th to 29th.

- Unit 1

Findings: The high emissions can be attributed to Ash spreader that tripped due to high ash piles, DHP precipt conveyor 11 to 24 that was still checked in due to first 5 knife gates that closed due to prolonged ash backlogs caused by Fly ash buncker conditioners failure. Unit was on oil support on some of the days.
- Resolution: Plant repaired

- Unit 2

Findings: The high emissions can be attributed to defective Fly Ash Bunkers one conditioners (bearings & flopper gates failures) which resulted with prolonged DHP standing/backlogs with first 5 knife gates closed due to high compartments high levels. Spreader tripped link conveyor overloaded with slurry.
- Resolution: Plant repaired.

- Unit 3

Findings: The high PM emissions can be attributed to Unit light up, SO3 that was not available. DHP precipt 11 that was standing with all kg's closed, DHP standing with first 5 knife gates closed, Precipt 24 stopped running.
- Resolution: Plant repaired.

- Unit 4

Findings: High PM emissions can be attributed to the DHP that was standing with knife gates closed due to high compartments levels and also due to low sulfur flow.
- Resolution: Plant repaired.

- Unit 5

Findings: High PM emissions can be attributed to the spreader that tripped on link conveyor gearbox & there was no power to run the motor, Top bunker conveyor tripped, the DHP was standing due to compartments high levels. Knife gate closed on first collecting conveyor due to DHP Precipt 21-24 standing on Unit 5. Unvailability of bucket elevator streams which resulted with DHP standing with knife gates closed due to high compartments levels.
- Resolution: Plant repaired.

- Unit 6 on outage.