Eskom

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Date:
18 June 2024

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Dear Ms. Nompumelelo Simelane

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

SUBMISSION OF KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF MAY 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.

Compiled by:

Tsakani Holeni
ENVIRONMENTAL SENIOR ADVISOR- KENDAL POWER STATION
Date: 18/06/2024

Supported by:

Solly Chokoe
ENVIRONMENTAL MANAGER- KENDAL POWER STATION
Date: 18/06/2024

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

Verified by:

Jacob Zwane
BOILER ENGINEERING: SENIOR SYSTEM ENGINEER- KENDAL POWER STATION
Date: 20/06/2024

Validated by:

Tendani Rasivhetshele
BOILER ENGINEERING MANAGER-KENDAL POWER STATION
Date: 20/06/2024

Supported by:

Nomfundo Mtshali
ACTING ENGINEERING MANAGER-KENDAL POWER STATION
Date: 2024/06/24

Approved by:

Tshepiso Temo
GENERAL MANAGER-KENDAL POWER STATION
Date: 2024/06/25

Eskom

MAY 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 May-2024
	Coal	Tons	2 260 000	863 238
	Fuel Oil	Tons	5 000	9695.250
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Indicative Production Rate May-2024
	Energy	GWh	3 062.304	1 488.759
	Ash	Tons	770 000	280 811.321
	RE Ash	kg/MWh	not specified	2.054

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)	18.750
Sulphur Content	%	<1 (%)	0.860
Ash Content	%	40 (%)	32.530

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 May-2024	Technology Type	SO_3 Utlization May-2024
Unit 1	$ESP + SO_3$	94.682%	SO_3	0.0%
Unit 2	$ESP + SO_3$	99.564%	SO_3	0.0%
Unit 3	$ESP + SO_3$	99.875%	SO_3	0.0%
Unit 4	$ESP + SO_3$	99.735%	SO_3	0.0%
Unit 5	$ESP + SO_3$	97.494%	SO_3	0.0%
Unit 6	$ESP + SO_3$	99.113%	SO_3	0.0%

There is no value for SO3 utilization due to failed network application. The station is currently addressing the issue through the HMI Replacement Project and currently in commissioning phase.

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	63.6	100.0	100.0	9.1
Unit 2	86.0	98.5	98.9	99.3
Unit 3	99.7	99.7	99.7	85.6
Unit 4	96.4	99.9	99.6	49.0
Unit 5	99.8	99.8	65.5	0.2
Unit 6	92.9	99.8	99.8	49.8

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 May 2024

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	1 635.6	2 030	813
Unit 2	120.7	2 356	1 110
Unit 3	62.3	3 178	1 341
Unit 4	126.1	2 501	943
Unit 5	778.0	1 780	759
Unit 6	335.8	3 868	2 009
SUM	3 058.54	15 714	6 975

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	0	0	0	20	20	1 306.9
Unit 2	7	3	0	6	9	151.3
Unit 3	3	0	0	0	0	39.8
Unit 4	8	5	0	1	6	85.1
Unit 5	0	0	0	10	10	835.0
Unit 6	0	0	0	13	13	272.6
SUM	18	8	0	50	58	

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm³)
Unit 1	22	0	0	0	0	1 652.5
Unit 2	19	0	0	0	0	2 345.3
Unit 3	30	0	0	0	0	2 049.1
Unit 4	31	0	0	0	0	1 488.7
Unit 5	24	0	0	0	0	1 694.4
Unit 6	24	0	0	0	0	2 556.0
SUM	150	0	0	0	0	

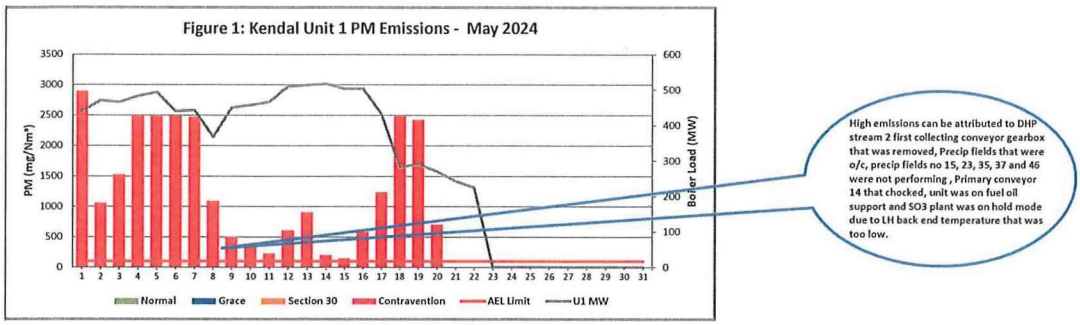
Table 6.4: Operating days in compliance to NOx AEL Limit - May 2024

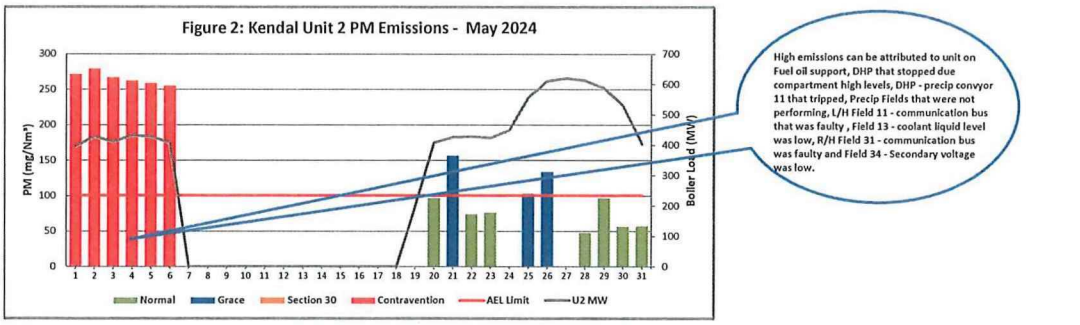
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	22	0	0	0	0	644.5
Unit 2	8	0	0	11	11	1 093.3
Unit 3	28	0	0	2	2	862.7
Unit 4	31	0	0	0	0	556.4
Unit 5	24	0	0	0	0	722.1
Unit 6	3	0	0	21	21	1 324.5
SUM	116	0	0	34	34	

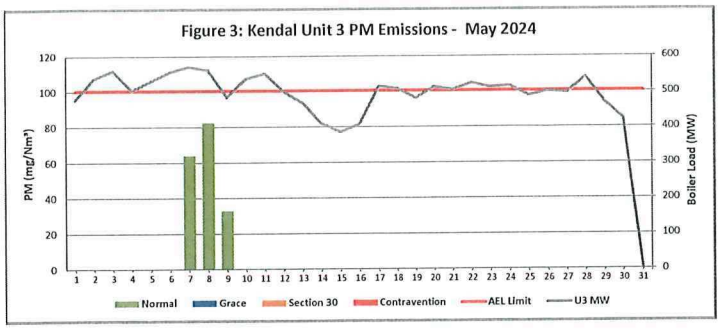
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

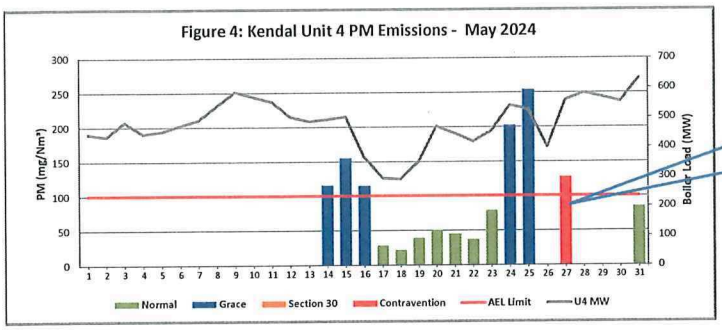
Table 6.5: Legend Description

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

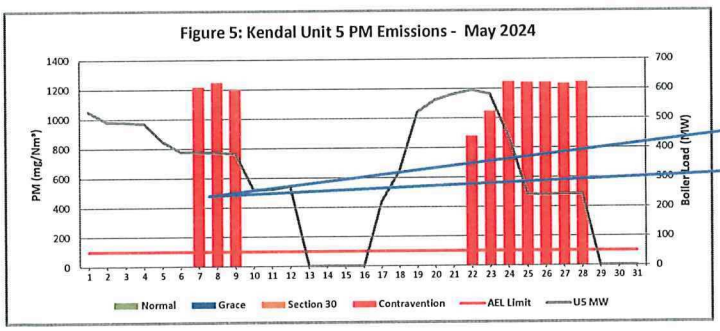




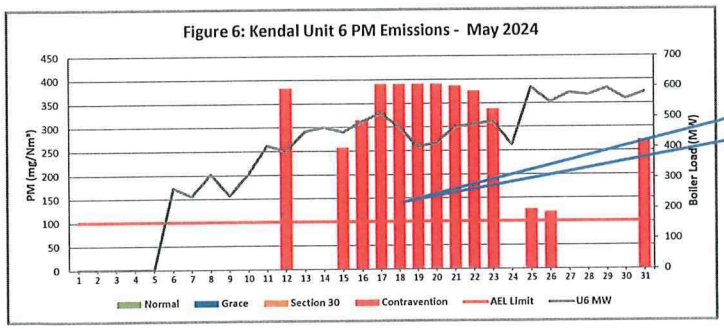




High PM emissions can be attributed to DHP that was standing, 1st two knife gates shut on pcp11 to 24 and PCP 23 unit 4 tripped on the process of resetting rapper, Pcp 23 kg kg 1-6 are closed kg 30% and Pcp 24 kg 1 were closed.



High PM emissions can be attributed to the DHP that stopped due to badly leaking steam 1 bucket elevator , DHP stream 1 2nd collecting precip conveyor was tripping due to overloaded bucket elevator, DHP Stream 1 bucket elevator choked , DHP was off - Str 1 B/Elev couple buckets were missing, drawing max amps, SO3 PLANT was on hold mode due to LH back end temps that were low at 104 degrees celcious, So3 flow was at 0kg/h and the unit was on Fuel oil support .



High PM emissions can be attributed to Unit light up - cold start, Precip conveyor 13 and 21 was also off due to stream 2 chutes being blocked and So3 was also shut for 12 hours on the 25th of May.

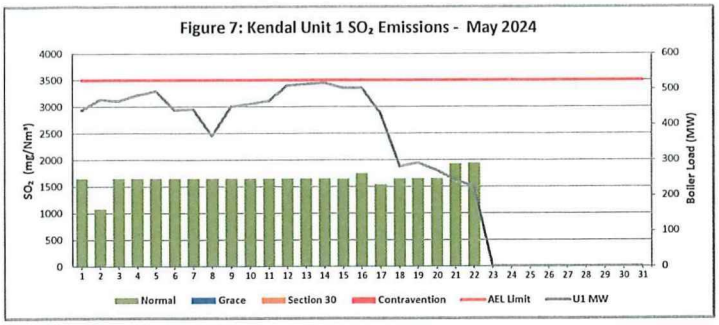


Figure 7: Kendal Unit 1 SO_2 Emissions - May 2024
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

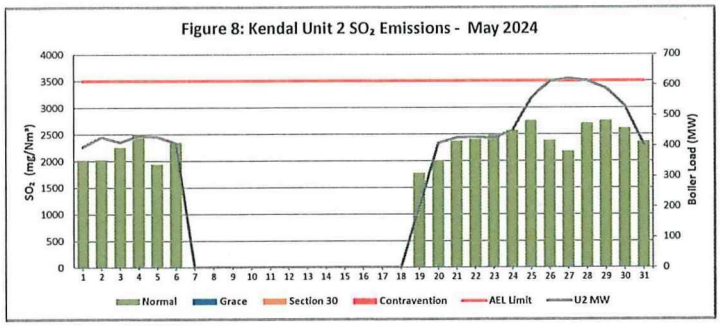


Figure 8: Kendal Unit 2 SO_2 Emissions - May 2024
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

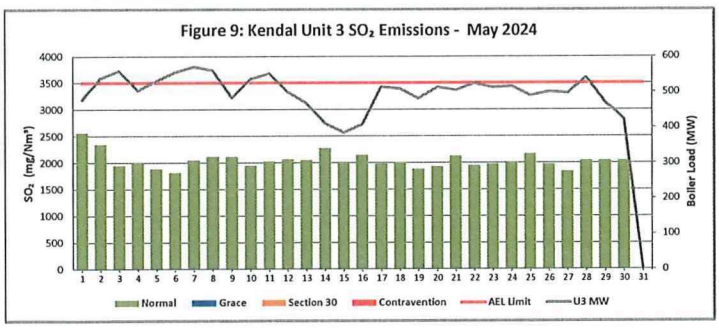


Figure 9: Kendal Unit 3 SO_2 Emissions - May 2024
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

Figure 10: Kendal Unit 4 SO_2 Emissions - May 2024

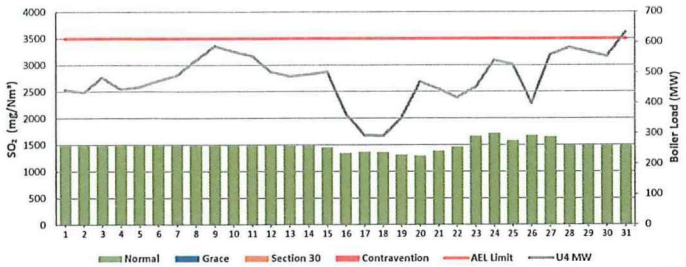


Figure 11: Kendal Unit 5 SO_2 Emissions - May 2024

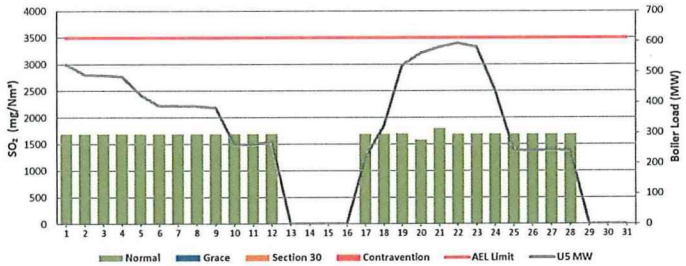


Figure 12: Kendal Unit 6 SO_2 Emissions - May 2024

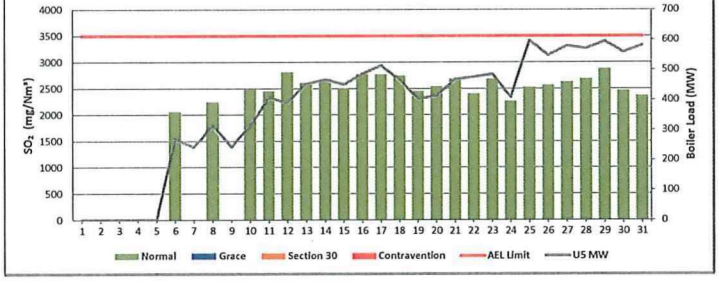


Figure 13: Kendal Unit 1 NOx Emissions - May 2024

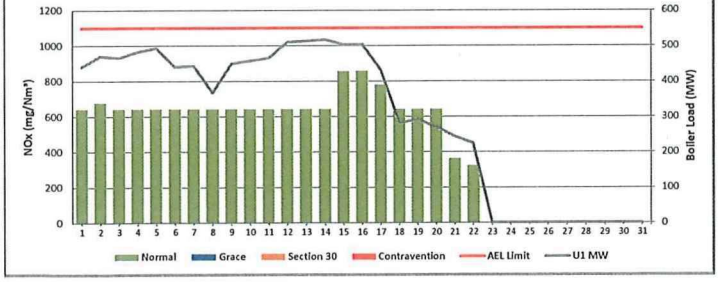


Figure 14: Kendal Unit 2 NOx Emissions - May 2024

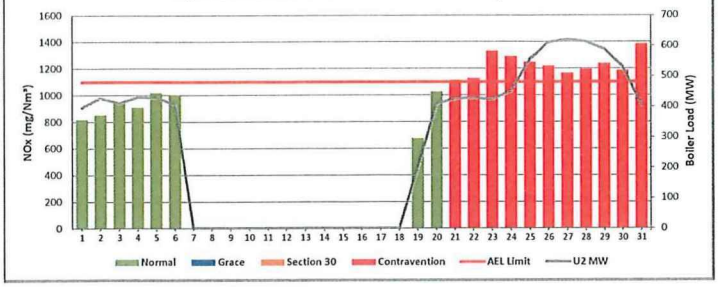


Figure 15: Kendal Unit 3 NOx Emissions - May 2024

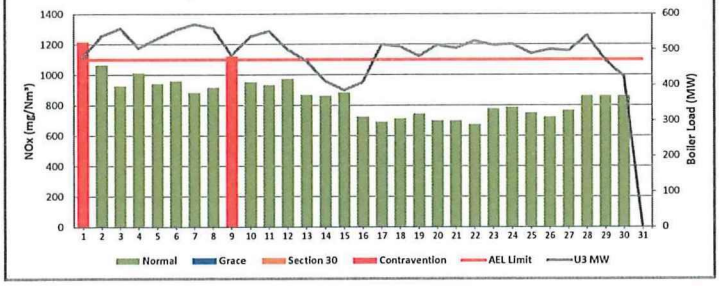


Figure 16: Kendal Unit 4 NOx Emissions - May 2024

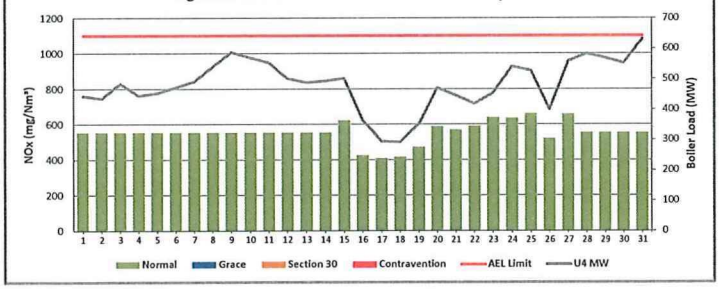


Figure 17: Kendal Unit 5 NOx Emissions - May 2024

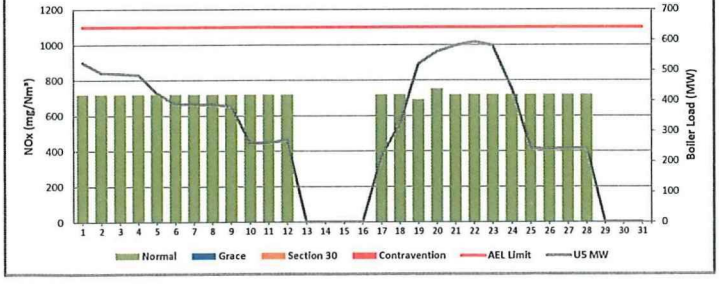
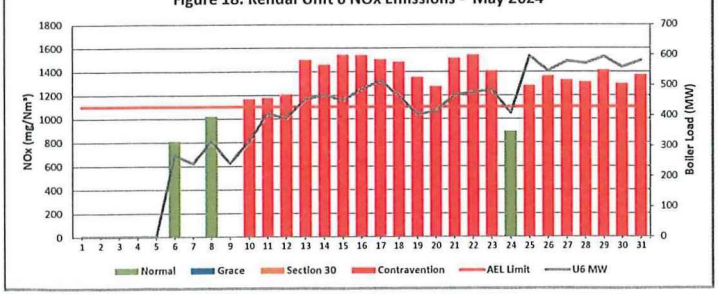


Figure 18: Kendal Unit 6 NOx Emissions - May 2024



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 1 and 2 maxd out, meaning the emissions were higher than what the monitor was correlated for, In which case we use surrogate values. This is attributted to abnormal plant conditions.
- Please note that the reported fiigures in tonnage calculation are the figures after the station used the Maxing out OM quantification exercise which is the use of "surrigate values" on days when the monitor maxed out. The following are the days when the monitor maxed out: Unit 1 from the 1st o the 8th, 13th and 16th to 19th, Unit 2 from the 1st to the 6th.

- Unit 1
- Findings: The high emissions can be attributed to DHP stream 2 first collecting conveyor gearbox that was removed, Precip fields no 15, 23, 35, 37 that was o/c and 46 not was not performing , Primary conveyor 14 chocked, unit was on fuel oil support and SO3 plant was on hold mode due to LH back end temperature that was too low.
- Resolution: Plant repaired

- Unit 2
- Findings: The high emissions can be attributed to unit on Fuel oil support, DHP that stopped due compartment high levels, DHP - precip convyor 11 that tripped, Precip Fields that were not performing, L/H Field 11 - communication bus that was faulty , Field 13 - coolant liquid level was low, R/H Field 31 - communication bus was faulty and Field 34 - Secondary voltage was low.
- Resolution: Plant repaired.

- Unit 3
- Unit was compliant.

- Unit 4
- Findings: The high emissions can be attributed to DHP that was standing, 1st two knife gates were shut on pcp11 to 24 and PCP 23 unit 4 tripped on the process of resetting rapper, Pcp 23 kg 1-6 were closed, kg 30% and Pcp 24 kg 1 were closed.

- Unit 5

Findings: High PM emissions can be attributed to the DHP that stopped due to badly leaking steam 1 bucket elevator, DHP stream 1 2nd collecting precip conveyor was tripping due to overloaded bucket elevator, DHP Stream 1 bucket elevator choked , DHP was off - Str 1 B/Elev couple buckets were missing, drawing max amps, SO3 PLANT was on hold mode due to LH back end temps low at 104 degrees celcious, So3 flow at 0kg/h and the unit was on Fuel oil support .
- Resolution: Plant repaired.

- Unit 6
- Findings: High PM emissions can be attributed to unit light up -cold start, Precip conveyor 13 and 21 was also off due to stream 2 chutes being blocked and So3 was also shut for 12 hours on the 25th of May
- Resolution: Plant repaired.