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Date:
03 April 2024

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Dear Ms. Nompumelelo Simelane

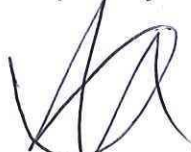
Ref: Kendal Power Station AEL (17/4/AEL/MP312/11/15)

RESUBMISSION OF KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF MAY 2023.

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.

Resubmission is made due to the engineering's analysis that was made on the reports to utilize Deutsch efficiency equation where monitors maxed out to get the surrogation value and this resulted in an increase in tonnages.

Compiled by:



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Supported by:



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KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF MAY 2023

Verified by:

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Validated by:



Tendani Rasivhetshela

BOILER ENGINEERING MANAGER-KENDAL POWER STATION

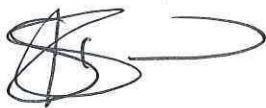
Supported by:

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Malibongwe Mabizela

ENGINEERING MANAGER-KENDAL POWER STATION

Approved by:



Tshepiso Temo

GENERAL MANAGER-KENDAL POWER STATION

22/04/2022

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-2023
	Coal	Tons	2 260 000	732 537
	Fuel Oil	Tons	5 000	10292.73
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate May-2023
	Energy	GWh(MW)	(3,153,600)4380	1 199 907.00
	Ash	Tons	770 000	261 662.3
	RE Ash	kg/MWh	not specified	2.970

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0.730
Ash Content	%	40 (%)	35.720

3 EMISSION LIMITS (mg/Nm³)

Associated Unit/Stack	PM	SO ₂	NO _x
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-2023	Technology Type	SO ₂ Utilization May-2023
Unit 1	ESP + SO ₂	Off-line	SO ₂	0.0%
Unit 2	ESP + SO ₂	98.744%	SO ₂	0.0%
Unit 3	ESP + SO ₂	99.451%	SO ₂	0.0%
Unit 4	ESP + SO ₂	Off-line	SO ₂	0.0%
Unit 5	ESP + SO ₂	97.805%	SO ₂	0.0%
Unit 6	ESP + SO ₂	99.129%	SO ₂	0.0%

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

SO₂ plant on hold mode due to no Sulphur flow.

SO₂ plant on hold mode due to steam temp low.

So₂ plant tripped - Steam temperature dropped down to 120 deg/c

SO₂ plant for Unit 3 was in service and was injecting as required however the station was unable to archive the information to our PI system. It is the failure of the stations very old and obsolete

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO ₂	NO	O ₂
Unit 1	89.9	84.9	0.0	0.0
Unit 2	91.7	95.9	95.9	0.0
Unit 3	64.6	93.3	90.2	25.9
Unit 4	0.0	0.0	0.0	0.0
Unit 5	95.8	88.5	89.9	96.2
Unit 6	0.0	42.6	100.0	0.0

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO₂

Note: Unit 3 and 6 dust monitors reliability is low due to monitors maxing out. Unit 2 SO₂, Nox and O₂, Unit 1 Nox and O₂, Unit 6 SO₂ and Nox and O₂ monitor reliability low due to defective monitors

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of May 2023

Associated Unit/Stack	PM (tons)	SO ₂ (tons)	NO _x (tons)
Unit 1	0.0	3.987	1.585
Unit 2	840.4	0	0
Unit 3	184.7	1.775	506
Unit 4	0.0	0	0
Unit 5	1.080.4	2.003	788
Unit 6	32.3	0	0
SUM	2.137.80	7.765	2.879

Table 6.2: Operating days in compliance to PM AEL Limit - May 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contraven- tion	Total Exceedance	Average PM (mg/Nm ³)
Unit 1	8	6	0	15	21	226.6
Unit 2	1	3	0	21	24	397.0
Unit 3	5	4	0	15	19	174.8
Unit 4	0	0	0	0	0	
Unit 5	1	4	0	17	21	860.1
Unit 6	0	1	0	0	1	299.3
SUM	15	18	0	68	86	

Table 6.3: Operating days in compliance to SO₂ AEL Limit - May 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contraven- tion	Total Exceedance	Average SO ₂ (mg/Nm ³)
Unit 1	31	0	0	0	0	2.041.4
Unit 2	0	0	0	0	0	
Unit 3	27	0	0	0	0	1.640.5
Unit 4	0	0	0	0	0	
Unit 5	23	0	0	0	0	1.581.0
Unit 6	0	0	0	0	0	
SUM	81	0	0	0	0	

Table 6.4: Operating days in compliance to NOx AEL Limit - May 2023

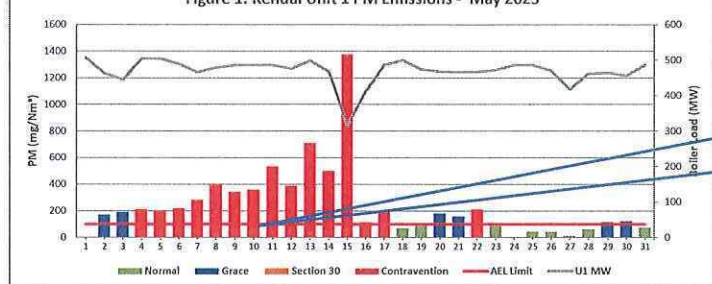
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	31	0	0	0	0	793.5
Unit 2	0	0	0	0	0	
Unit 3	27	0	0	0	0	459.6
Unit 4	0	0	0	0	0	
Unit 5	21	0	0	2	0	626.6
Unit 6	0	0	0	0	0	
SUM	79	0	0	2	0	

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO₂.

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

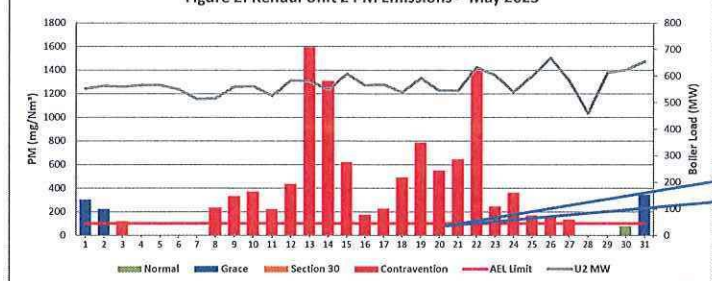
Figure 1: Kendal Unit 1 PM Emissions - May 2023



High emissions can be attributed to light up conditions with oil support, Compartment 10 and 20 full, causing DHP to trip, closing knife gate, SO3 plant off due to no flow, SO3 plant on hold mode due to steam temp low, DHP 1st collecting conveyor stream 1 tripped, DHP stop due to high level on compartments and all precip conv hoopers closed, SO3 plant off

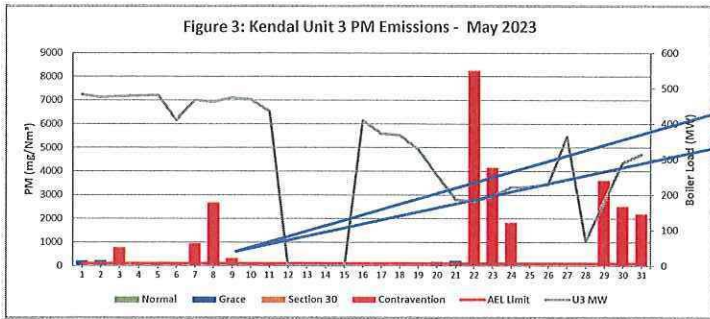
Unit 1 monitor maxed out on the 13th - 10th,

Figure 2: Kendal Unit 2 PM Emissions - May 2023

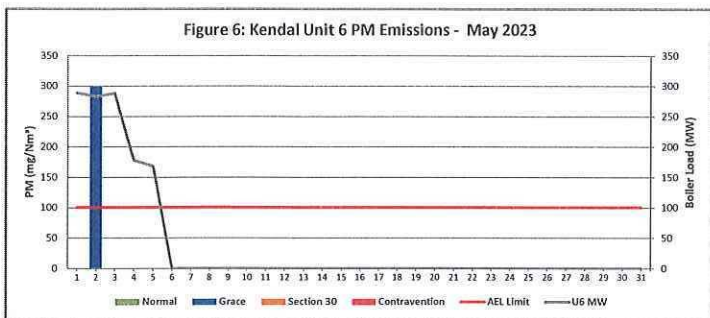
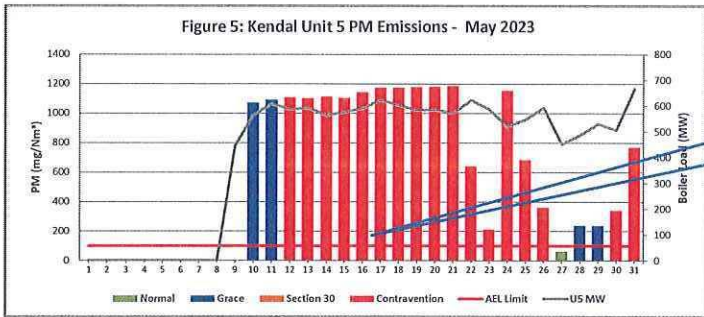
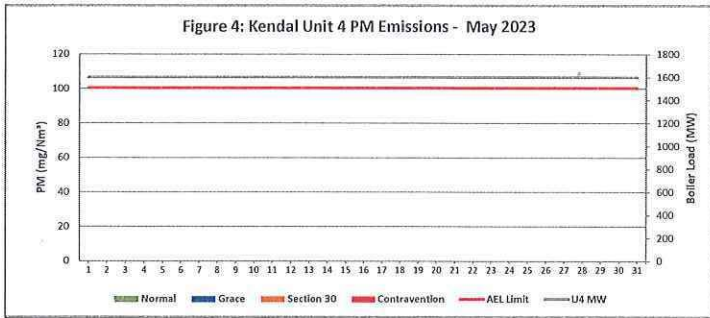


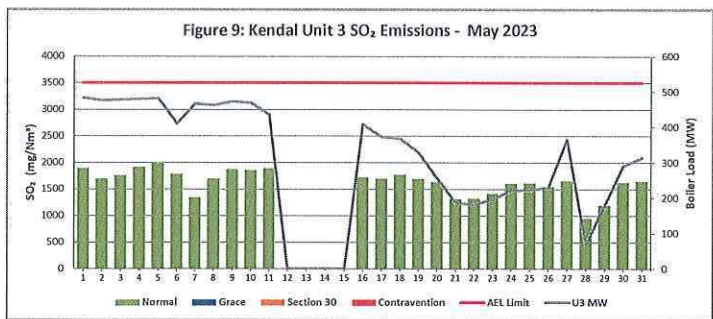
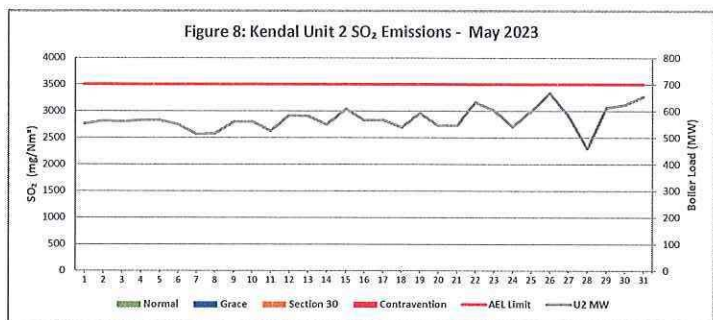
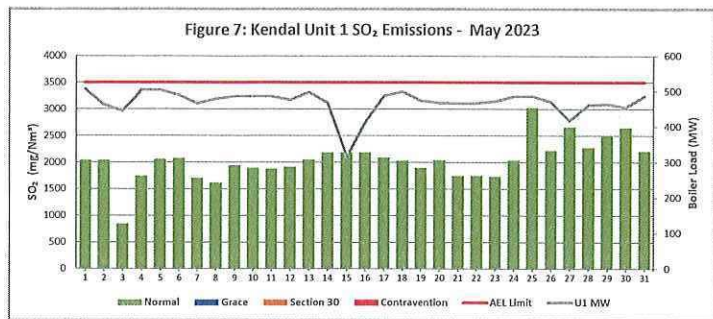
High emissions can be attributed to SO3 plant on hold mode, no Sulphur flow, DHP tripped on PLC failure, DHP precip chain conv 11 & 23

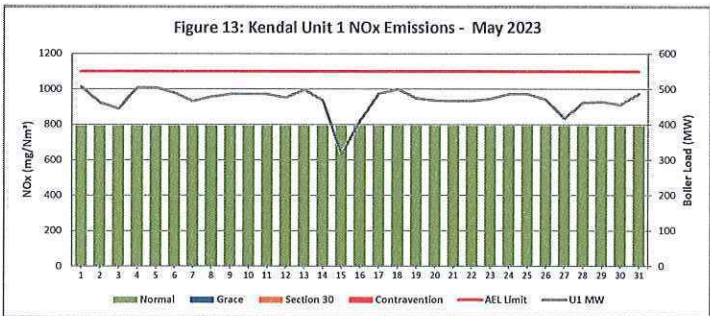
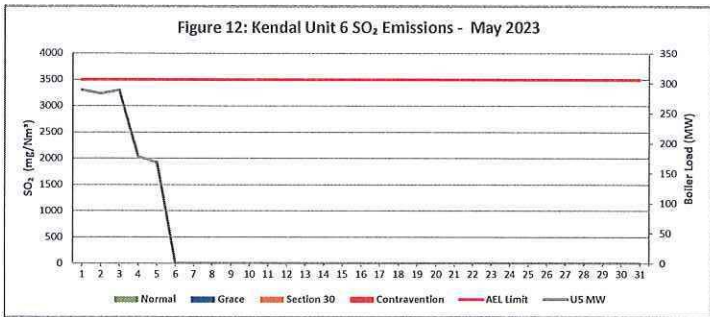
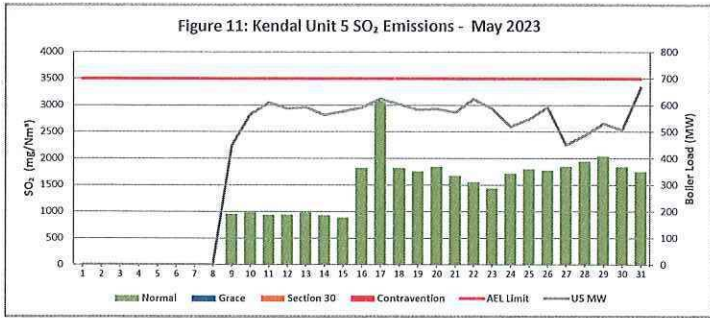
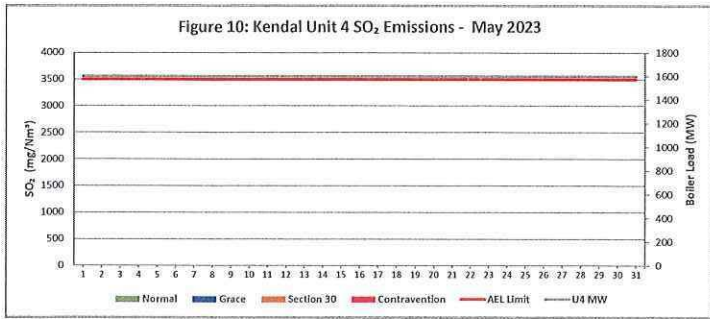
Unit 2 monitor maxed out on the 13th & 22nd

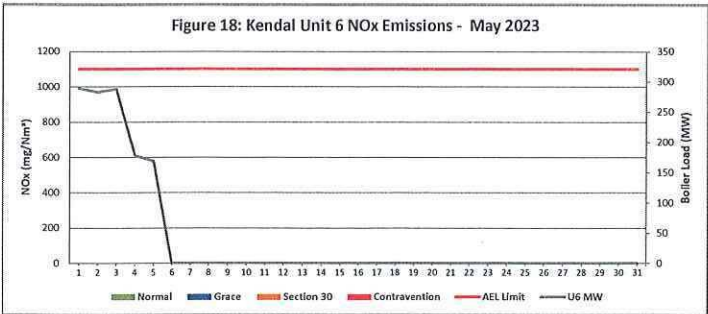
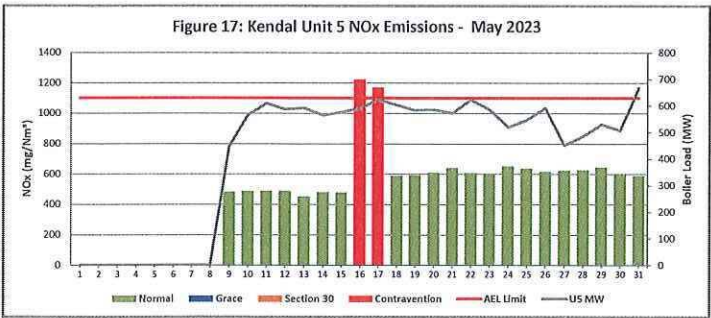
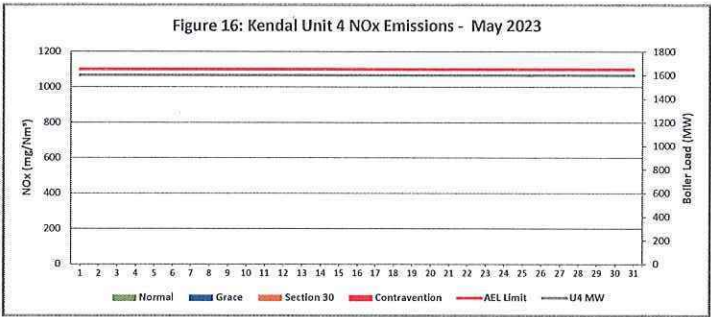
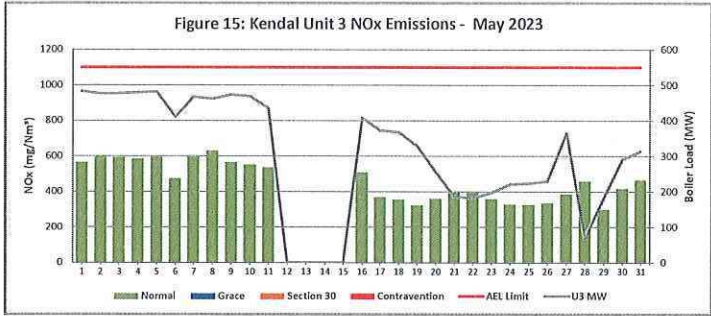
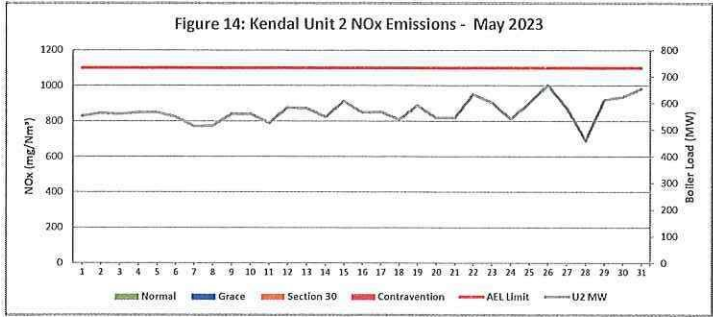


Unit 3 maxed out form the 01st -03rd, 07th -09th and the 20th -24th, 29th-31st









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

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

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

$$\eta = 1 - \frac{(\text{Dust Emission From AQR Report Dust Monitor (tons)} \times 100)}{(\text{Coal Burnt (tons)} \times \% \text{ Ash Content} \times 80\%)}$$

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 24 hours

The formula is as follows:

$$= (1 - (\text{count hours above 99.325\%/24hours})) \times 100$$

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 still using the old monitor correlation. After new correlations are done, new correlation factors will be implemented and backfitted to the date of monitor installation.
- U1, 2 and 3 monitors maxed out, meaning the emission were higher than what the monitor was correlated for. In which case we use surrogate values. This is attributed to abnormal plant conditions including Unavailability of the DHP and No SO3.
- Please note the reported figures in tonnage calculation are the tonnage 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 following are the days when the monitor was maxing out: Unit 1 on the 13th, U2 on the 13th & 22nd, Unit 3 from the 01st -03rd, 07th -09th and the 20th -24th, 29th-31st. Figures were restated based on surrogate value determination.
- Unit 5 SOx and NOx on the 16th and 17th data was deleted due to defective monitors, the tool has averaged itself.
- Unit 2 O2 for the entire month was replaced from QAL 2 report due to defective monitor.
- Note: Some of the data was lost during to the Operational Technology Network failure.
- Unit 1
 - Findings: The high emissions can be attributed to Light up conditions with oil support, Compartment 10 and 20 full, causing DHP to trip. Closing knife gate, SO3 plant off due to no flow. SO3 plant on hold mode due to steam temp low. DHP 1st collecting conveyor stream 1 tripped, DHP stop due to high level on compartments and all precip conv hoopers closed. SO3 plant off due to low steam temp. DHP standing due to Top chain conveyor gearbox oil level low and compartment. SO3 plant off du to low steam temp.
 - Resolution: Plant repaired
- Unit 2
 - Findings: The high emissions can be attributed to SO3 plant on hold mode, no Sulphur flow, DHP tripped on PLC failure, DHP precip chain conv 11 & 23 choked
 - Resolution: Plant repaired.
- Unit 3
 - Findings: The high PM emissions can be attributed to So3 plant tripping - Raining and water falling onto pipe work, Precip conveyors 23 and 24 tripped on overload, knife gates closed. So3 plant tripped - Steam temperature dropped down to 120 deg/c, Fuel Oil Usage for Combustion support
 - Resolution: Plant repaired.
- Unit 4 Off
- Unit 5
 - Findings: High PM emissions can be attributed to DHP tripping due to full compartments. Could not ash with 21 -24 due to stream 2 first conveyor that kept on tripping
 - Resolution: Plant repaired.
- Unit 6 the unit was on for only 3 days on the days where the data was lost.
- Findings: Resolution: Plant repaired.