Eskom

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Date:
27 March 2023

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Dear Ms. Nompumelelo Simelane

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

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

Compiled by:

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

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Eskom

JANUARY 2023

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 Jan-2023
	Coal	Tons	2 260 000	583 276
	Fuel Oil	Tons	5 000	6912.47
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Jan-2023
	Energy	GWh(MW)	(3,153,600)4380	1 157 317.00
	Ash	Tons	770 000	177 082.6
	RE Ash	kg/MWh	not specified	8.140

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0.670
Ash Content	%	40 (%)	30.360

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 Jan-2023	Technology Type	SO_3 Utlization Jan-2023
Unit 1	$ESP + SO_3$	92.060%	SO_3	93.4%
Unit 2	$ESP + SO_3$	87.248%	SO_3	56.3%
Unit 3	$ESP + SO_3$	92.043%	SO_3	58.6%
Unit 4	$ESP + SO_3$	98.394%	SO_3	0.0%
Unit 5	$ESP + SO_3$	96.620%	SO_3	21.7%
Unit 6	$ESP + SO_3$	98.404%	SO_3	31.3%

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

U2,3,5 and 6 SO3 Utilization is low due to:
SO3 plant trip on sulphur flow low, low temp
SO3 Plant is on hold mode due to low temp.
SO3 plant on hold mode due to no sulphur flow

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO_2	NO	O_2
Unit 1	67.3	99.9	99.9	99.9
Unit 2	30.2	68.7	43.5	71.6
Unit 3	52.2	8.1	8.1	11.2
Unit 4	97.0	96.1	81.3	89.0
Unit 5	99.3	86.3	85.7	92.6
Unit 6	98.7	98.8	92.6	98.5

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

Note: Unit 1 and 3 dust monitors realiability is low due to monitors maxing out. Unit 2 SO2 and Nox,Unit 4 O2, Unit 5 SO2 and Nox and Unit 6 O2 monitors reliability low due to defective monitors

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of January 2023

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	3 184.0	3 122	1 317
Unit 2	2 708.0	1 401	668
Unit 3	2 452.9	1 545	981
Unit 4	149.6	441	114
Unit 5	553.8	1 168	487
Unit 6	379.8	1 599	606
SUM	9 428.12	9 275	4 173

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	0	0	0	31	31	1 747.6
Unit 2	0	1	0	18	19	3 225.1
Unit 3	0	2	0	29	31	1 966.1
Unit 4	0	0	0	13	13	877.9
Unit 5	0	2	0	10	12	915.4
Unit 6	0	2	0	24	26	343.8
SUM	**0**	**7**	**0**	**125**	**132**	

Table 6.3: Operating days in compliance to SO_2 AEL Limit - January 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm³)
Unit 1	31	0	0	0	0	1 826.8
Unit 2	21	0	0	0	0	1 322.3
Unit 3	31	0	0	0	0	1 318.2
Unit 4	13	0	0	0	0	1 761.1
Unit 5	14	0	0	0	0	1 554.6
Unit 6	27	0	0	0	0	1 396.8
SUM	**137**	**0**	**0**	**0**	**0**	

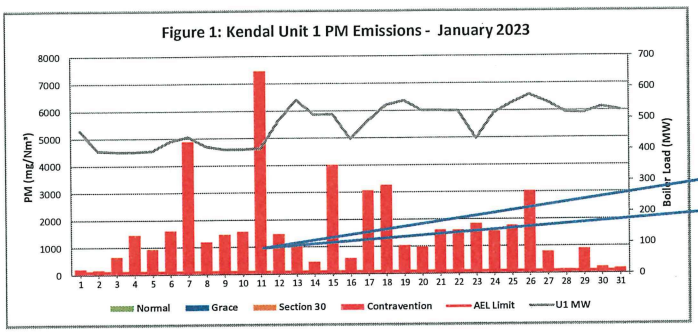
Table 6.4: Operating days in compliance to NOx AEL Limit - January 2023

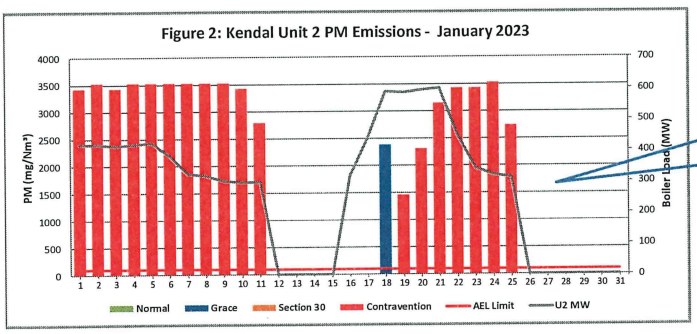
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	31	0	0	0	0	780.9
Unit 2	21	0	0	0	0	642.8
Unit 3	31	0	0	0	0	854.6
Unit 4	13	0	0	0	0	452.6
Unit 5	14	0	0	0	0	655.5
Unit 6	27	0	0	0	0	529.1
SUM	137	0	0	0	0	

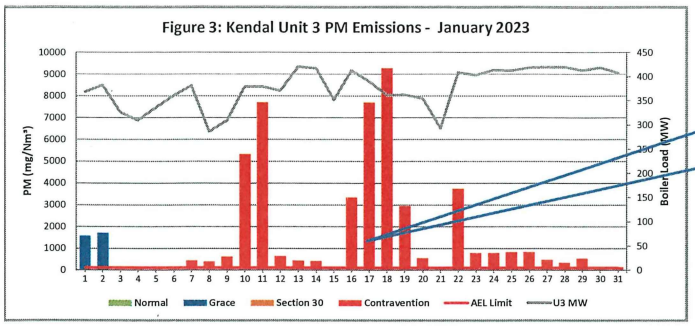
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

Table 6.5: Legend Description

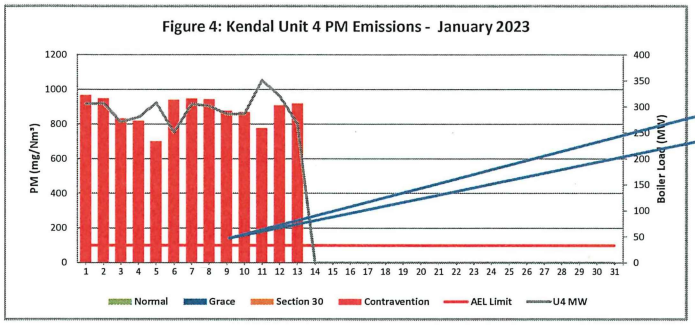
Condition	Colour	Description
Normal		Emissions below Emission Limit Value (ELV)
Grace		Emissions above the ELV during grace period
Section 30		Emissions above ELV during a NEMA S30 incident
Contravention		Emissions above ELV but outside grace or S30 incident conditions



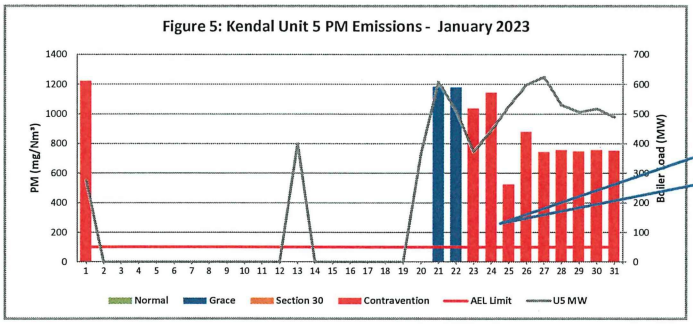




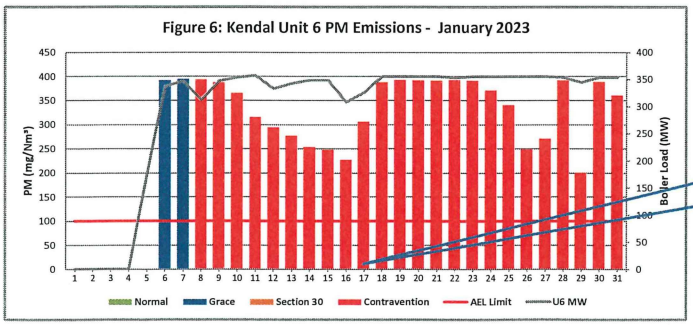
High PM emissions can be attributed to compartment levels high and precip hoppers knife gates shut. DHP tripped due to top bunker conv that kept on tripping. stream 1 1st collector conveyor tripped SO3 plant trip on sulphur flow low, low temp. Stream 2 dust handling plant stopped due to massive ash leak on bottom inspection door - flopper gate is fully selected to the chute due to ash leak at the top bunker conveyor.



High PM emissions can be attributed to due to ash leaks on stream 1 bucket elevator. DHP Precip conveyor OFF due to Compartment levels high, Precip hopper knife gate closed. Precip 11, 12 and 13 Kept tripping.



High PM emissions can be attributed to DHP stopping due to stream 1 bucket elevator and second collecting conveyors pulling high AMPS, bucket elevator choking. Precip conveyor 12 and 22 kept on tripping. DHP tripped due to spiked FAB 3 Compartment 20 level switch. SO3 Plant is on hold mode due to low temp.



High PM emissions can be attributed to DHP stopped due to high level on compartments, SO3 plant on hold mode due to no sulphur flow, All Precip conveyor not running, Knife gates closed.

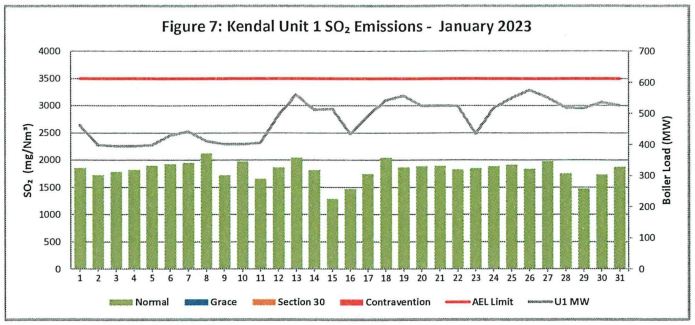


Figure 7: Kendal Unit 1 SO_2 Emissions - January 2023
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

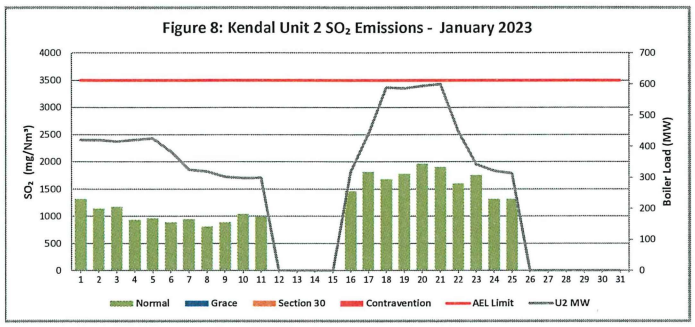


Figure 8: Kendal Unit 2 SO_2 Emissions - January 2023
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

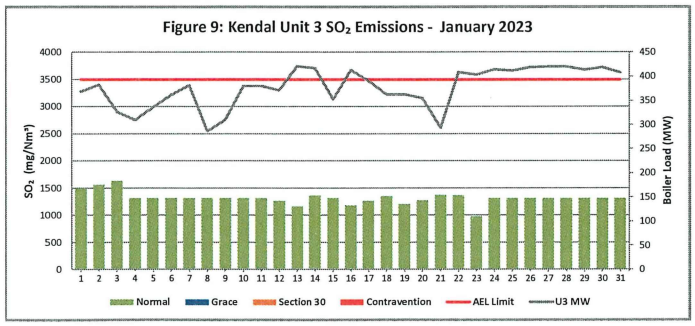


Figure 9: Kendal Unit 3 SO_2 Emissions - January 2023
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

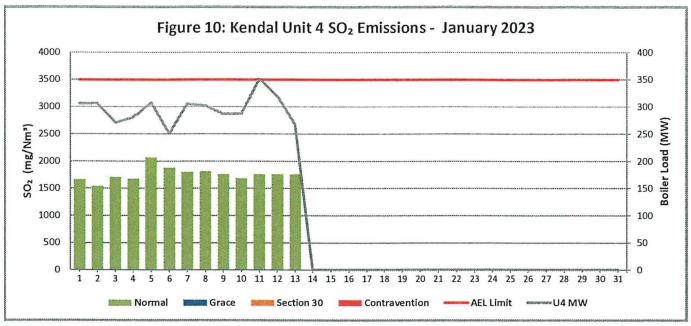


Figure 10: Kendal Unit 4 SO_2 Emissions - January 2023
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

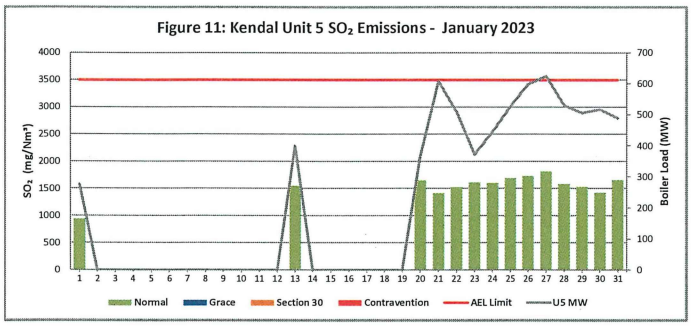


Figure 11: Kendal Unit 5 SO_2 Emissions - January 2023
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

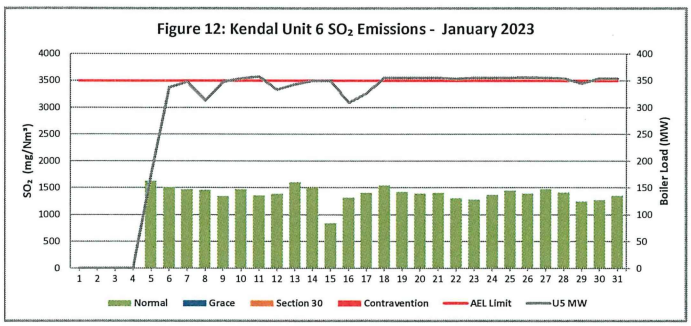


Figure 12: Kendal Unit 6 SO_2 Emissions - January 2023
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

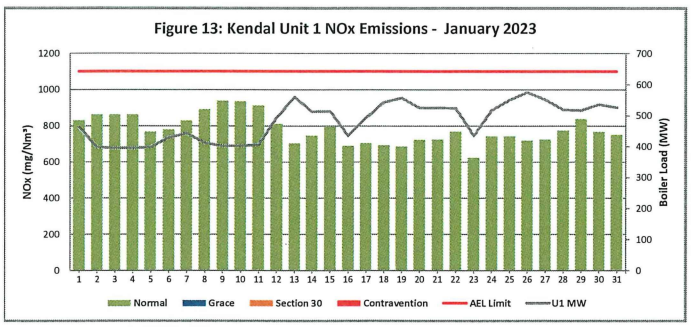


Figure 13: Kendal Unit 1 NOx Emissions - January 2023
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

Figure 14: Kendal Unit 2 NOx Emissions - January 2023

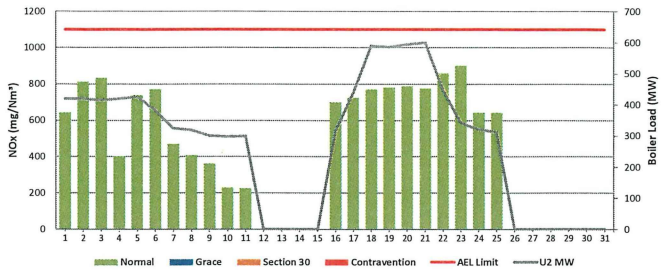


Figure 15: Kendal Unit 3 NOx Emissions - January 2023

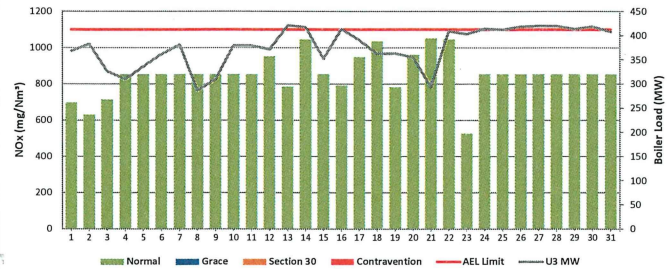


Figure 16: Kendal Unit 4 NOx Emissions - January 2023

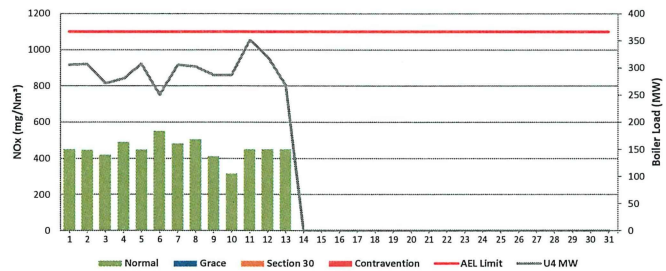


Figure 17: Kendal Unit 5 NOx Emissions - January 2023

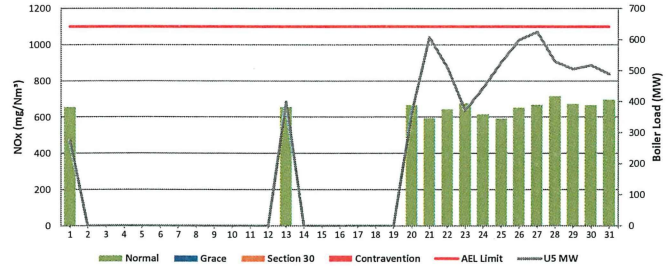
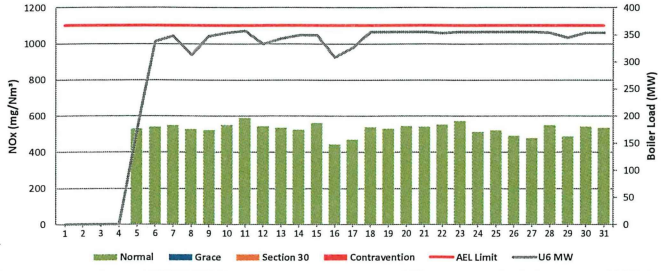


Figure 18: Kendal Unit 6 NOx Emissions - January 2023



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

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 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 still using the old monitor correlation After new correlations are done, new correlation factors will be implemeted and backfitted to the date of monitor installation
- Avarage emeissions for unit 2 SOx and NOx from the the 1st to the 4th, Unt 23SOx and NOx from the 3rd to the 31th were used from the QAL2 report as the monitor was defective
- Avarage emissions for Unit 5 SOx and NOx from the 20th to the 24th the were used from the QAL 2 report as the monitors were defective

-
- Unit 1
- Findings The high emissions can be attributed to SO3 plant off due to SO3 plant keep tripping due to converter temperature high, ESP knife gates closed due to flopper gates limit fault DHP of f due to high compartment levels, SO3 plant on hold mode due to no suphur flow, DHP standing due to second collecting conveyor and Stream 1 bucket elevator pulling high Amps
- High NOx emissions can be attributed to unbalanced conditions of combustion resulting in high flame temperature and consenquentially high NOX The unbalanced conditions of combustion were caused by various issues on mills

- Resolution Plant repaired

- Unit 2
- Findings The high emissions can be attributed to DHP off due to faulty PLC, DHP stopped due to ash bunker knife gates limits lost, SO3 plant trip due to no Sulphur flow and DHP off due to high compartment levels
- Resolution Plant repaired

- Unit 3
- Findings The high PM emissions can be attributed to ESP fields 11,15,24,27,41,42& 43 O/C, DHP trip due to high compartment levels, ESP chain conveyor 13,14 & 23 choked, DHP ash back log and SO3 plant out of service
- Resolution Palnt repaired

- Unit 4
- Findings High PM emissions can be attributed to DHP tripping due to stream 2 second collecting conveyor speed switch wheel moving out of posistion, SO3 plant out of service due to no sulphur flow, DHP trip due to compartments level high and So3 plant on hold mode due to flue gas temperature low
- Resolution Plant repaired

- Unit 5
- Findings High PM emissions can be attributed to SO3 plant off due to no steam fow, DHP off due to compartments level high and ESP conveyor 11 to 14 tripped
- Resolution Plant repaired

- Unit 6
- Findings High PM emissions can be attributed to DHP trips due to high compartment levels SO3 off due to no Suphur flow DHP off bucket elevetor stream 1 discharge chute blocked
- Resolution Plant repaired