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Date:
15 November 2022
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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 SEPTEMBER 2022.

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:


Irene Motswenyane
ENVIRONMENTAL OFFICER- KENDAL

Date: 15/11/2022

Supported by:



Solly Chokoe
ENVIRONMENTAL MANAGER- KENDAL

Date: 15/11/2022

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KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF SEPTEMBER 2022

Verified by:



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Validated by:



Tendani Rasivhetshele
BOILER ENGINEERING MANAGER-KENDAL

Date: 2022/11/16

Supported by:



Malibongwe Mabizela
ENGINEERING MANAGER-KENDAL

22/11/2022
Date:

Approved by:



Kobus Steyn
GENERAL MANAGER-KENDAL

Date: 23 Nov 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 Sep-2022
	Coal	Tons	2 260 000	709 983
	Fuel Oil	Tons	5 000	7218.42

Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Sep-2022
	Energy	GWh(MW)	(3,153,600)4380	1 293 808.00
	Ash	Tons	770 000	221 727.7
	RE Ash	kg/MWh	not specified	1.530

Note: Fuel oil consumption rate was higher than the permitted consumption rate due to multiple unit trips and mills underperforming.

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0.730
Ash Content	%	40 (%)	31.230

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 Sep-2022	Technology Type	SO ₂ Utilization Sep-2022
Unit 1	ESP + SO ₂	98.903%	SO ₂	75.6%
Unit 2	ESP + SO ₂	97.201%	SO ₂	56.5%
Unit 3	ESP + SO ₂	99.848%	SO ₂	0.0%
Unit 4	ESP + SO ₂	99.643%	SO ₂	78.7%
Unit 5	ESP + SO ₂	98.958%	SO ₂	67.6%
Unit 6	ESP + SO ₂	99.765%	SO ₂	62.8%

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

Unit 1,2,4,5 & 6: SO₂ Utilization due to:

- SO₂ Plant on hold due to low Aux steam temperatures
- Faulty SO₂ flow meter
- SO₂ Plant trip due to low steam temperatures.
- SO₂ Plant on hold due to no sulphur flow.
- SO₂ Plant tripped on low flue gas temperatures.
- SO₂ Plant off due to SO₂ cooling fan tripped.

Unit 3:

- SO₂ plant utilisation is zero due to defective flow meter.

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO ₂	NO	O ₂
Unit 1	94.2	100.0	90.9	100.0
Unit 2	89.6	81.0	81.7	100.0
Unit 3	99.0	100.0	95.8	89.1
Unit 4	100.0	100.0	92.6	37.4
Unit 5	100.0	51.6	55.5	74.8
Unit 6	89.4	86.5	78.8	32.3

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO₂
 Note: Unit 4 O₂, Unit 5 SO₂, NO & O₂, Unit 6 NO & O₂ monitor reliability low due to defective monitors.

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of September 2022

Associated Unit/Stack	PM (tons)	SO ₂ (tons)	NO _x (tons)
Unit 1	246.8	1 688	549
Unit 2	1 197.6	1 242	473
Unit 3	44.2	1 730	614
Unit 4	66.2	922	284
Unit 5	352.4	2 059	655
Unit 6	72.3	3 376	1 224
SUM	1 979.52	11 018	3 798

Table 6.2: Operating days in compliance to PM AEL Limit - September 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contra-vention	Total Exceedance	Average PM (mg/Nm ³)
Unit 1	6	6	3	0	9	338.3
Unit 2	5	9	10	6	25	645.1
Unit 3	24	1	0	0	1	43.4
Unit 4	0	0	2	3	5	218.8
Unit 5	0	0	0	12	12	339.0
Unit 6	20	5	0	1	6	75.1
SUM	55	21	15	22	58	

Table 6.3: Operating days in compliance to SO₂ AEL Limit - September 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contra-vention	Total Exceedance	Average SO ₂ (mg/Nm ³)
Unit 1	16	0	0	0	0	2 705.2
Unit 2	30	0	0	0	0	1 011.1
Unit 3	28	0	0	0	0	1 817.5
Unit 4	19	0	0	0	0	1 928.9
Unit 5	26	0	0	0	0	1 877.9
Unit 6	29	0	0	0	0	2 059.7
SUM	148	0	0	0	0	

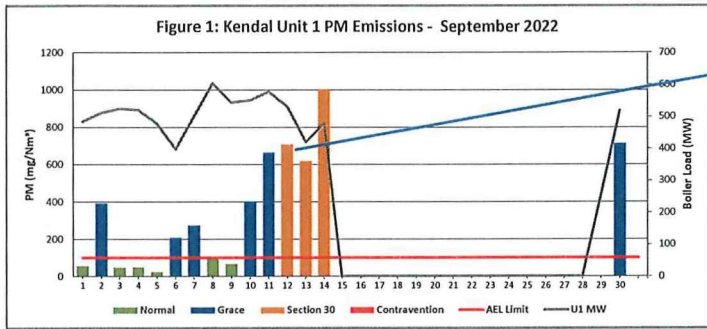
Table 6.4: Operating days in compliance to NOx AEL Limit - September 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contra-vention	Total Exceedance	Average NOx (mg/Nm ³)
Unit 1	16	0	0	0	0	868.6
Unit 2	30	0	0	0	0	382.4
Unit 3	28	0	0	0	0	625.0
Unit 4	18	0	0	1	1	614.5
Unit 5	26	0	0	0	0	604.2
Unit 6	29	0	0	0	0	704.1
SUM	147	0	0	1	1	

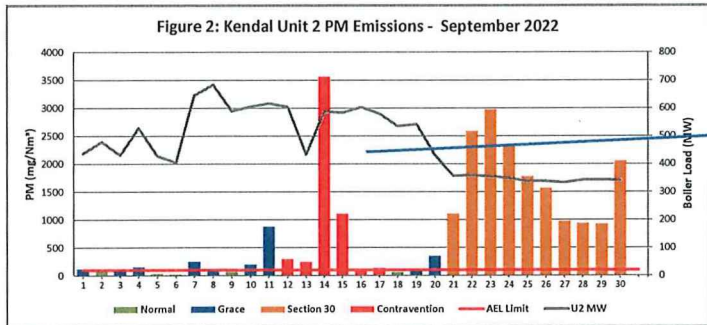
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO₂

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
Contra-vention	Red	Emissions above ELV but outside grace or S30 incident conditions

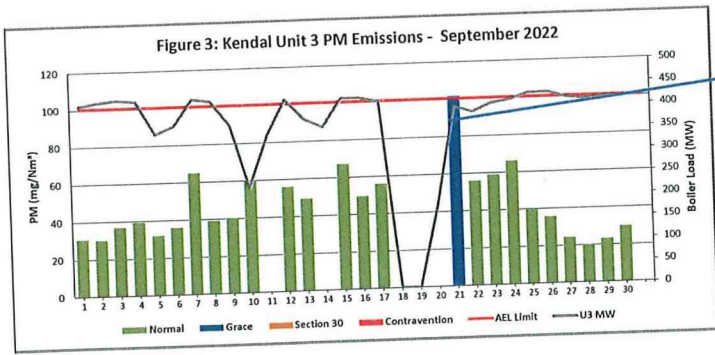


- High PM emissions can be attributed to :
 - SO3 plant off due to no Sulphur flow.
 - ESP conveyor 23 hopper number 2 bypass knife gates blocked.



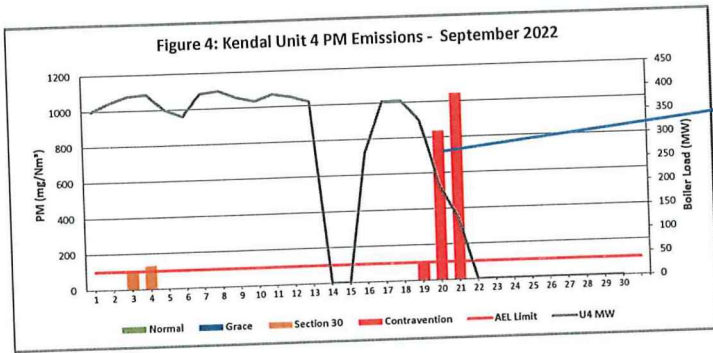
- High PM emissions can be attributed to :
 SO3 plant stopped due to burner box burning.
 ESP chain conveyor 13,14,24 blocked.
 SO3 plant off due to SO3 flow meter faulty

Figure 3: Kendal Unit 3 PM Emissions - September 2022



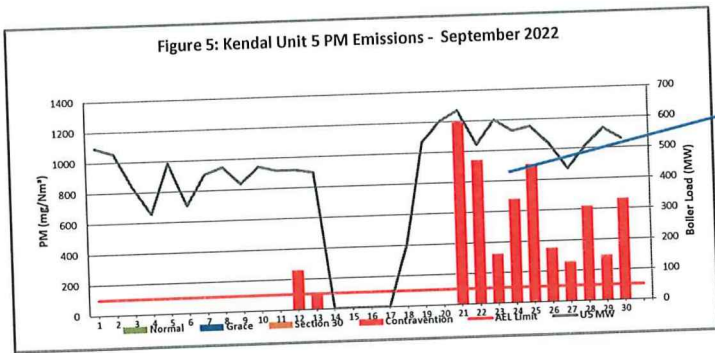
- High PM emissions can be attributed to :
Precip fields ,11,27 and 42 o/c - fails to reset due to high ash back log.

Figure 4: Kendal Unit 4 PM Emissions - September 2022



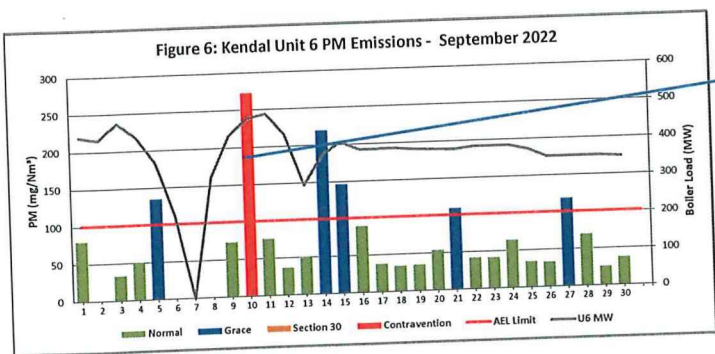
- High PM emissions can be attributed to unit's :
- DHP off due to discrepancy on top bunker
- DHP off due to stream 2 second coil conveyor tail end pulley failure.

Figure 5: Kendal Unit 5 PM Emissions - September 2022



- High PM emissions can be attributed to unit's :
- DHP tripped due to high FAB 3 compartment 10.
- SO3 plant on hold due to no sulphur flow
- Precip chain conveyor 11 & 12 choked.

Figure 6: Kendal Unit 6 PM Emissions - September 2022



- High PM emissions can be attributed to unit :
- Unit light up
- SO3 plant pump burned out
- DHP Stream 2 O/C.

Figure 7: Kendal Unit 1 SO₂ Emissions - September 2022

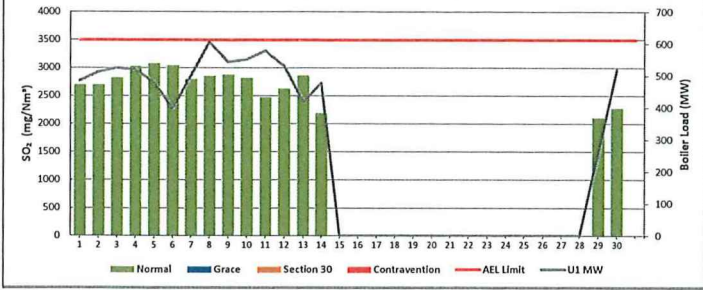


Figure 8: Kendal Unit 2 SO₂ Emissions - September 2022

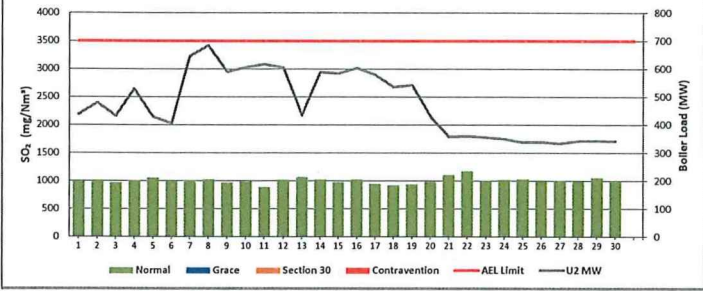
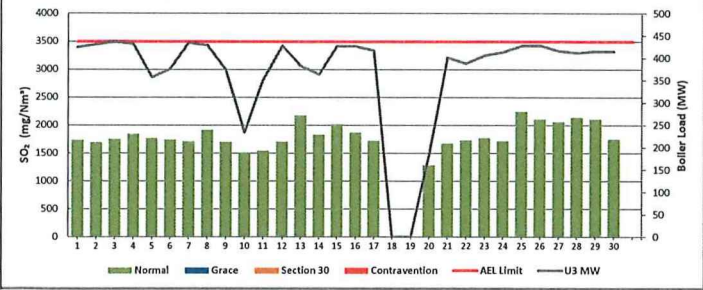


Figure 9: Kendal Unit 3 SO₂ Emissions - September 2022



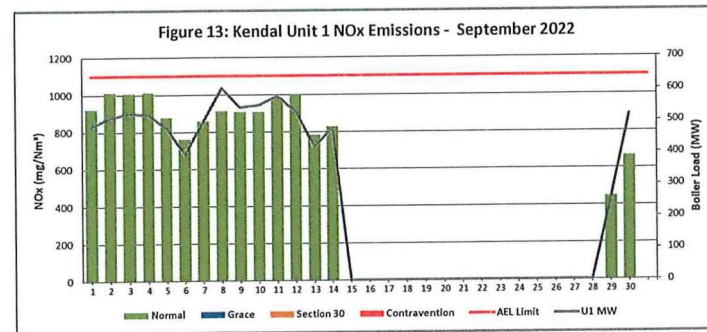
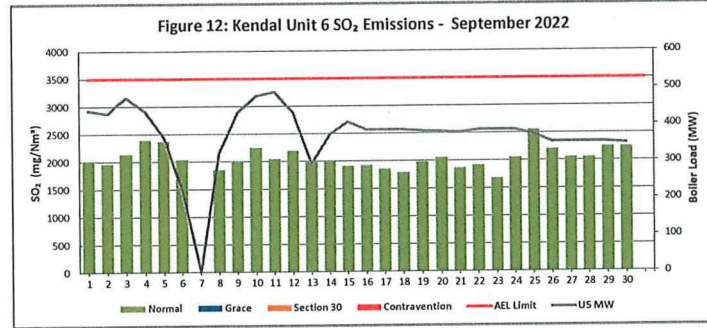
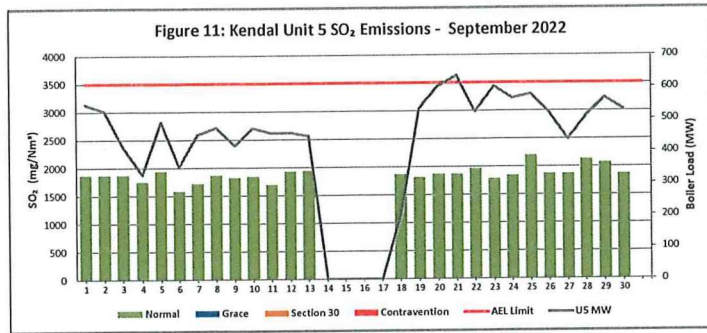
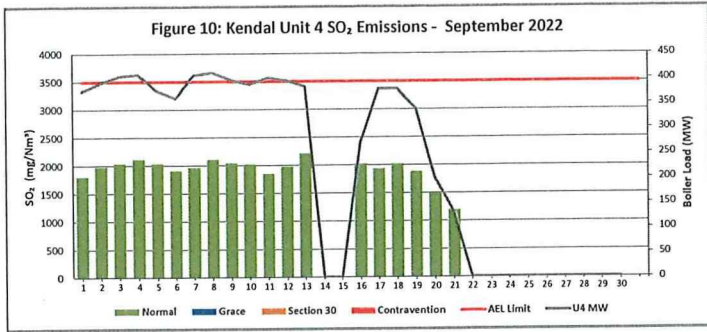


Figure 14: Kendal Unit 2 NOx Emissions - September 2022

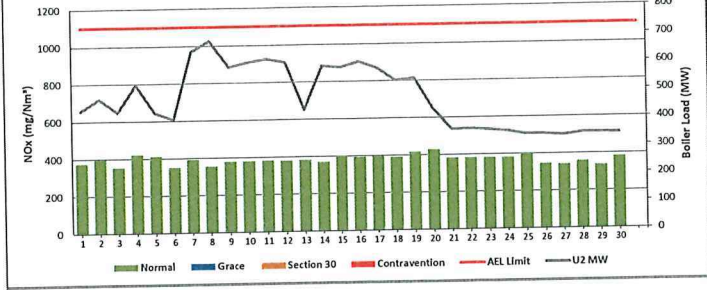


Figure 15: Kendal Unit 3 NOx Emissions - September 2022

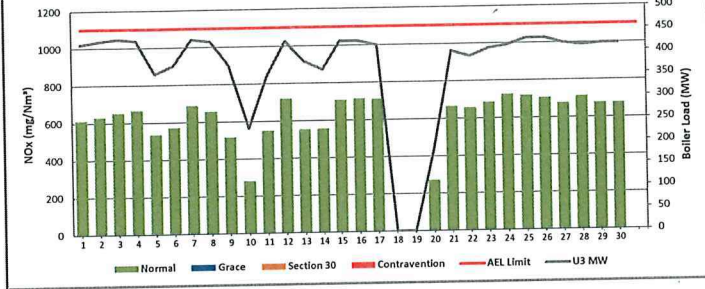


Figure 16: Kendal Unit 4 NOx Emissions - September 2022

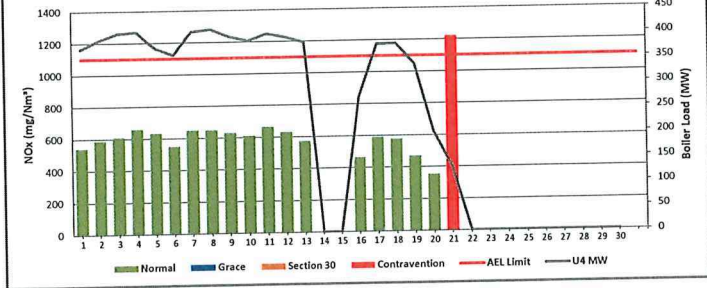


Figure 17: Kendal Unit 5 NOx Emissions - September 2022

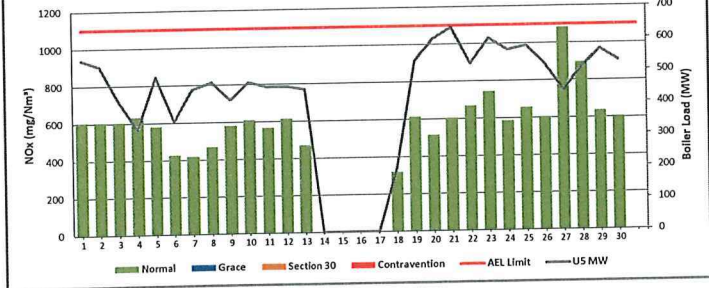
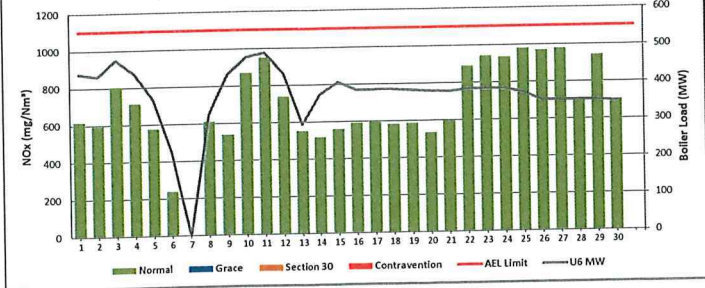


Figure 18: Kendal Unit 6 NOx Emissions - September 2022



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

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

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

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:

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

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
- Average emissions for unit 2 NOx from 21st to 24th September were used from the available data as the monitor was defective
- Average emissions for Unit 2 pressure was used from the QAL2 parallel report due to defective analysers.
- Average emissions for Unit 1 and 2 SOx and NOx and Unit 3 NOx was used from QAL 2 report.
- Average emissions for U2 Temp and Pressure from the 13th to the 24th was used from QAL2 report.
-
- Unit 1
- Findings: The high emissions can be attributed to ash backlogs, all knife gates closed due to DHP compartments full, choked precip conveyor 13 and 21.
- Resolution: Plant repaired
- Unit 2
- Findings: The high emissions can be attributed all knife gates closed due to DHP compartments level 20, Precip conveyor 13 and 14 tripped, SO3 plant off due to faulty flow meter.
- Resolution: Plant repaired.
- Unit 3
- Findings: The high PM emissions can be attributed to DHP stream 1 second collector tripped and fail to start.
- Resolution: Plant repaired.
- Unit 4
- Findings: High PM emissions can be attributed to DHP's off trips due to discrepancy on top bunker and Stream 2 second conveyor tail end pulley failure.
- Resolution: The plant was repaired.
- Unit 5
- Findings: High PM emissions can be attributed to SO3 plant trip on low flue gas temperatures. SO3 plant being on hold due to no sulphur flow. DHP tripped due to high FAB 3 compartment 10. DHP conveyor 11 off, choked, thus knife gates closed. Choked precip chains conveyors 11 and 12.
- Resolution: The plant was repaired.
- Unit 6
- Findings: High PM emissions can be attributed to unit light up on 5th September. SO3 plant pump burned out. SO3 Plant off due to SO3 cooling fan trip.
- Resolution: The plant was repaired.