

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

Date:
03 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 JULY 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 equation where monitors maxed out to get the surrogation value and this resulted in an increase in tonnages.

Compiled by:



Tsakani Holeni
ENVIRONMENTAL SENIOR ADVISOR- KENDAL POWER STATION

Supported by:



Solly Chokoe
ENVIRONMENTAL MANAGER- KENDAL POWER STATION

Generation Division
(Kendal Power Station)
N12 Balmoral Off Ramp, Emalahleni
Private Bag x7272, Emalahleni 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 JULY 2023

Verified by:

 P.P

Jacob Zwane

BOILER ENGINEERING: SENIOR SYSTEM ENGINEER- KENDAL POWER STATION

Validated by:



Tendani Rasivhetshela

BOILER ENGINEERING MANAGER-KENDAL POWER STATION

Supported by:



Malibongwe Mabizela

ENGINEERING MANAGER-KENDAL POWER STATION

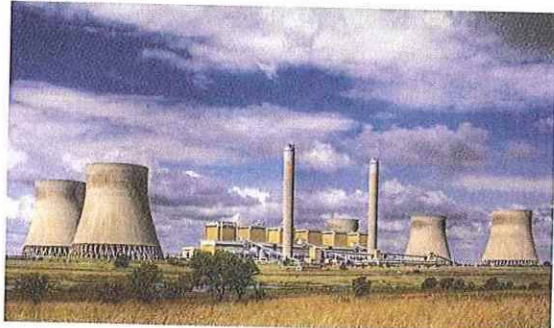
Approved by:



Tshepiso Temo

GENERAL MANAGER-KENDAL POWER STATION

2024/04/22



1 RAW MATERIALS AND PRODUCTS

Raw Materials and Products	Raw Material Type	Units	Maximum Permitted Consumption Rate	Consumption Rate Jul-2023
	Coal	Tons	2 260 000	764 043
	Fuel Oil	Tons	5 000	11343.890
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Indicative Production Rate Jul-2023
	Energy	GWh	3 062.304	1 243.968
	Ash	Tons	770 000	278 570.088
	RE Ash	kg/MWh	not specified	2.365

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
CV Content	MJ/kg	16-24 (MJ/kg)	17.340
Sulphur Content	%	<1 (%)	0.850
Ash Content	%	40 (%)	36.460

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 Jul-2023	Technology Type	SO ₂ Utilization Jul-2023
Unit 1	ESP + SO ₂	Off-line	SO ₂	0.0%
Unit 2	ESP + SO ₂	97.403%	SO ₂	0.0%
Unit 3	ESP + SO ₂	99.555%	SO ₂	5.5%
Unit 4	ESP + SO ₂	Off-line	SO ₂	Off-line
Unit 5	ESP + SO ₂	97.324%	SO ₂	0.0%
Unit 6	ESP + SO ₂	99.029%	SO ₂	0.0%

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

SO₃ plant on hold mode due to aux steam temp low, SO₃ plant off due to the inlet steam temp low, SO₃ plant on hold mode sulphur flow meter faulty reading too high, SO₃ plant tripped due to low back end temps

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO ₂	NO	O ₂
Unit 1	55.8	90.3	93.1	97.6
Unit 2	51.6	94.0	94.6	0.0
Unit 3	45.0	100.0	100.0	86.7
Unit 4	OFF	OFF	OFF	OFF
Unit 5	98.7	99.7	100.0	100.0
Unit 6	93.1	88.7	67.1	100.0

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

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

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of July 2023

Associated Unit/Stack	PM (tons)	SO ₂ (tons)	NO _x (tons)
Unit 1	0.0	3 508	1 372
Unit 2	961.3	1 769	690
Unit 3	214.8	2 344	825
Unit 4	OFF	OFF	OFF
Unit 5	1 456.1	2 097	813
Unit 6	309.7	1 289	742
SUM	2 941.83	11 008	4 442

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

Associated Unit/Stack	Normal	Grace	Section 30	Contraven- tion	Total Exceedance	Average PM (mg/Nm³)
Unit 1	1	4	0	26	30	1 383.9
Unit 2	0	4	0	20	24	792.7
Unit 3	0	4	0	19	23	202.9
Unit 4	OFF	OFF	OFF	OFF	OFF	OFF
Unit 5	0	2	0	24	26	941.9
Unit 6	0	6	0	17	23	395.7
SUM	1	20	0	106	126	

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

Associated Unit/Stack	Normal	Grace	Section 30	Contraven- tion	Total Exceedance	Average SO ₂ (mg/Nm³)
Unit 1	31	0	0	0	0	1 760.4
Unit 2	26	0	0	0	0	1 910.1
Unit 3	26	0	0	0	0	1 973.2
Unit 4	OFF	OFF	OFF	OFF	OFF	OFF
Unit 5	28	0	0	0	0	1 830.0
Unit 6	27	0	0	0	0	1 346.7
SUM	138	0	0	0	0	

Sulphur common line pipe work system replacement there was no sulphur flow - Project tie in - the station had to switch off the entire stream.

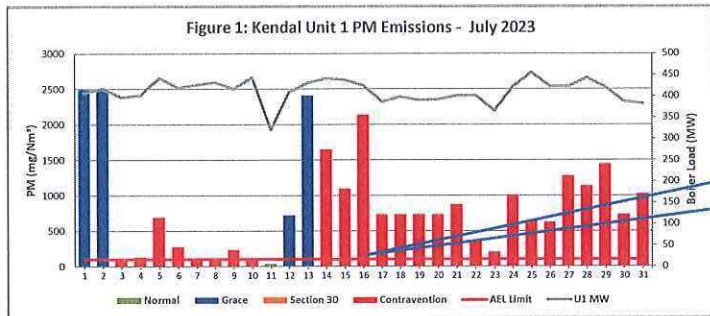
Table 6.4: Operating days in compliance to NOx AEL Limit - July 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	31	0	0	0	0	695.9
Unit 2	26	0	0	0	0	733.0
Unit 3	26	0	0	0	0	689.0
Unit 4	OFF	OFF	OFF	OFF	OFF	OFF
Unit 5	28	0	0	0	0	705.5
Unit 6	27	0	0	0	0	770.6
SUM	138	0	0	0	0	

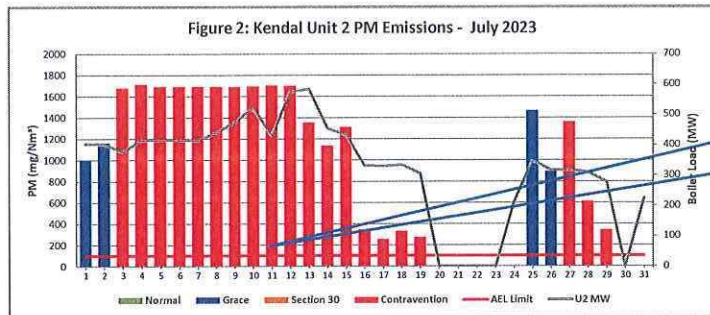
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO₂

Table 6.5: Legend Description

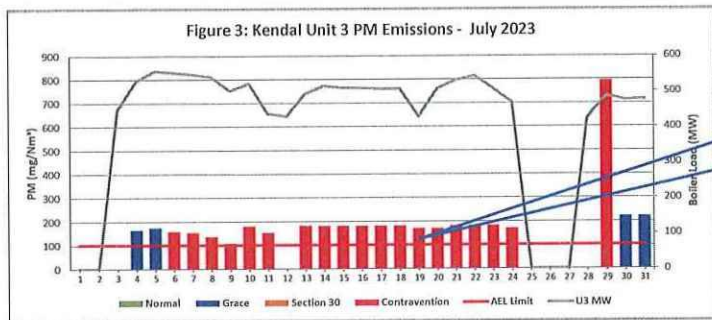
Condition	Colour	Description
Normal	GREEN	Emissions below Emission Limit Value (ELV)
Grace	BLUE	Emissions above the ELV during grace period
Section 30	ORANGE	Emissions above ELV during a NEMA S30 incident
Contravention	RED	Emissions above ELV but outside grace or S30 incident conditions



Unit 1 Monitor maxed out on the following days Unit 1 from the 1st - 3rd, 12th - 21st and 26th - 31st.

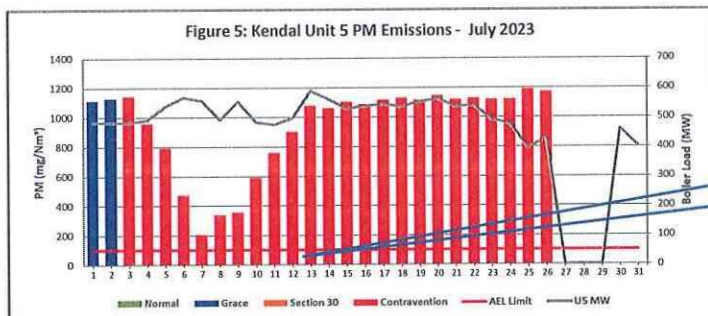
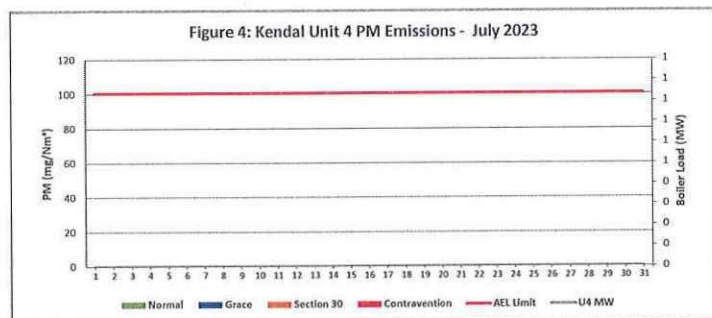


Unit 2 Monitor maxed out of the U2 on the 1st - 13th & 25th - 28th.

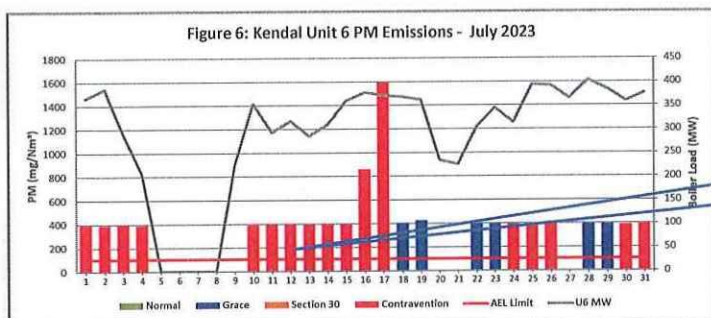


High PM emissions can be attributed to top bunker conveyor tripping - hopper knife gates closed on all precip conveyors. Precip conveyor 12 tripped and fails to start from the control room, Precip conveyor 24 tripped - Conveyor chocked, Foil oil usage - Unit light up (cold start).

Unit 3 monitor maxed out on the 10th -11th, 13th - 24th and the 29th -31st.

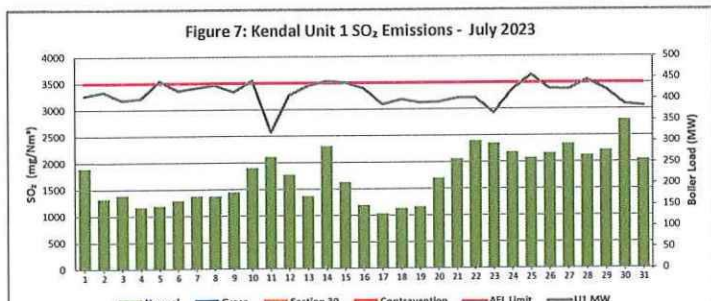


High PM emissions can be attributed to Precip chain conveyors tripping and chocking, SO3 plant tripped due to low back end temps, DHP stopped due to faulty comp, Knife gates closed.



High PM emissions can be attributed to DHP tripped due to tap bunkers high levels, fuel oil support, SO3 plant off, DHP PLC off. Fuel oil used to start up the unit. SO3 plant heater that fail to reset.

Unit 6 on the 2nd and the 18th -19th



■ Normal
 ■ Grace
 ■ Section 30
 ■ Contravention
 — AEL Limit
 — U2 MW

Figure 8: Kendal Unit 2 SO₂ Emissions - July 2023

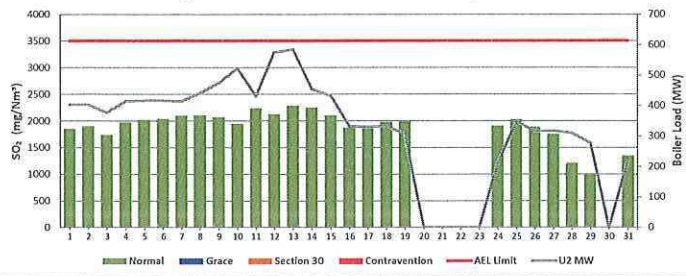


Figure 9: Kendal Unit 3 SO₂ Emissions - July 2023

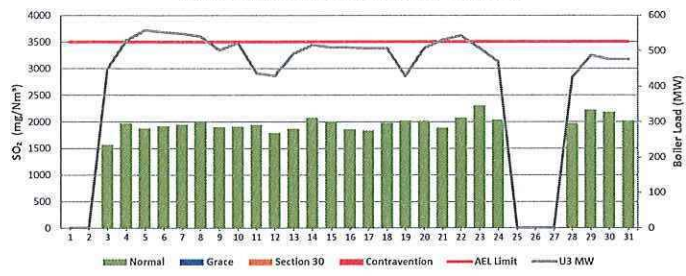


Figure 10: Kendal Unit 4 SO₂ Emissions - July 2023

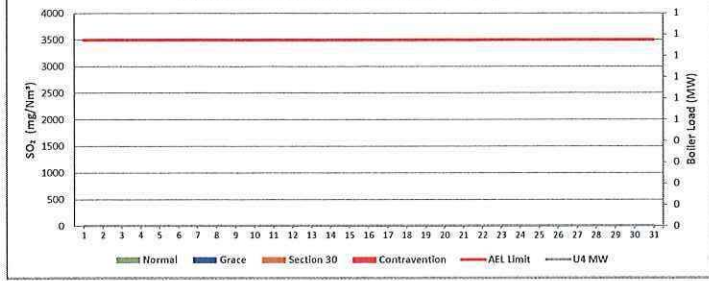


Figure 11: Kendal Unit 5 SO₂ Emissions - July 2023

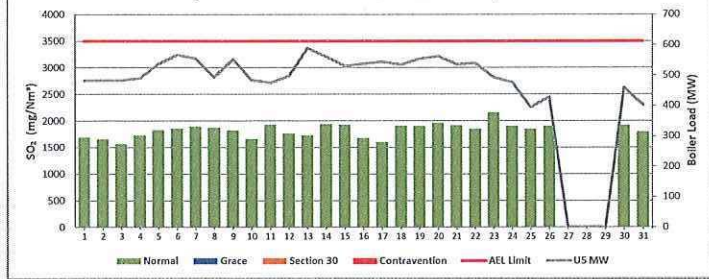


Figure 12: Kendal Unit 6 SO₂ Emissions - July 2023

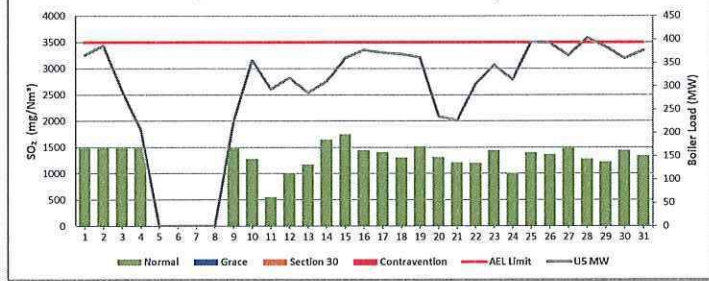


Figure 13: Kendal Unit 1 NO_x Emissions - July 2023

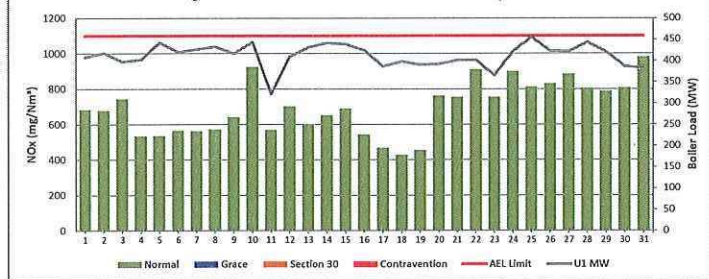


Figure 14: Kendal Unit 2 NOx Emissions - July 2023

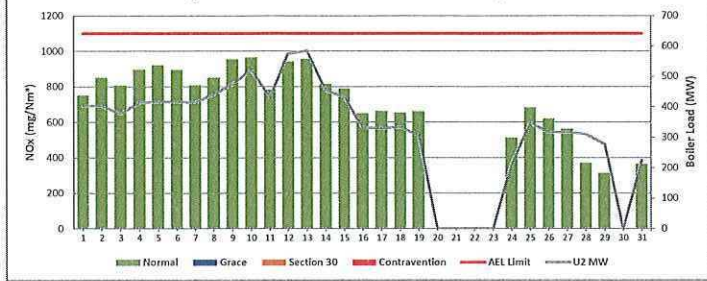


Figure 15: Kendal Unit 3 NOx Emissions - July 2023

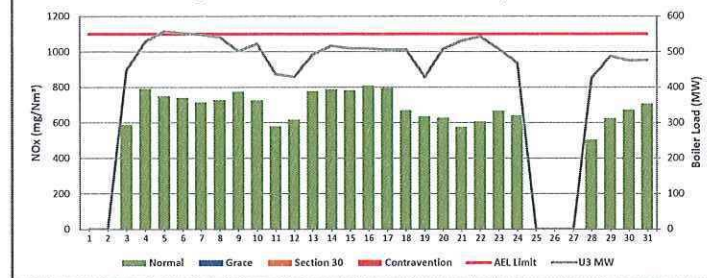


Figure 16: Kendal Unit 4 NOx Emissions - July 2023

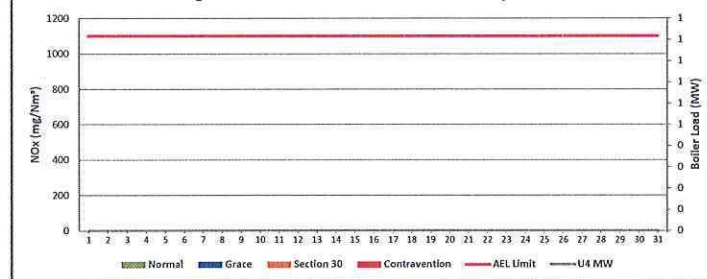


Figure 17: Kendal Unit 5 NOx Emissions - July 2023

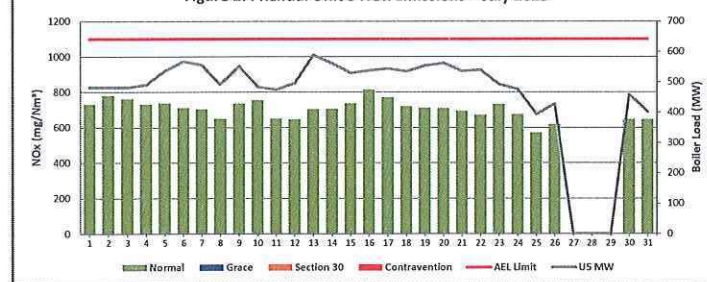
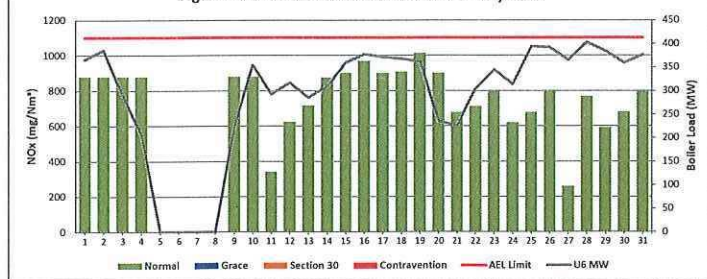


Figure 18: Kendal Unit 6 NOx Emissions - July 2023



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

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

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

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 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
- 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, 3 and 6 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 no DHP and No SO3 plant during the period.
- 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 following are the days when the monitor was maxing out: Unit 1 from the 1st - 3rd, 12th - 21st and 26th - 31st, U2 on the 1st - 13th & 25th - 28th, Unit 3 from the 10th - 11th, 13th - 24th and the 29th - 31st, Unit 6 on the 2nd and the 18th - 19th. Figures were restated based on the surrogate value determination that Kendal conducted.
- Unit 6 O2 gas Monitor was defective, substituted with QAL 2 SRM value for for the entire month.
- Unit 1 NOx on the 1st to the 11th, 21st - 22nd, 27th, 30th, 31st monitor was defective, data was deleted the tool will average itself.
- Unit 1
- Findings: The high emissions can be attributed to Primary conveyor 11 chocked, SO3 plant on hold mode due to aux steam temp low, Unit on Fuel oil support, Precip chain con12 chocked at the drive and speed switch faulty. Precip conv 21 chocke, DHP stopped due to comp level high. Hopper knife gates closed.
- Resolution: Plant repaired.
- Unit 2
- Findings: The high emissions can be attributed to DHP tripped due to comp high level, So3 plant off due to the inlet steam temp low, DHP tripped due to comp high level. Hopper knife gate closed, preci chain conv 13 chocked, Precip 13 tripped conveyor chocked. SO3 plant on hold mde sulphur flow meter faulty reading too high.
- Resolution: Plant repaired.
- Unit 3
- Findings: The high PM emissions can be attributed to top bunker conveyor tripping - hopper knife gates closed on all precip conveyors. Precip conveyor 12 tripped and fails to start from the control room, Precip conveyor 24 tripped - Conveyor chocked, Foil oil usage - Unit light up (cold start).
- Resolution: Palnt repaired.
- Unit 4
- Unit off
- Unit 5
- Findings: High PM emissions can be attributed to Precip chain conveyors tripping and chocking, SO3 plant tripped due to low back end temps, DHP stopped due to faulty comp, Knife gates closed.
- Resolution: Plant repaired.
- Unit 6
- Findings: High PM emissions can be attributed to Precip chain conveyors tripping and chocking, SO3 plant tripped due to low back end temps, DHP stopped due to faulty comp, Knife gates closed.
- Resolution: Plant repaired.