



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)

**SUBMISSION OF KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF DECEMBER 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:**

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](http://www.eskom.co.za)

**KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF DECEMBER 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



DECEMBER 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 Dec-2023
	Coal	Tons	2 260 000	581 118
	Fuel Oil	Tons	5 000	10334.170
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Indicative Production Rate Dec-2023
	Energy	GWh	3 062 304	951 963
	Ash	Tons	770 000	193 512.294
	RE Ash	kg/MWh	not specified	1.042

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)	18.620
Sulphur Content	%	<1 (%)	0.680
Ash Content	%	40 (%)	33.300

3 EMISSION LIMITS (mg/Nm³)

Associated Unit/Stack	PM	SO <sub>2</sub>	NO <sub>x</sub>
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 Dec-2023	Technology Type	SO <sub>2</sub> Utilization Dec-2023
Unit 1	ESP + SO <sub>2</sub>	99.441%	SO <sub>2</sub>	0.0%
Unit 2	ESP + SO <sub>2</sub>	99.028%	SO <sub>2</sub>	0.0%
Unit 3	ESP + SO <sub>2</sub>	Off-line	SO <sub>2</sub>	Off-line
Unit 4	ESP + SO <sub>2</sub>	99.256%	SO <sub>2</sub>	0.0%
Unit 5	ESP + SO <sub>2</sub>	99.544%	SO <sub>2</sub>	0.0%
Unit 6	ESP + SO <sub>2</sub>	Off-line	SO <sub>2</sub>	Off-line

There is no value for SO<sub>2</sub> Utilization for Dec-2023 due to switch failure on the server however we are in a process of retrieving the lost data.

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

#### 5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO <sub>2</sub>	NO	O <sub>3</sub>
Unit 1	95.8	92.6	95.8	89.5
Unit 2	44.7	92.0	96.6	73.9
Unit 3	Off	Off	Off	Off
Unit 4	100.0	99.8	99.3	39.0
Unit 5	89.2	99.6	100.0	100.0
Unit 6	Off	Off	Off	Off

Note: NO<sub>x</sub> emissions is measured as NO in PPM. Final NO<sub>x</sub> value is expressed as total NO<sub>2</sub>.

#### 6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of December 2023

Associated Unit/Stack	PM (tons)	SO <sub>2</sub> (tons)	NO <sub>x</sub> (tons)
Unit 1	194.4	2 108	956
Unit 2	270.7	1 844	838
Unit 3	Off	Off	Off
Unit 4	303.5	1 929	1 051
Unit 5	234.1	2 622	1 140
Unit 6	Off	Off	Off
SUM	1 002.65	8 504	3 986

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

Associated Unit/Stack	Normal	Grace	Section 30	Contraven-tion	Total Exceedance	Average PM (mg/Nm³)
Unit 1	17	4	0	6	10	125.6
Unit 2	0	4	0	15	19	321.1
Unit 3	Off	Off	Off	Off	Off	Off
Unit 4	12	6	0	8	14	267.1
Unit 5	9	4	0	6	10	140.3
Unit 6	Off	Off	Off	Off	Off	Off
SUM	38	18	0	35	53	

Table 6.3: Operating days in compliance to SO<sub>2</sub> AEL Limit - December 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contraven-tion	Total Exceedance	Average SO <sub>2</sub> (mg/Nm³)
Unit 1	31	0	0	0	0	1 247.5
Unit 2	23	0	0	0	0	1 841.8
Unit 3	Off	Off	Off	Off	Off	Off
Unit 4	27	0	0	0	0	1 458.1
Unit 5	31	0	0	0	0	1 549.5
Unit 6	Off	Off	Off	Off	Off	Off
SUM	112	0	0	0	0	

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

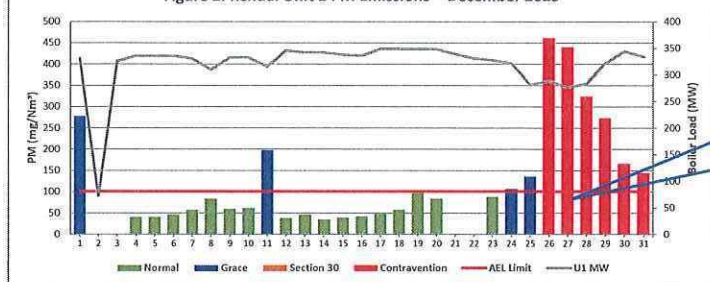
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm <sup>3</sup> )
Unit 1	31	0	0	0	0	561.0
Unit 2	23	0	0	0	0	819.2
Unit 3	Off	Off	Off	Off	Off	Off
Unit 4	27	0	0	0	0	785.9
Unit 5	31	0	0	0	0	673.5
Unit 6	Off	Off	Off	Off	Off	Off
SUM	112	0	0	0	0	

Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO<sub>2</sub>.

Table 6.5: Legend Description

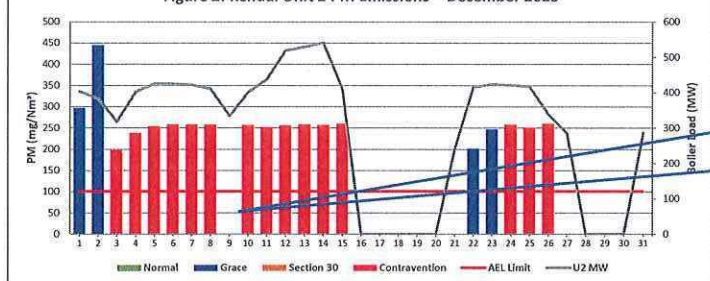
Condition	Colour	Description
Normal	GREEN	Emissions below Emission Limit Value (ELV)
Grace	BLUE	Emissions above the ELV during grace period
Section 30	ORANGE	Emissions above ELV during a NEMA S30 incident
Contravention	RED	Emissions above ELV but outside grace or S30 incident conditions

Figure 1: Kendal Unit 1 PM Emissions - December 2023



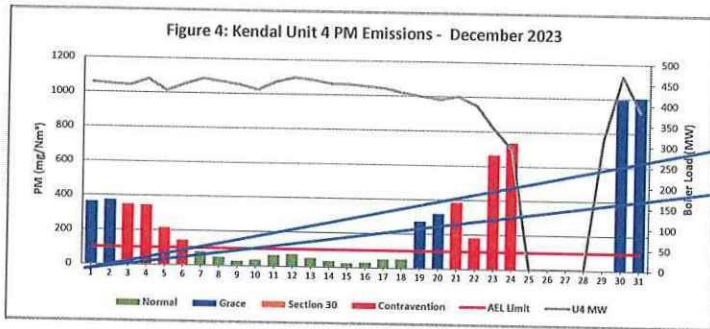
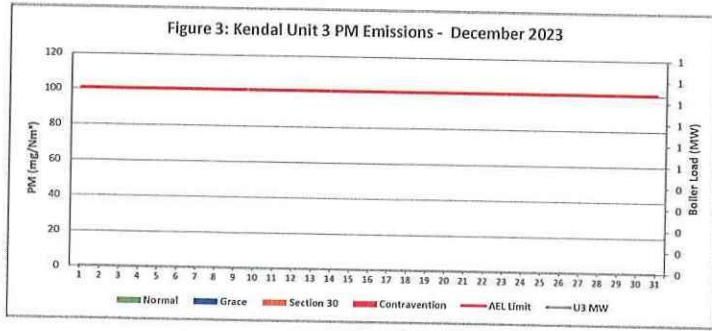
High emissions can be attributed to Stream 1 1st roll conv motor that failed.  
All precip conv hopper knife gates closed from 1-7 21 to 24 knife gate closed due to 1st collecting conveyor that is o/c for motor repair.  
Mills are underperforming - Unit on Fuel support  
Ash backlogs on PC13,23,24  
DHP off due to compartment 20 level high  
Precip chain conveyor 11 to 24 stop due to Compartment 10 full

Figure 2: Kendal Unit 2 PM Emissions - December 2023

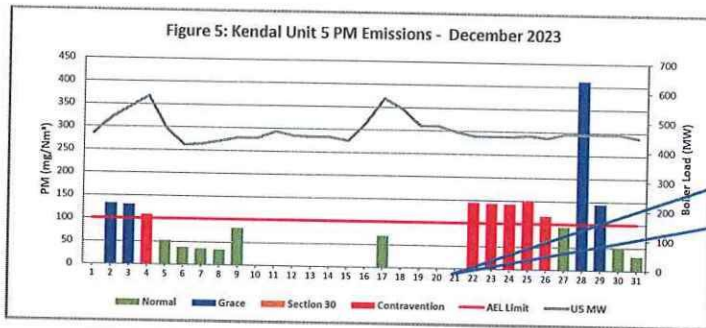


High emissions can be attributed to Precip Field not performing. Unit on light up condition - cold start, Unit trip on flame failure.  
DHP Standing - top bankers full, Compartments full, close of knife gates - ash backlogs  
PCP 11 & 13 overloaded and choked,  
No standby stream, Pcp11to14 standing due to S1 1st collector gearbox failed.





High PM emissions can be attributed to Ash Spreader not available due to link gearbox shaft pin damaged. Ash Stacker is on standby. DHP Standing with all R/gates shut, DHP not running due to both streams not available due to bucket elevator choked. Not ashing - ash backlogs FI1,21,12,22,31,41,32,42 are affected by ash backlogs, CE rappers no 1, 2 tripping on overload on both casings, High ash hopper levels.



High PM emissions can be attributed to Ash Spreader not available due to link gearbox shaft pin damaged. Ash Stacker is on standby. PCC 21,22,23 & 24 off due to stream 2 B/E that choked, Dhp is standing on the LHS Pcp11-14 standing, 2nd collecting conveyor has tripped. 00ETK24 coupling broken, ashing to E dump, Ash Spreader a/c Stacker stream off due 00ETK24 headstation cleaning.

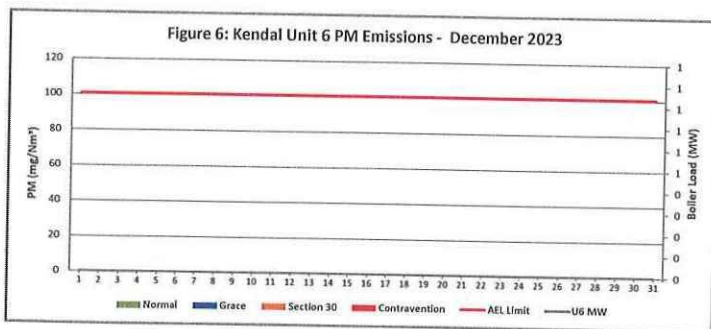


Figure 7: Kendal Unit 1 SO<sub>2</sub> Emissions - December 2023

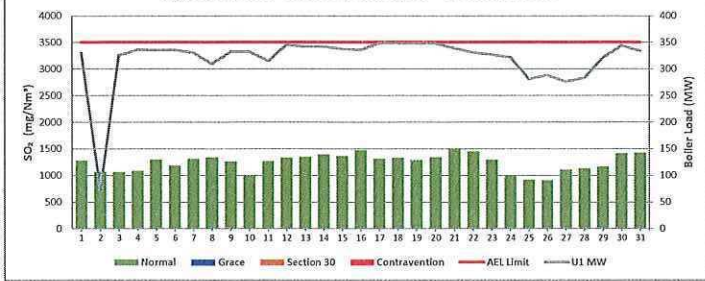


Figure 8: Kendal Unit 2 SO<sub>2</sub> Emissions - December 2023

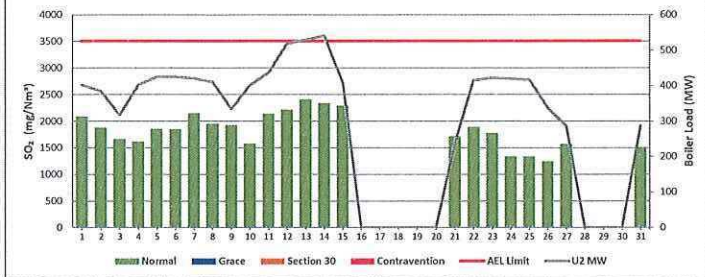
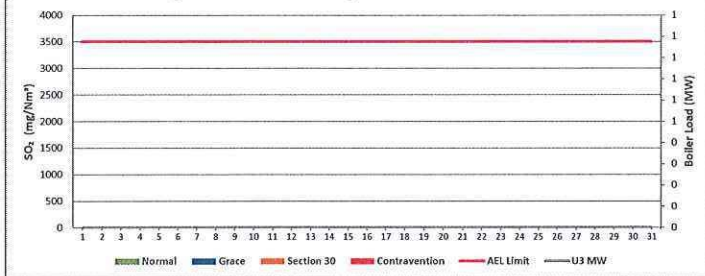


Figure 9: Kendal Unit 3 SO<sub>2</sub> Emissions - December 2023



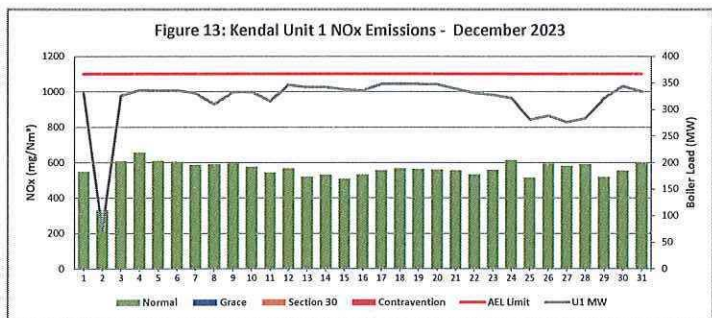
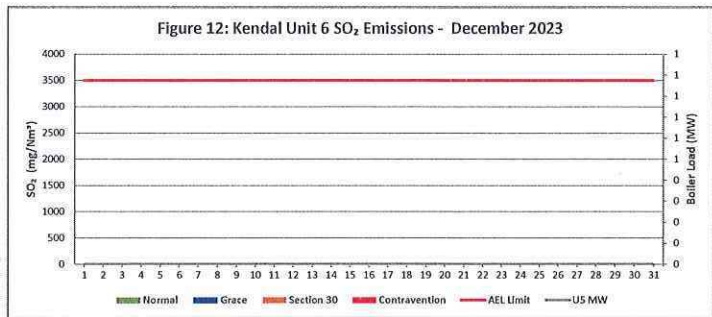
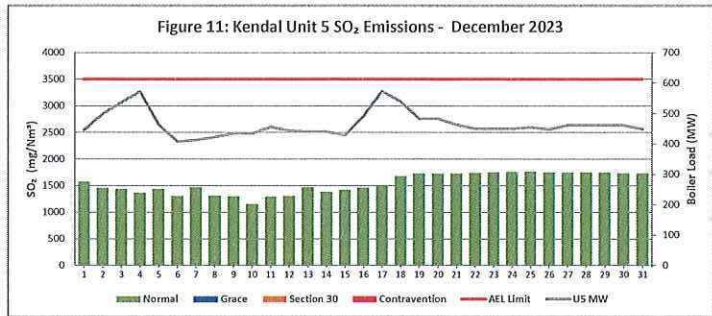
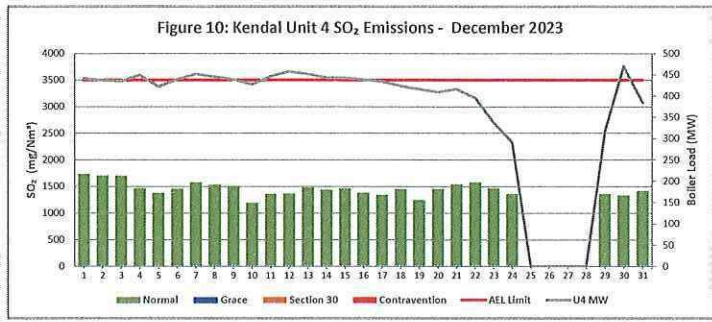




Figure 14: Kendal Unit 2 NOx Emissions - December 2023

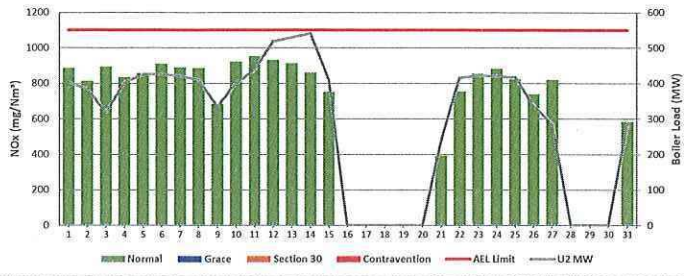


Figure 15: Kendal Unit 3 NOx Emissions - December 2023

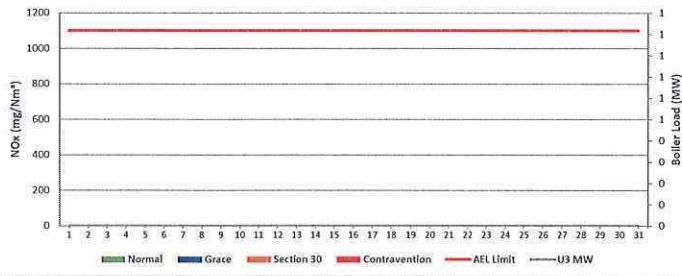


Figure 16: Kendal Unit 4 NOx Emissions - December 2023

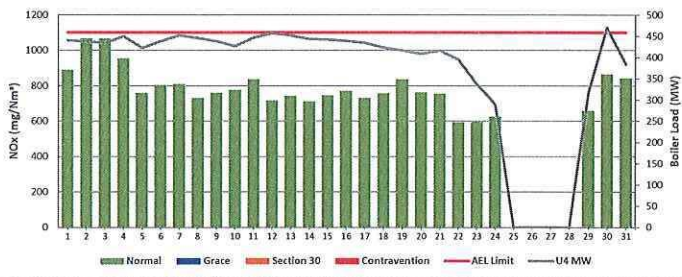


Figure 17: Kendal Unit 5 NOx Emissions - December 2023

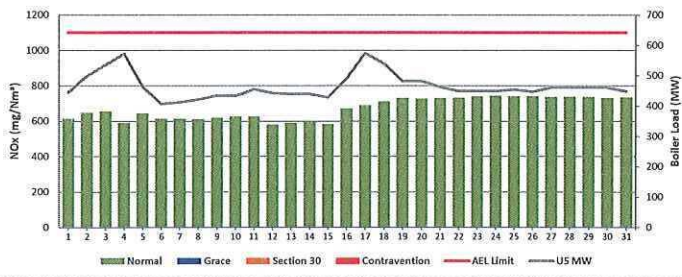
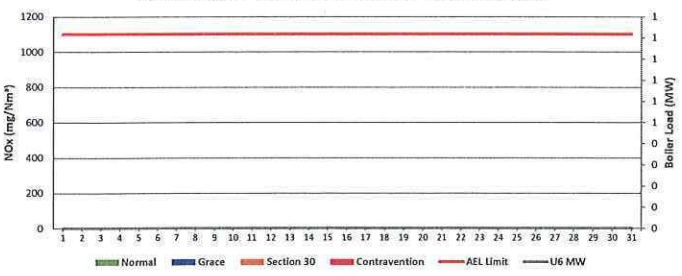


Figure 18: Kendal Unit 6 NOx Emissions - December 2023



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

## 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:

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

#### 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 and 2 monitors maxed out, meaning the emission were higher than what the monitor was correlated for. In which case we use surrogate values.
- 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 on the 1st and 11th, U2 on the 1st - 8th & 10th -15th & 23 to 26th. Figures were restated based on the surrogate value determination that Kendal conducted.
- **Unit 1**
- Findings: The high emissions can be attributed to Stream 1 1st coll conv motor that failed.
- All precip conv hopper knife gates closed from 1- 7 21 to 24 knife gate closed due to 1st collecting conveyor that is o/c for motor repair. Mills are underperforming - Unit on Fuel support Ash backlogs on PC13,23,24, DHP off due to compamt 20 level hig, Precipt chain conveyor 11 to 24 stop due to Compartment 10 full
- Resolution: Plant repaired
- **Unit 2**
- Findings: The high emissions can be attributed to Precip Field not performing. Unit on light up condition - cold start, Unit trip on flame failure. DHP Standing - top bankers full, Compartments full, close of knife gates - ash backlogs. PCP 11 & 13 overloaded and choked, No standby stream, Pcp11to14 standing due to S1 1st collector gearbox failed.
- Resolution: Plant repaired.
- **Unit 3** is on Outage
- **Unit 4**
- Findings: High PM emissions can be attributed to Ash Spreader not available due to link gearbox shaft pin damaged.
- Ash Stacker is on standby. DHP Standing with all k/gates shut, DHP not running due to both streams not available due to bucket elevator choked Not ashing - ash backlogs. F11,21,12,22,31,41,32,42 are affected by ash backlogs, -CE rappers no 1, 2 tripping on overload on both casings, High ash hopper levels.
- Resolution: Plant repaired.
- **Unit 5**
- Findings: High PM emissions can be attributed attributed Ash Spreader not available due to link gearbox shaft pin damaged. Ash Stacker is on standby. PCC 21,22,23 & 24 off due to stream 2 B/E that choked, Dhp is standing on the LHS Pcp11-14 standing, 2nd collecting conveyor has tripped. 00ETK24 coupling broken, ashing to E dump, Ash Spreader o/c. Stacker stream off due 00ETK24 headstation cleaning.
- Resolution: Plant repaired.
- **Unit 6** is on Outage.