Eskom

JUNE 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 Jun-2022
	Coal	Tons	*2 260 000*	*2 419 326*
	Fuel Oil	Tons	*5 000*	*3248.63*
Production Rates	**Product / By-Product Name**	**Units**	**Maximum Production Capacity Permitted**	**Production Rate Jun-2022**
	Energy	GWh(MW)	*(3,153,600)4380*	*1 539 056.00*
	Ash	Tons	*770 000*	*764 990.8*
	RE Ash	kg/MWh	*not specified*	*2.660*

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	*<1 (%)*	*0.800*
Ash Content	%	*40 (%)*	*31.620*

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 Jun-2022	Technology Type	SO_3 Utlization Jun-2022
Unit 1	*ESP + SO_3*	*99.7%*	*SO_3*	*0.0%*
Unit 2	*ESP + SO_3*	*94.8%*	*SO_3*	*0.0%*
Unit 3	*ESP + SO_3*	*100.0%*	*SO_3*	*0.0%*
Unit 4	*ESP + SO_3*	*98.5%*	*SO_3*	*0.0%*
Unit 5	*ESP + SO_3*	*99.9%*	*SO_3*	*0.0%*
Unit 6	*ESP + SO_3*	*99.4%*	*SO_3*	*0.0%*

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

Unit 1 -6 sulphur utilization readings not available because CAPDATAA04 and CAPDATAA05 failed. The hardware is being replaced.

5 MONITOR RELIABILITY (%)

SO_3

Associated Unit/Stack	PM	SO_2	NO	O_2
Unit 1	*69.0*	*98.3*	*98.5*	*99.4*
Unit 2	*18.8*	*27.5*	*26.0*	*36.7*
Unit 3	*99.3*	*86.0*	*100.0*	*98.9*
Unit 4	*100.0*	*100.0*	*98.9*	*66.8*
Unit 5	*89.2*	*99.7*	*99.8*	*100.0*
Unit 6	*94.5*	*100.0*	*100.0*	*100.0*

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

Note: Unit 2 SO2, NO and O2, Unit3 NO and Unit4 O2 monitor realiabilitys is low due to defective monitors. Unit 1 and Unit 2 PM monitor reliability is low due to monitors maxing out.

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of June 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	167.0	4 139	1 342
Unit 2	1 170.3	2 034	805
Unit 3	12.2	2 712	1 103
Unit 4	588.2	3 057	775
Unit 5	300.4	2 337	786
Unit 6	234.4	3 045	1 295
SUM	2 472.52	17 324	6 107

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	17	2	11	0	13	115.6
Unit 2	0	2	15	0	17	1 701.9
Unit 3	25	4	1	0	5	67.8
Unit 4	14	2	14	0	16	544.4
Unit 5	15	4	5	0	9	322.3
Unit 6	13	6	9	0	15	148.8
SUM	**84**	**20**	**55**	**0**	**75**	

Table 6.3: Operating days in compliance to SO_2 AEL Limit - June 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm³)
Unit 1	29	0	0	1	1	2 838.8
Unit 2	20	0	0	0	0	1 562.1
Unit 3	30	0	0	0	0	1 848.1
Unit 4	30	0	0	0	0	2 210.7
Unit 5	24	0	0	0	0	1 843.8
Unit 6	28	0	0	0	0	2 211.0
SUM	**161**	**0**	**0**	**1**	**1**	

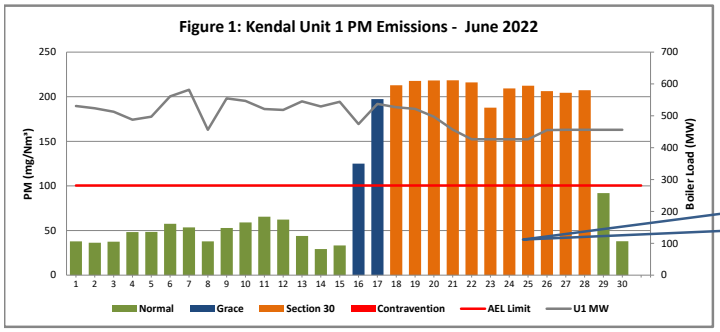
Table 6.4: Operating days in compliance to NOx AEL Limit - June 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	29	0	0	1	1	929.4
Unit 2	20	0	0	0	0	616.7
Unit 3	30	0	0	0	0	754.2
Unit 4	30	0	0	0	0	550.6
Unit 5	24	0	0	0	0	614.0
Unit 6	19	0	0	9	9	938.2
SUM	**152**	**0**	**0**	**10**	**10**	

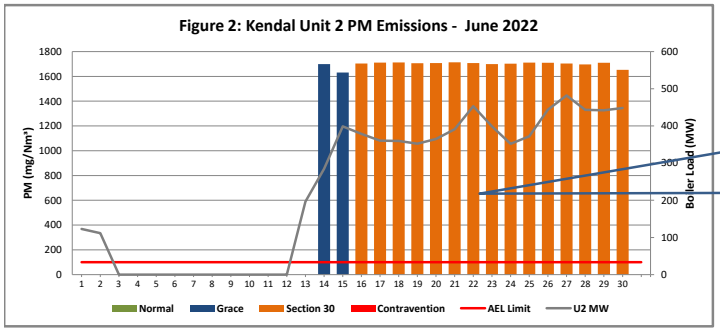
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

Table 6.5: Legend Description

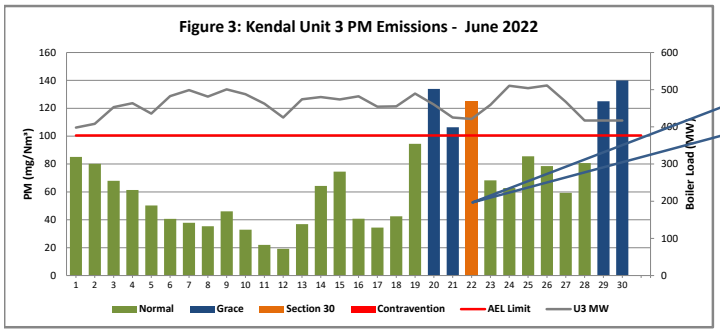
Condition	Colour	Description
Normal		Emissions below Emission Limit Value (ELV)
Grace		Emissions above the ELV during grace period
Section 30		Emissions above ELV during a NEMA S30 incident
Contravention		Emissions above ELV but outside grace or S30 incident conditions



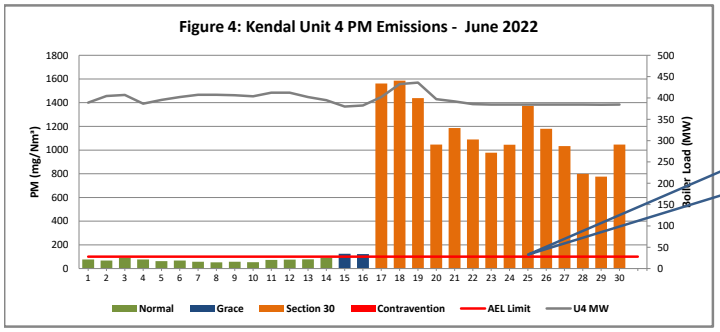
Unit 1 dust emissions can be attributted to ash backlogs, All knife gates closed due to DHP compartments full, choked pricip conveyor 13, 14 and 21, SO3 plant trip due to low sulphur flow.



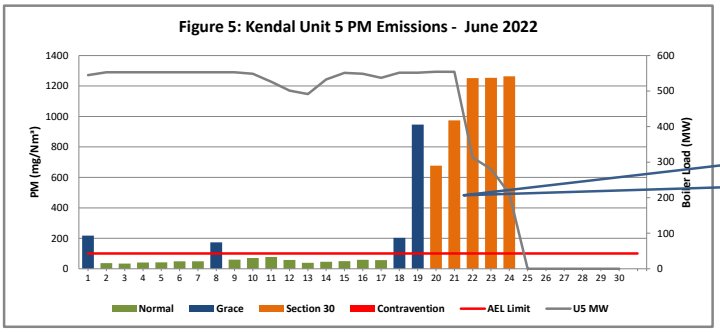
High emissions 0n the 1st to the 2nd and 13th to the 15th can be attributted light up condition and from the 16th the high emissions can be attributed All precip conveyor off and all hopper knife gates fully closed due to high compartments levels, DHP off due to stream 1 second collecting conveyor motor cable off, DHP off due to ash leakages,DHP trip due to bunker conveyor limit lost, SO3 plant off due to low back end temperatures.



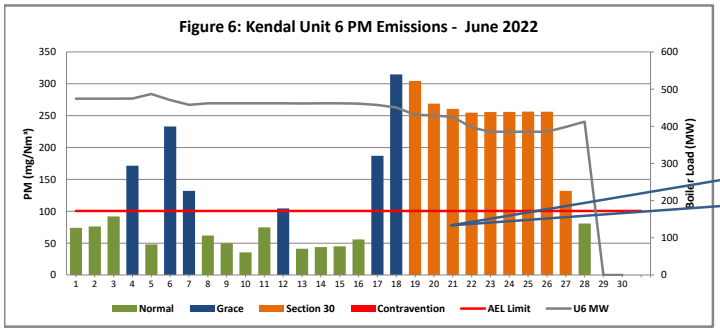
High PM emissions can be attributed to DHP trip due to compartment levels high. SO3 plant that kept on tripping due converter high temperature.



High PM emissions can be attributed to Ash backlogs, DHP off due to compartments levels high, SO3 plant on hold mode due sulphur temperature low, Precip chain conveyor 11, 12,21,22,23,24 checked in. SO3 plant on hold mode due to low precip inlet temp.



High PM emissions can be attributed to DHP tripped due to high compatment levels. SO3 plant on hold mode due to no suphur flow, low precip inlet temp



High PM emissions can be attributed to precip conveyor off due to closed limit fault.SO3 plant on hold mode due to low precip inlet temp.DHP off due to high compatment levels resulting to ash backlogs.

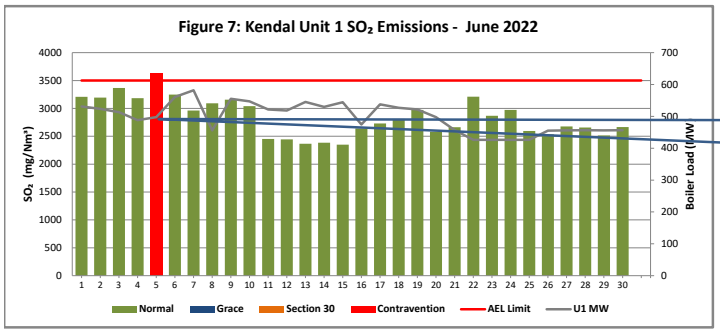


Figure 7: Kendal Unit 1 SO₂ Emissions - June 2022
SO₂ (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

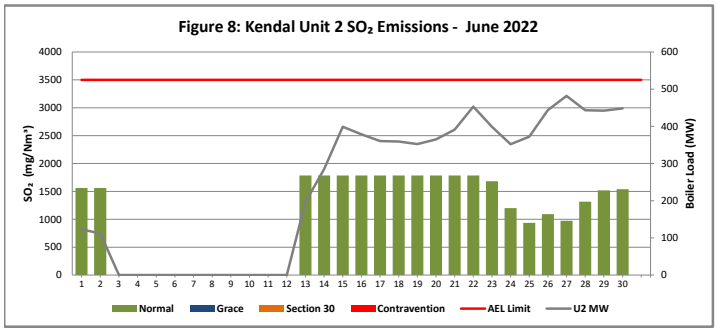


Figure 8: Kendal Unit 2 SO₂ Emissions - June 2022
SO₂ (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

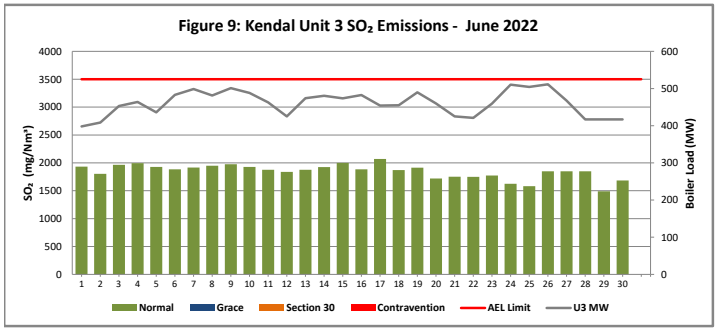


Figure 9: Kendal Unit 3 SO₂ Emissions - June 2022
SO₂ (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

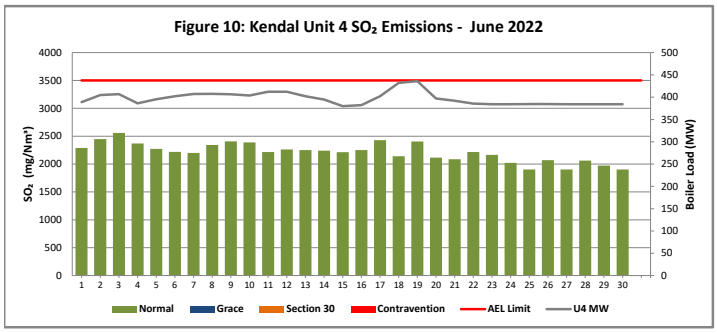


Figure 10: Kendal Unit 4 SO_2 Emissions - June 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

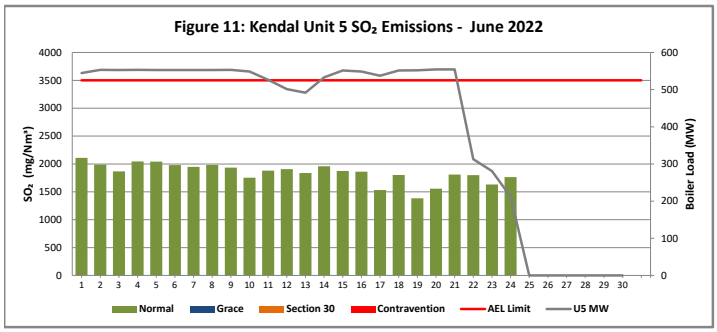


Figure 11: Kendal Unit 5 SO_2 Emissions - June 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

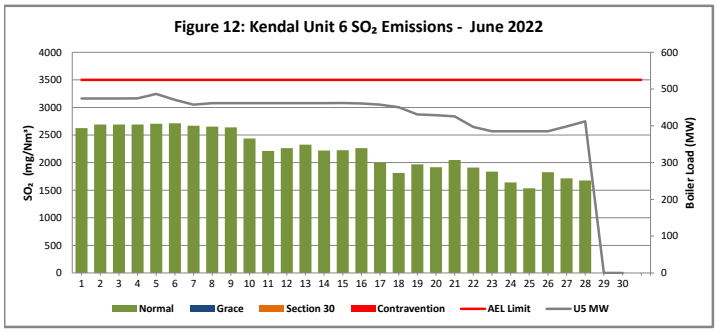


Figure 12: Kendal Unit 6 SO_2 Emissions - June 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW

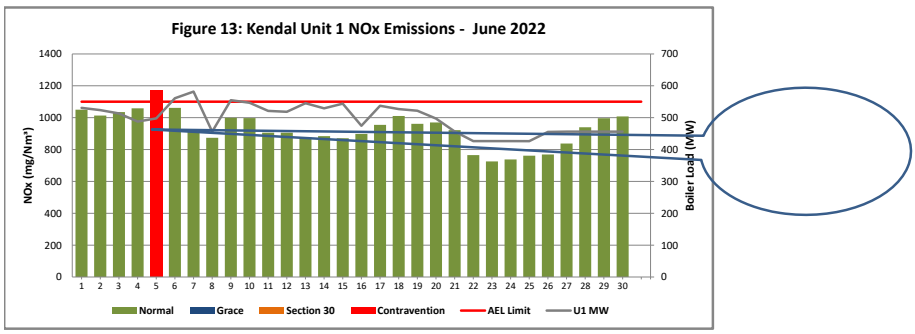


Figure 13: Kendal Unit 1 NOx Emissions - June 2022
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

Figure 14: Kendal Unit 2 NOx Emissions - June 2022

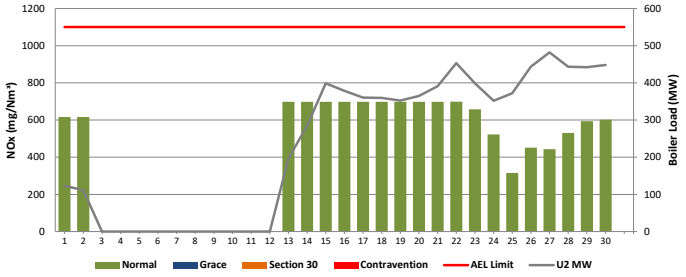


Figure 15: Kendal Unit 3 NOx Emissions - June 2022

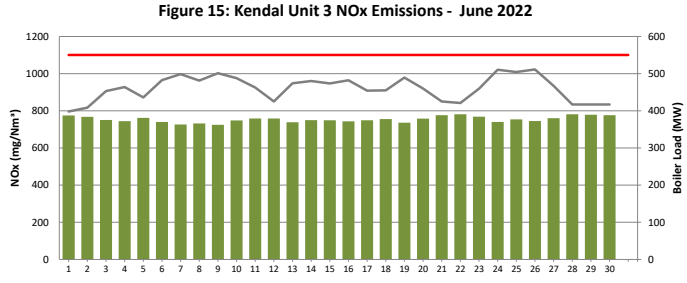


Figure 16: Kendal Unit 4 NOx Emissions - June 2022

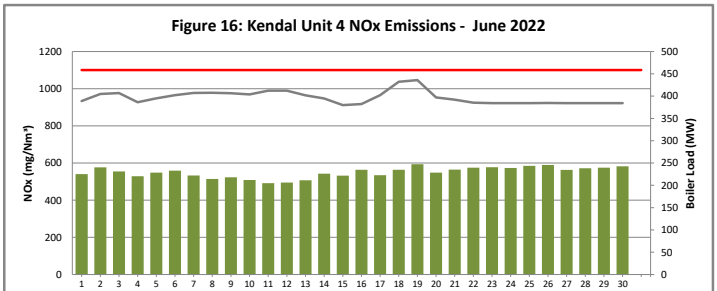


Figure 17: Kendal Unit 5 NOx Emissions - June 2022

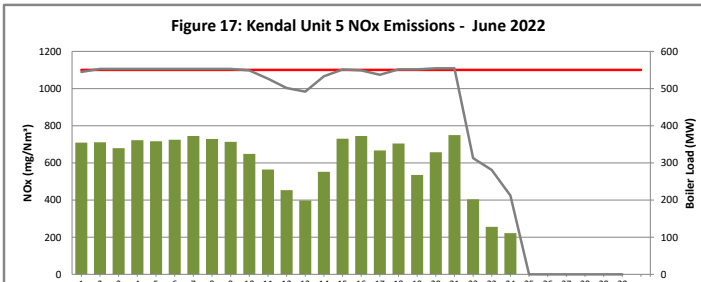
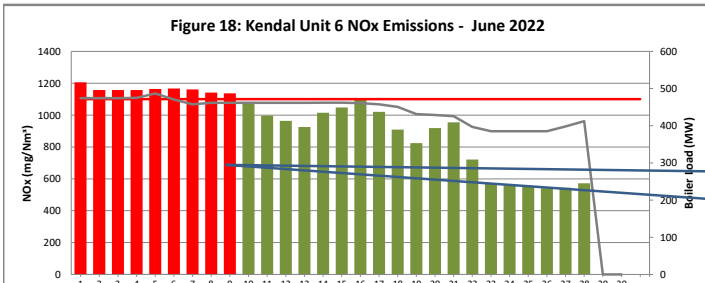


Figure 18: Kendal Unit 6 NOx Emissions - June 2022



Unit 6 high NOx emissions can attribute to burner tils and dampers which were not in correct position and defective O2 monitor.

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

$\boldsymbol{\eta}$ = (1 – $(Output/Input)$)x 100

$\boldsymbol{\eta}$ = 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 98% reliability is compared to the dust concentration signal. If the dust concentration signal is above 98% 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 98%/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
- Avarage emissions for Unit 2 pressure was used from the QAL2 parallel report due to defective analysers.
- Avarage emissions for Unit 1 and 2 SOx and NOx and Unit 3 NOx was used from QAL 2 report.
- Avarage emissions for U2 Temp and Pressure from the 13th to the 24th was used from QAL2 report.
- Unit 6 high NOx emissions can attribute to burner tils and dampers which were not in correct position and defective O2 monitor.
-
- Unit 1
- Findings: The high emissions can be attributed to ash backlogs, all knife gates closed due to DHP compartments full, choked pricip conveyor 13, 14 and 21 and SO3 plant trip due to low sulphur flow.
- Resolution: Plant repaired

- Unit 2
- Findings: The high emissions can be attributed to light up condition 1st to the 2nd and 13th to the 15th and from the 16th the high emissions can be attributed All precip conveyor off and all hopper knife gates fully closed due to high compartments levels, DHP off due to stream 1 second collecting conveyor motor cable off, DHP off due to ash leakages,DHP trip due to bunker conveyor limit lost, SO3 plant off due to low back end temperatures.
- Resolution: Plant repaired.

- Unit 3
- Findings: The high PM emissions can be attributed to DHP trip due to compartment levels high. SO3 plant that kept on tripping due converter high temperature.
- Resolution: The DHP was returned back to service after repairs.

- Unit 4
- Findings: High PM emissions can be attributed to Ash backlogs, DHP off due to compartments levels high, SO3 plant on hold mode due sulphur temperature low, Precip chain conveyor 11, 12,21,22,23,24 checked in. SO3 plant on hold mode due to low precip inlet temp.
- Resolution: The plant was repaired.

- Unit 5
- Findings: High PM emissions can be attributed to DHP tripped due to high compatment levels. SO3 plant on hold mode due to no suphur flow, low precip inlet temp.
- Resolution: The plant was repaired.

- Unit 6
- Findings: High PM emissions can be attributed to precip conveyor off due to closed limit fault.SO3 plant on hold mode due to low precip inlet temp.DHP off due to high compatment levels resulting to ash backlogs.
- Resolution: The plant was repaired.