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Date
31 May 2021

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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 APRIL 2021.

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:



Tshilidzi Vilane
ENVIRONMENTAL OFFICER- KENDAL

Date: 31-05-2021

Supported by:



Solly Chokoe
ACTING ENVIRONMENTAL MANAGER- KENDAL

Date: 31-05-2021

KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTHS OF APRIL 2021.

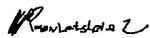
Verified by:



Hono Malatsi
SENIOR TECHNICIAN BOILER ENGINEERING- KENDAL

Date: 2021/05/31

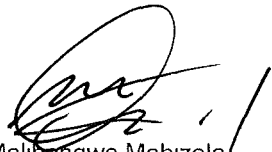
Validated by:



Tendani Rasivhetshela
ACTING BOILER ENGINEERING MANAGER-KENDAL

Date 31/05/2021

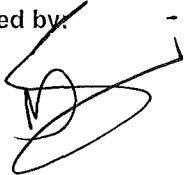
Supported by:



Malibongwe Mabizela
ACTING ENGINEERING MANAGER-KENDAL

Date 31/05/2021

Approved by:



Yangaphe Ngcashi
GENERAL MANAGER-KENDAL

Date 2021.05.31

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 Apr-2021
	Coal	Tons	2 260 000	682 692
Fuel Oil	Tons	5 000	407,5	

Production Rates	Product / By-Product Name	Units	Max. Permitted Rate (Monthly)	Production Rate Apr-2021
	Energy	GWh(MW)	3258 (4380)	1 128 269,00
Ash	Tons	Not specified	235 392,2	
RE Ash	kg/MWh	Not specified	0,260	

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0,770
Ash Content	%	40 (%)	34,480

3 EMISSION LIMITS (mg/Nm³)

Associated Unit/Stack	PM	SO _x	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 ABATEMET TECHNOLOGY (%)

Associated Unit/Stack	Technology Type	Efficiency Apr-2021	Technology Type	Utilization Apr-2021
Unit 1	ESP + SO ₃	99,9%	SO ₃	91,8%
Unit 2	ESP + SO ₃	99,8%	SO ₃	96,7%
Unit 3	ESP + SO ₃	99,7%	SO ₃	98,9%
Unit 4	ESP + SO ₃	99,9%	SO ₃	98,7%
Unit 5	ESP + SO ₃	Unit off	SO ₃	Unit off
Unit 6	ESP + SO ₃	Unit off	SO ₃	Unit off

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

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO ₂	NO	O ₂
Unit 1	100,0	0,0	0,0	0,0
Unit 2	80,2	0,0	0,0	0,0
Unit 3	98,9	98,2	98,9	98,9
Unit 4	72,7	0,0	0,0	95,2
Unit 5	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off

Note 1: Unit 4 dust monitor reliability is at 72.7% because of the faulty monitor on the 08th to the 16th and on the 25th to 26th because of the power cables not available, therefore an average emissions available in the months was used.

Note 2: For unit 2 Gaseous Monitor's readings are available but parallel test not yet completed since the repairs thus previous parallel tests data was used

Note 3: Parallel test on unit 4 is completed and factors were implemented however monitor data is not available and QAL2 data was used hence the reliability is also at 0%

6 EMISSION PERFORMANCE

Table 6 1 Monthly tonnages for the month of April 2021

Associated Unit/Stack	PM (tons)	SO ₂ (tons)	NO _x (tons)	CO ₂ (tons)
Unit 1	81.7	4 417	1 569	455 205
Unit 2	83.3	3 698	1 634	283 949
Unit 3	66.4	2 169	547	181 349
Unit 4	69.2	3 514	1 195	291 622
Unit 5	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off
SUM	300.50	13 798	4 945	1 212 125

Table 6 2 Operating days in compliance to PM AEL Limit - April 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm ³)
Unit 1	30	0	0	0	0	39.9
Unit 2	26	2	0	0	2	63.2
Unit 3	14	4	0	0	4	88.7
Unit 4	26	1	0	0	1	49.9
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
SUM	96	7	0	0	7	

Table 6 3 Operating days in compliance to SO_x AEL Limit - April 2021

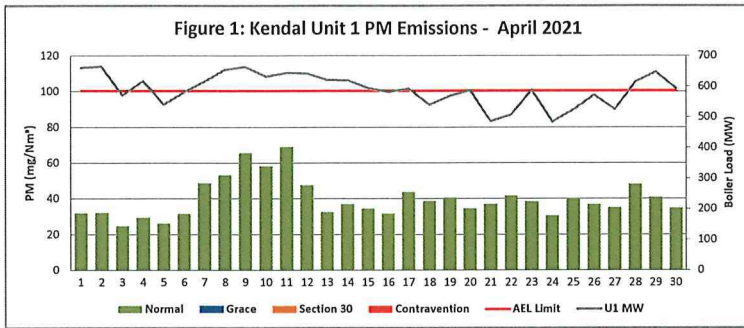
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO _x (mg/Nm ³)
Unit 1	30	0	0	0	0	1 920.2
Unit 2	28	0	0	0	0	2 467.7
Unit 3	18	0	0	0	0	2 097.9
Unit 4	29	0	0	0	0	2 104.7
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
SUM	105	0	0	0	0	

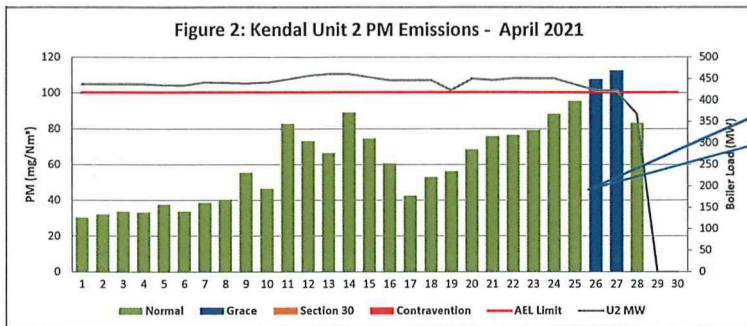
Table 6.4: Operating days in compliance to NOx AEL Limit - April 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm ³)
Unit 1	30	0	0	0	0	682,1
Unit 2	28	0	0	0	0	1 090,5
Unit 3	18	0	0	0	0	526,5
Unit 4	29	0	0	0	0	716,0
Unit 5	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
Unit 6	Unit off	Unit off	Unit off	Unit off	Unit off	Unit off
SUM	105	0	0	0	0	

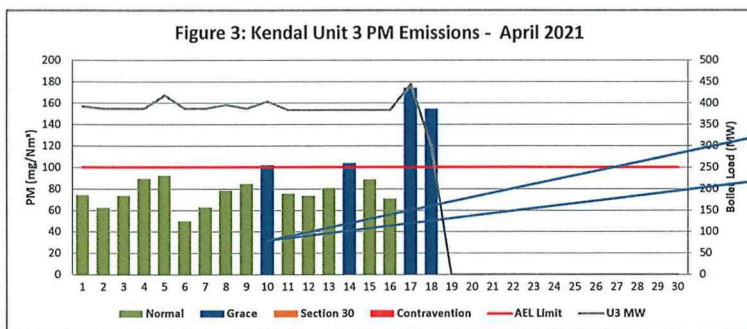
Table 6.5: Legend Description

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

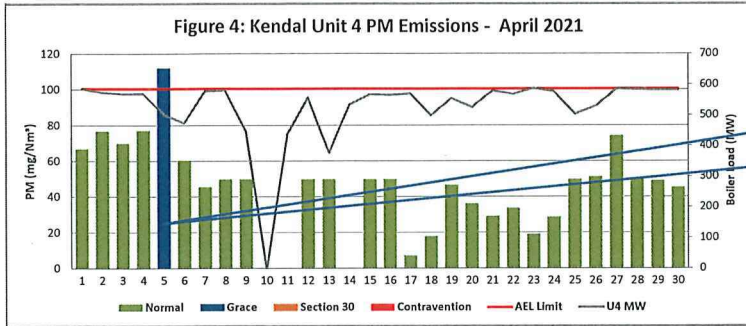




High PM emissions on 26 & 27 can be attributed to poor electrostatic precipitator fields performance and SO3 plant off due to no sulphur flow



Unit 3 high PM emissions on the 10th & 14th was due to electrostatic precipitators(ESP) underperforming and on the 14th was precip field no.23 that kept tripping, and on 17 & 18 can be attributed to six ESP fields that kept tripping on CE rappers faults and SO3 plant on hold mode



Unit 4 high PM emissions can be attributed to precip filters 1, 4, 15 & 21 internal short circuits and SO3 plant on hold mode for oil top-up

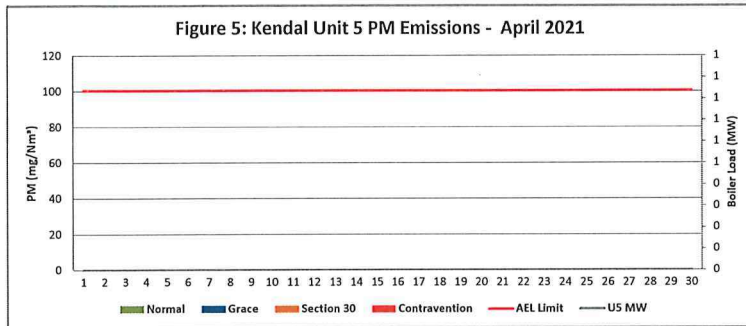


Figure 6: Kendal Unit 6 PM Emissions - April 2021

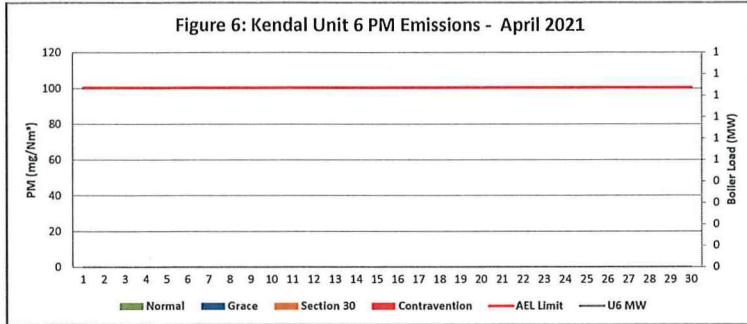
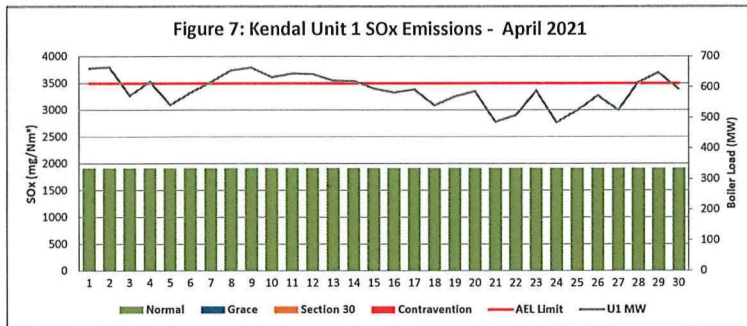
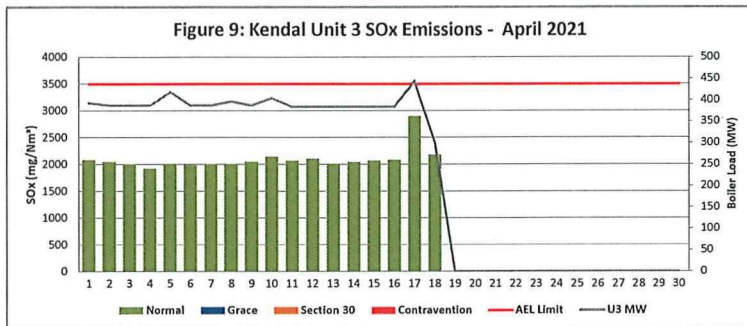
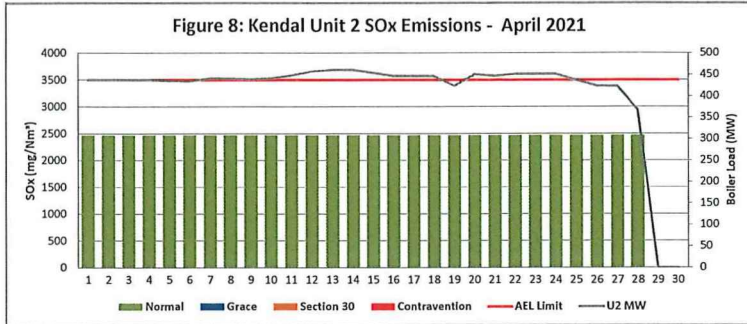


Figure 7: Kendal Unit 1 SOx Emissions - April 2021





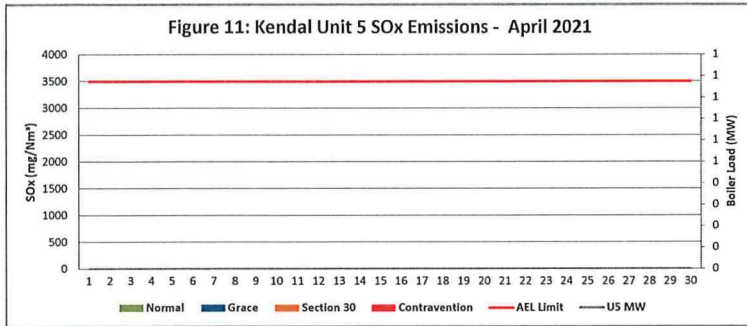
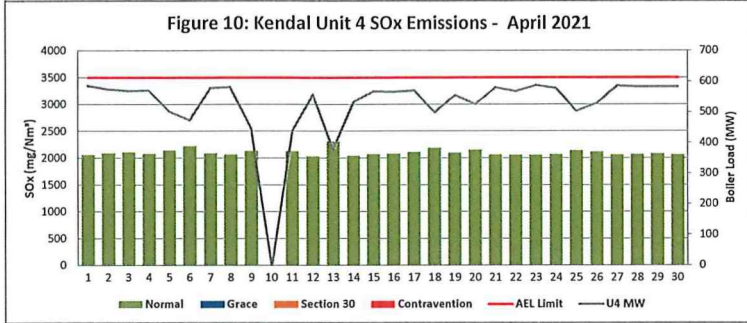


Figure 12: Kendal Unit 6 SOx Emissions - April 2021

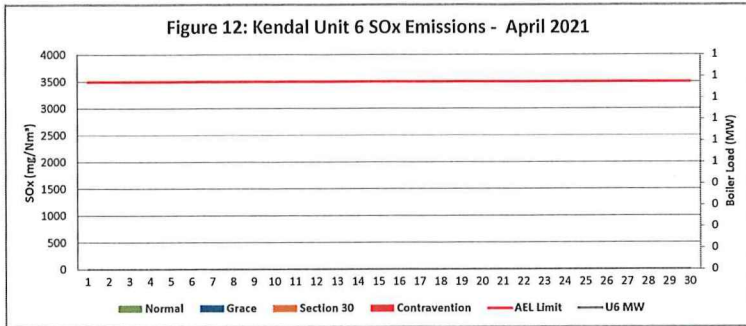


Figure 13: Kendal Unit 1 NOx Emissions - April 2021

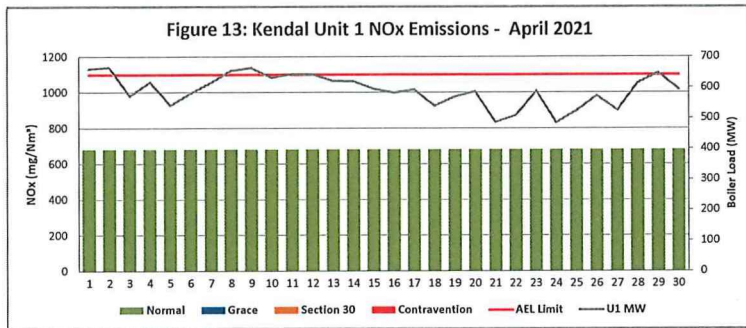


Figure 14: Kendal Unit 2 NOx Emissions - April 2021

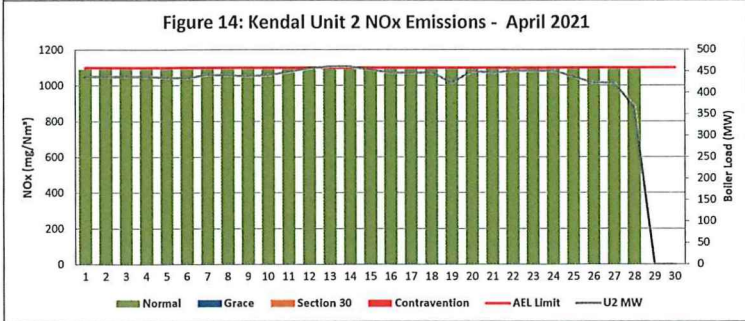
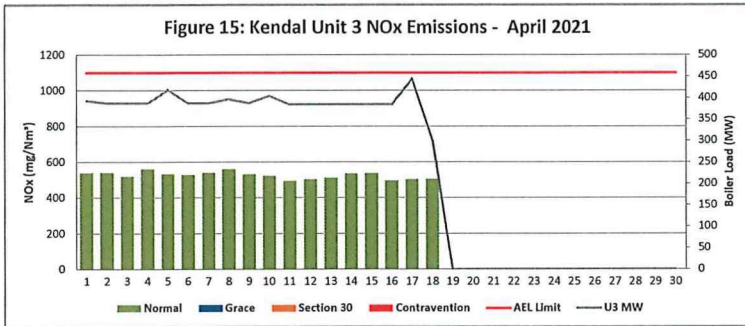


Figure 15: Kendal Unit 3 NOx Emissions - April 2021



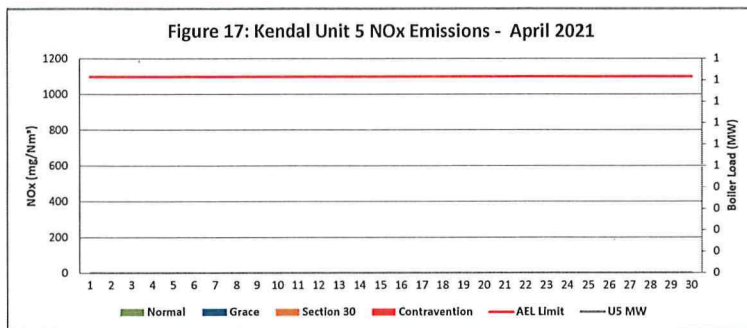
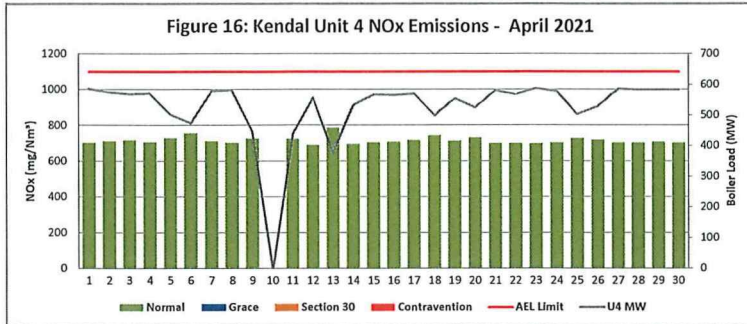
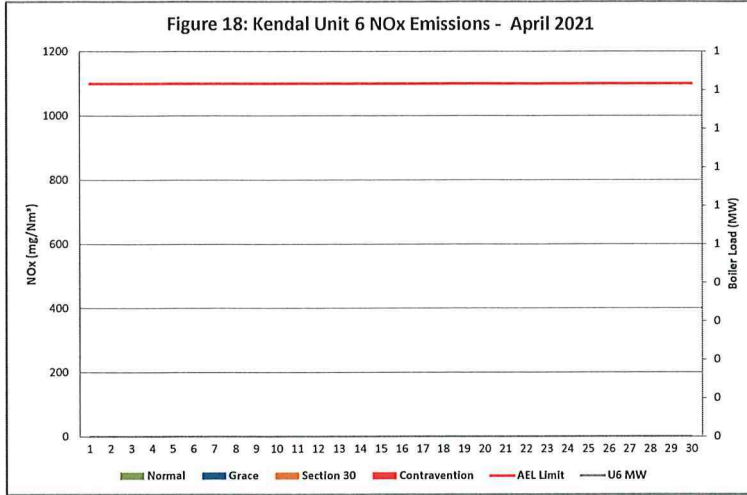


Figure 18: Kendal Unit 6 NOx Emissions - April 2021



7 COMMENTS

There were no complaints for this months

Source Code / Name	Root Cause Analysis	Calculation of Impacts / emissions associated with the incident	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 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. 24 hours. The formula is as follows

$$= (1 - (\text{count hours above 98\%/24hours})) \times 100$$

Note 1 Unit 4 dust monitor reliability is at 72.7% because of the faulty monitor on the 08th to the 16th and on the 25th to 26th because of the power cables not available, therefore an average emissions available in the months was used

Note 2 Gaseous Monitor's readings are available but parallel test not yet completed since the repairs thus previous parallel tests data was used except unit 3 monitor data was available and was used since parallel tests are also completed

Note 3 Parallel test on unit 4 is completed and factors were implemented however monitor data is not available and QAL2 data was used hence the reliability is also at 0%

Emissions Performance

- Note that gaseous emissions were manually entered using Independent third party QAL2 parallel test reports due to the unreliability of the CEMS monitors data, awaiting parallel tests to be completed, units 3&4 factors are implemented on this report, still waiting for final reports for units 1&2 that are sent back to contractor for corrections
- Average velocity values from the latest correlation report were used on the gaseous emissions on Unit 1, 2, 3 & 4 due to defective CEMS monitors and velocity correction factors were set M=1 and C=0
- Units 5 & 6 were offload during this month for repairs to address emissions issues

Unit 2

Findings

High PM emissions on 26 & 27 can be attributed to poor electrostatic precipitator fields performance and SO3 plant off due to no sulphur flow

Resolution Unit was shut down for boiler tube leak and electrostatic precipitator fields were repaired, sulphur flow was also restored

Unit 3

Unit 3 high PM emissions on the 10th & 14th was due to electrostatic precipitators (ESP) underperforming and on the 14th was precip field no 23 that kept tripping, and on 17 & 18 can be attributed to six ESP fields that kept tripping on CE rappers faults and SO3 plant on hold mode

Resolution Unit was shut down and precip fields were repaired

Unit 4

Unit 4 high PM emissions can be attributed to precip fields 14,15 & 21 internal short circuits and SO3 plant on hold mode for oil top up

Resolution SO3 plant was returned back to service after oil top up