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Date
30 August 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 JULY 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:

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Date: 30/08/2021

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Date: 30/08/2021

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

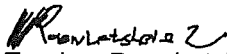
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Date: 31/08/2021

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Date 31/08/2021

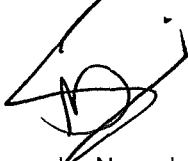
Supported by:



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Date 31/08/2021

Approved by:



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GENERAL MANAGER-KENDAL

Date 2021.08.31

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 Jul-2021
	Coal	Tons		2 260 000
Fuel Oil	Tons		2 000	1979,88

Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Jul-2021
	Energy	GWh(MW)		3062,304
Ash	Tons		770 000	285 600,5
RE Ash	kg/MWh		not specified	0,590

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0,800
Ash Content	%	40 (%)	32,670

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 Jul-2021	Technology Type	Utilization Jul-2021
Unit 1	ESP + SO ₃	99,9%	SO ₃	73,4%
Unit 2	ESP + SO ₃	99,8%	SO ₃	83,9%
Unit 3	ESP + SO ₃	99,8%	SO ₃	96,4%
Unit 4	ESP + SO ₃	99,7%	SO ₃	94,9%
Unit 6	ESP + SO ₃	Off-line	SO ₃	Off-line

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	57,3	40,5	100,0
Unit 2	100,0	100,0	99,9	99,9
Unit 3	100,0	100,0	99,7	100,0
Unit 4	85,9	99,9	99,9	99,9
Unit 5	0,0	99,7	97,6	100,0
Unit 6	Off-line	Off-line	Off-line	Off-line

Note: Unit 4 dust monitor was faulty between 13 to 16 and a monthly average was used, monthly average is still within the MES reliability threshold and therefore daily average used within those days is considered within grace period for reliability

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of July 2021

Associated Unit/Stack	PM (tons)	SO ₂ (tons)	NO _x (tons)
Unit 1	40,4	4 914	1 436
Unit 2	97,8	3 984	1 557
Unit 3	95,1	0	0
Unit 4	158,7	3 298	1 347
Unit 6	Off-line	Off-line	Off-line
SUM	391,99	12 195	4 340

Note: Unit 5 PM and Gaseous emissions are not included in the report because unit 5 is still under commission correlations and parallel tests are still not done and the last tests that were done for unit 5 have expired, therefore the CEMS instruments readings or data available for unit 5 cannot be confirmed to be valid until new correlations and parallel tests are done.

Table 6.2: Operating days in compliance to PM AEL Limit - July 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm ³)
Unit 1	29	0	0	0	0	22,0
Unit 2	20	7	0	0	7	83,7
Unit 3	18	4	2	0	6	81,6
Unit 4	16	10	2	3	15	114,8
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	83	21	4	3	28	

Table 6.3: Operating days in compliance to SOx AEL Limit - July 2021

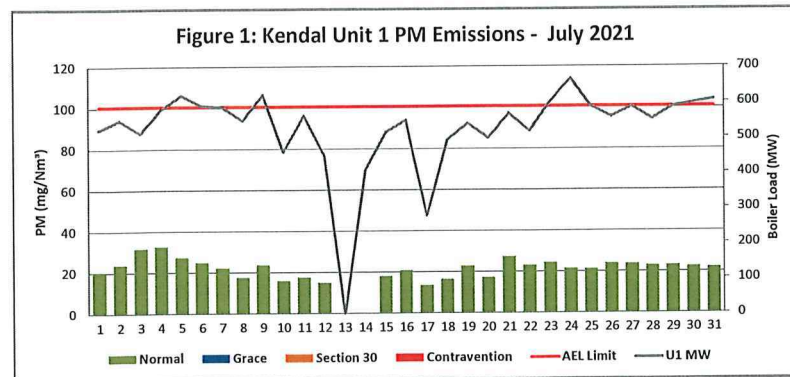
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm ³)
Unit 1	30	0	0	0	0	3 054,2
Unit 2	28	0	0	0	0	2 324,2
Unit 3	25	0	0	0	0	2 077,6
Unit 4	31	0	0	0	0	1 574,6
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	114	0	0	0	0	

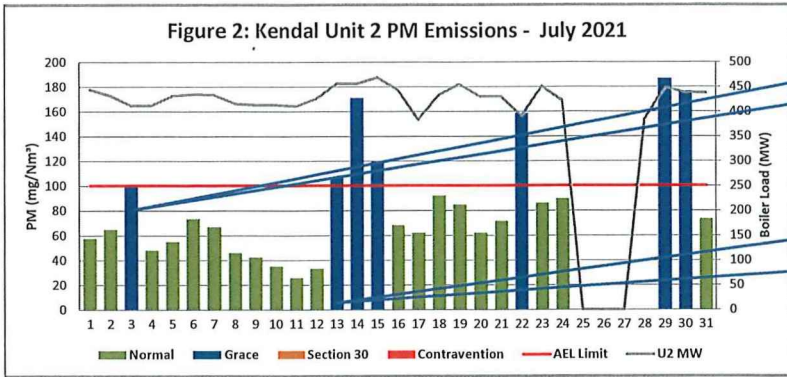
Table 6.4: Operating days in compliance to NOx AEL Limit - July 2021

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm ³)
Unit 1	30	0	0	0	0	891,9
Unit 2	28	0	0	0	0	872,5
Unit 3	25	0	0	0	0	593,2
Unit 4	31	0	0	0	0	637,3
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	114	0	0	0	0	

Table 6.5: Legend Description

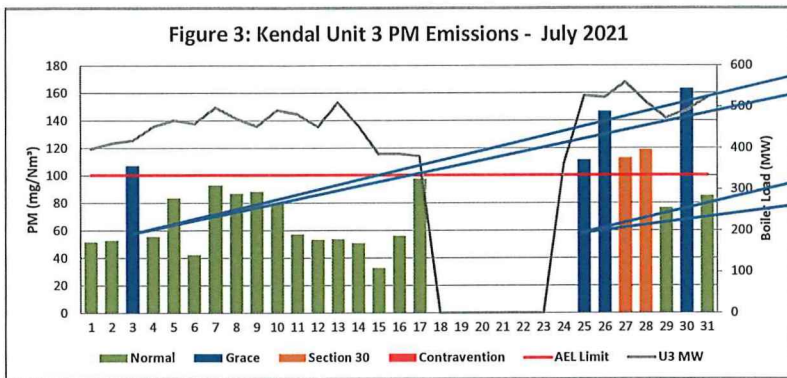
Condition	Colour	Description
Normal	Green	Emissions below Emission Limit Value (ELV)
Grace	Blue	Emissions above the ELV during grace period
Section 30	Orange	Emissions above ELV during a NEMA S30 incident
Contravention	Red	Emissions above ELV but outside grace or S30 incident conditions





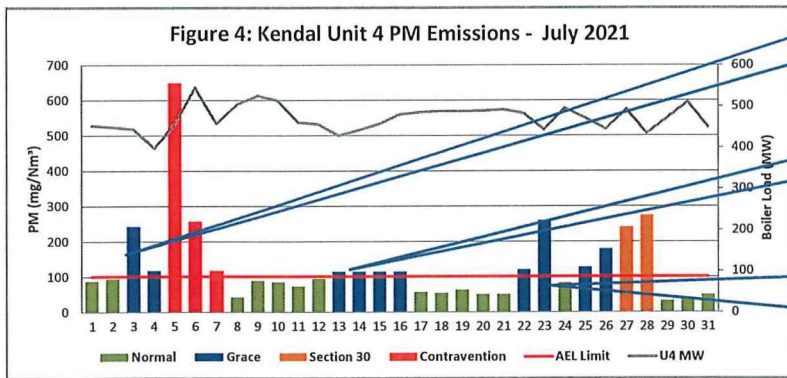
On the 03rd and the 02nd the high emissions can be attributed to Sulphur common plant supply pump failure

On the 10th the high emissions can be attributed multiple trips of the SO3 plant due low back end temperatures



the high PM emissions can be attributed to Sulphur common plant supply pump failure

High PM emissions can be attributed to ash backlogs and high back end temperatures affecting performance of SO3 plant and ESP.



On the 03rd there was a failure of common sulphur plant pump and there was a light up on the 05th

Unit 4 dust monitor was faulty from 13 to 16 and an average emissions were used

High PM emissions can be attributed to precip fields short circuits, SO3 plant off due to low back end temperatures and possibly a monitor fault

Unit 4 monitor was not working between 13 to 16 and a monthly average was used, monthly average is still within the MES reliability threshold and therefore daily average used within those days is considered within grace period for reliability

Figure 6: Kendal Unit 6 PM Emissions - July 2021

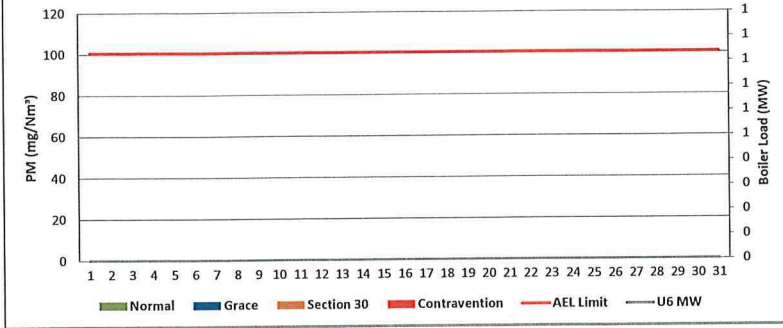
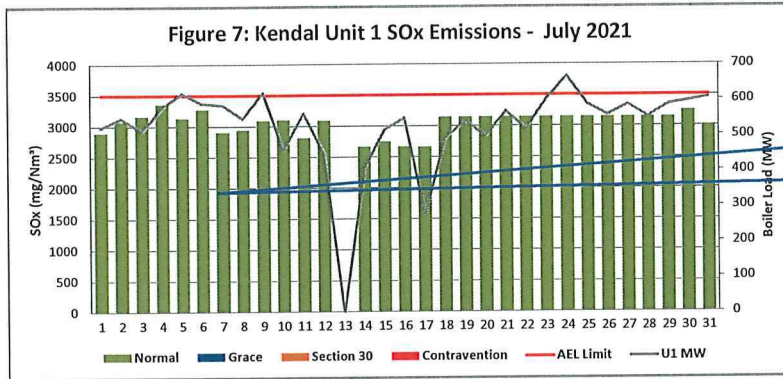


Figure 7: Kendal Unit 1 SOx Emissions - July 2021



An average emissions was done for 7 & 8 due to faulty instrument

Figure 8: Kendal Unit 2 SOx Emissions - July 2021

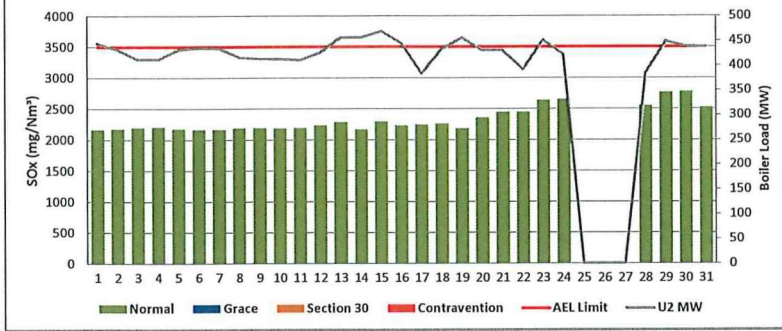


Figure 9: Kendal Unit 3 SOx Emissions - July 2021

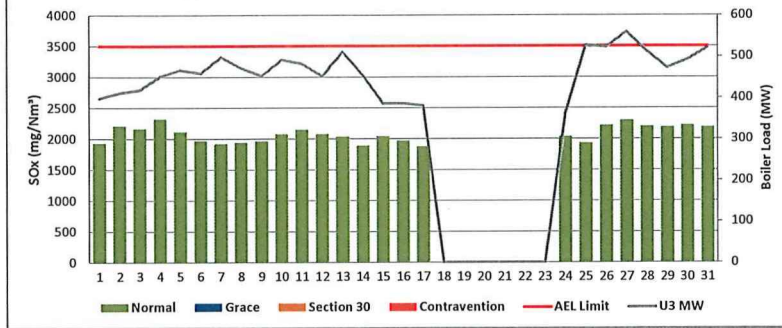


Figure 10: Kendal Unit 4 SOx Emissions - July 2021

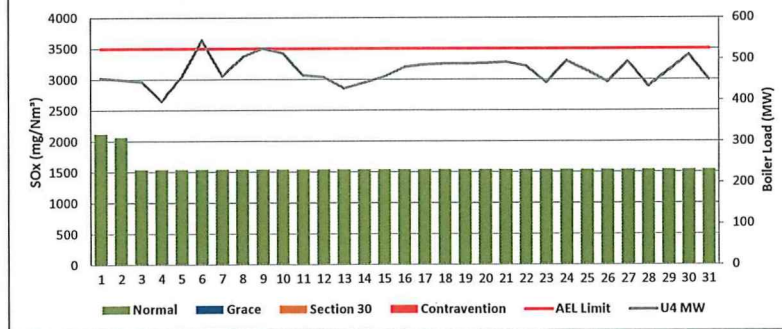


Figure 12: Kendal Unit 6 SOx Emissions - July 2021

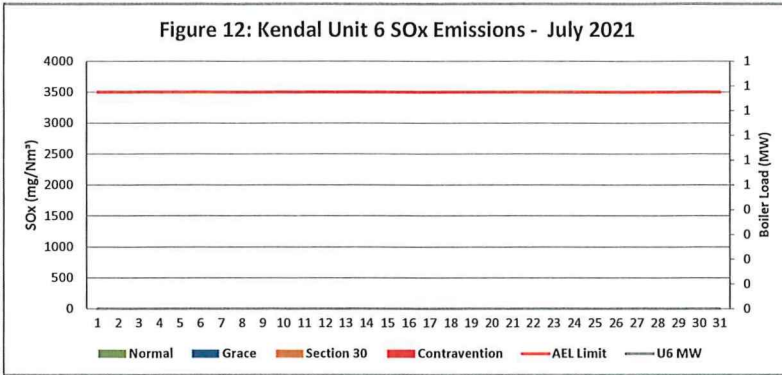
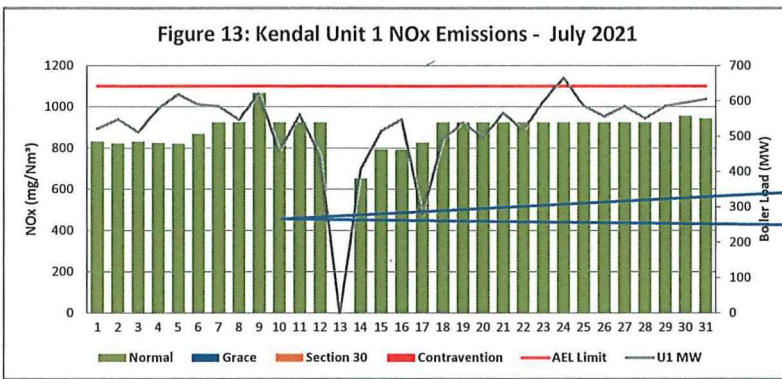


Figure 13: Kendal Unit 1 NOx Emissions - July 2021



Average emissions were used on 10 to 12 due to a faulty instrument

Figure 14: Kendal Unit 2 NOx Emissions - July 2021

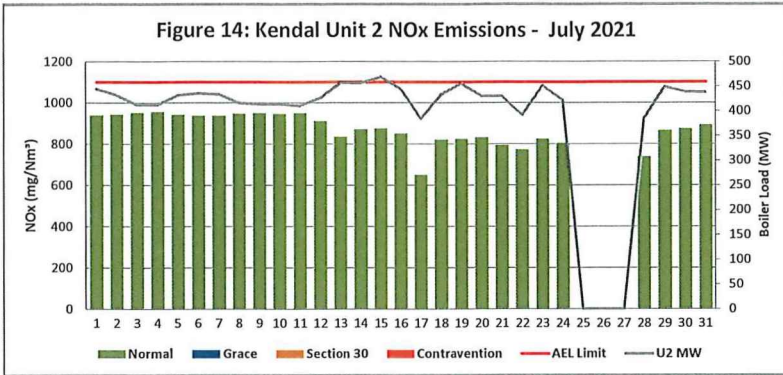


Figure 15: Kendal Unit 3 NOx Emissions - July 2021

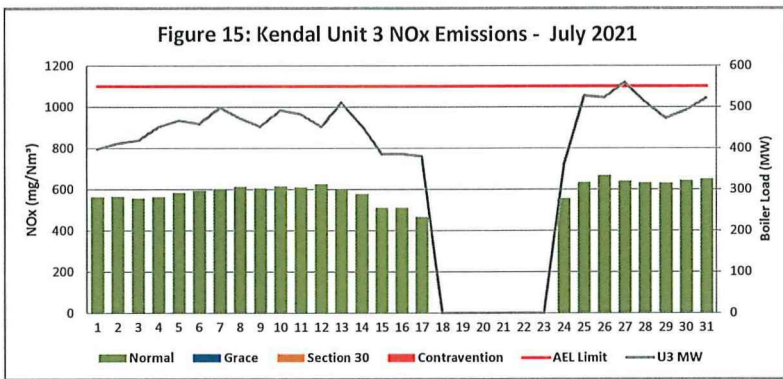


Figure 16: Kendal Unit 4 NOx Emissions - July 2021

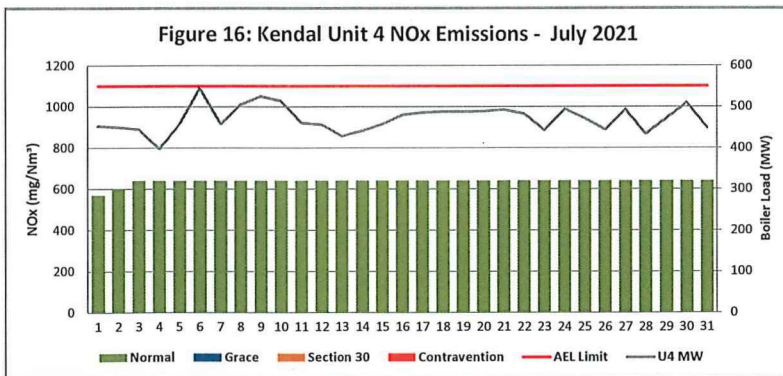
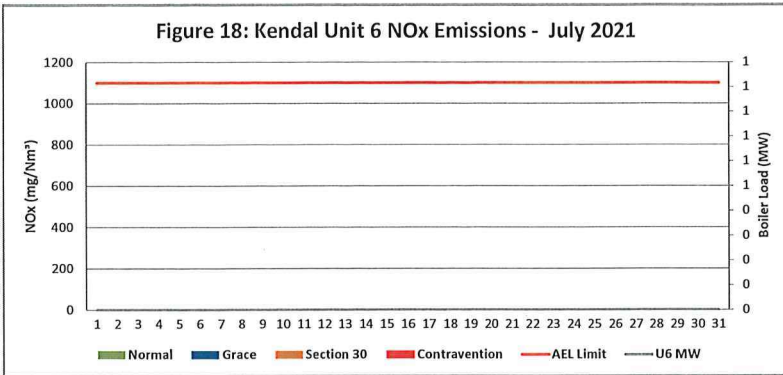


Figure 18: Kendal Unit 6 NOx Emissions - July 2021



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

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

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

Emissions Performance

- Average velocity values from the latest correlation report were used on the gaseous emissions on Unit 1 & 3 due to defective CEMS monitors and velocity correction factors were set M=1 and C=0
- Unit 1 SOx and NOx reliability was low because of faulty analyzers
- Unit 6 was still offload during this month for repairs to address emissions issues

Unit 2

Findings On the 03rd the high emissions can be attributed to Sulphur common plant supply pump failure. On the 10th the high emissions can be attributed to multiple trips of the SO3 plant due to low back end temperatures.

Resolution.

Sulphur common plant supply pump was repaired.

Unit 3

Findings High PM emissions on 25 to 28 can be attributed to ash backlogs and high back end temperatures affecting performance of SO3 plant and ESP.

Resolution

Ash backlogs were cleared after plant was repaired and back end temperatures improved after soot blowing was done.

Unit 4

Findings. High PM emissions on 25 to 28 can be attributed to precip fields short circuits, SO3 plant off due to low back end temperatures and possibly a monitor fault (Investigation in progress).

Resolution. ESP fields were repaired during unit shutdown and SO3 plant returned back to service after back end temperatures improved.

Note Unit 4 dust monitor was not working between 13 to 16 and a monthly average was used, monthly average is still within the MES reliability threshold and therefore daily average used within those days is considered within grace period for reliability.

Unit 5

Unit 5 PM and Gaseous emissions are not included in the report because unit 5 correlations and parallel tests are still not done and the last tests that were done for unit 5 have expired, therefore the CEMS instruments readings or data available for unit 5 cannot be confirmed to be valid until new correlations and parallel tests are done.