Eskom

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Date:
18 October 2022

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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 2022.

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:

Irene Motswenyane
ENVIRONMENTAL OFFICER- KENDAL

Date: 18/10/2022

Supported by:

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Date: 18/10/2022

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KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF JULY 2022

Verified by:

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Validated by:

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Date: 21/10/2022

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Approved by:

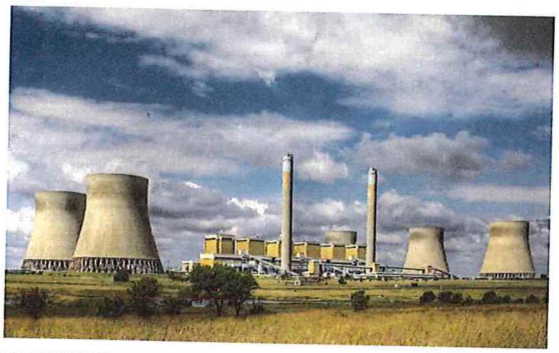
Date: 21 Oct 2022

Kobus Steyn
GENERAL MANAGER-KENDAL

Eskom

JULY 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 Jul-2022
	Coal	Tons	2 260 000	883 833
	Fuel Oil	Tons	5 000	4250.81
Production Rates	Product / By-Product Name	Units	Maximum Production Capacity Permitted	Production Rate Jul-2022
	Energy	GWh(MW)	(3.153,600)4380	1 436 866.00
	Ash	Tons	770 000	274 253.4
	RE Ash	kg/MWh	not specified	0.28

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	<1 (%)	0.840
Ash Content	%	40 (%)	31.030

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 Jul-2022	Technology Type	SO_3 Utlization Jul-2022
Unit 1	$ESP + SO_3$	98.312%	SO_3	0.0%
Unit 2	$ESP + SO_3$	97.376%	SO_3	0.0%
Unit 3	$ESP + SO_3$	99.669%	SO_3	9.0%
Unit 4	$ESP + SO_3$	97.682%	SO_3	0.0%
Unit 5	$ESP + SO_3$	97.209%	SO_3	0.0%
Unit 6	$ESP + SO_3$	98.221%	SO_3	0.0%

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

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	81.6	82.9	94.7
Unit 2	88.6	65.4	33.1	100.0
Unit 3	92.5	100.0	0.0	95.3
Unit 4	99.6	100.0	96.7	71.2
Unit 5	99.3	100.0	97.4	100.0
Unit 6	93.3	100.0	98.5	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, Unit 3 NO and Unit 4 O2 monitor's realiability is low due to defective monitors.

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of July 2022

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	698.5	2 553	899
Unit 2	1 298.7	1 654	1 049
Unit 3	141.8	2 048	963
Unit 4	567.5	948	283
Unit 5	826.7	1 068	382
Unit 6	563.1	1 322	602
SUM	4 096.31	9 593	4 178

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	4	6	3	12	21	556.6
Unit 2	7	7	15	0	22	542.2
Unit 3	16	4	2	8	14	107.9
Unit 4	1	5	7	7	19	985.9
Unit 5	0	4	0	14	18	954.7
Unit 6	0	4	0	17	21	316.5
SUM	28	30	27	58	115	

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm³)
Unit 1	26	0	0	0	0	2 697.7
Unit 2	30	0	0	0	0	1 084.9
Unit 3	30	0	0	0	0	1 643.7
Unit 4	21	0	0	0	0	1 910.6
Unit 5	21	0	0	0	0	1 589.4
Unit 6	23	0	0	0	0	1 732.5
SUM	151	0	0	0	0	

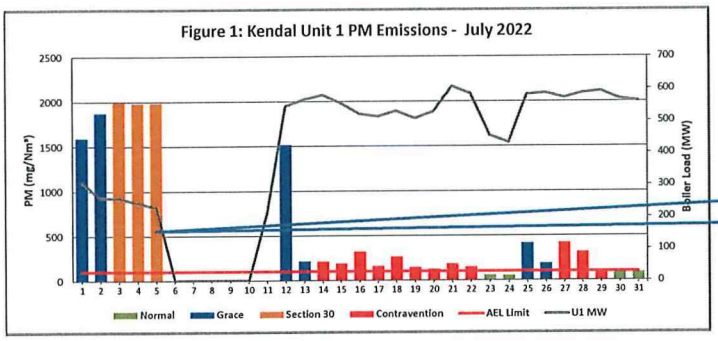
Table 6.4: Operating days in compliance to NOx AEL Limit - July 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	26	0	0	0	0	946.9
Unit 2	30	0	0	0	0	687.1
Unit 3	30	0	0	0	0	771.9
Unit 4	21	0	0	0	0	567.2
Unit 5	21	0	0	0	0	568.3
Unit 6	23	0	0	0	0	785.7
SUM	151	0	0	0	0	

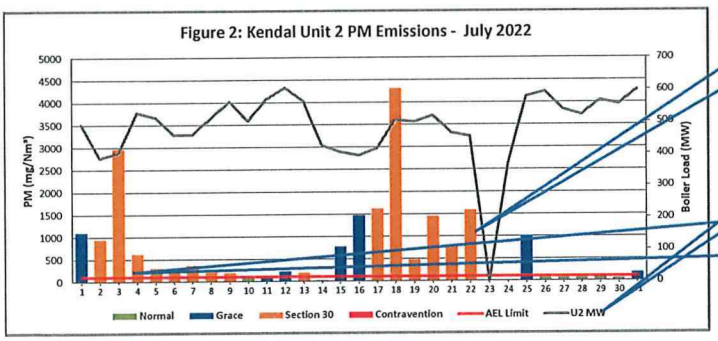
Note: NOx emissions is measured as NO in PPM. Final NOx value is expressed as total NO_2

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



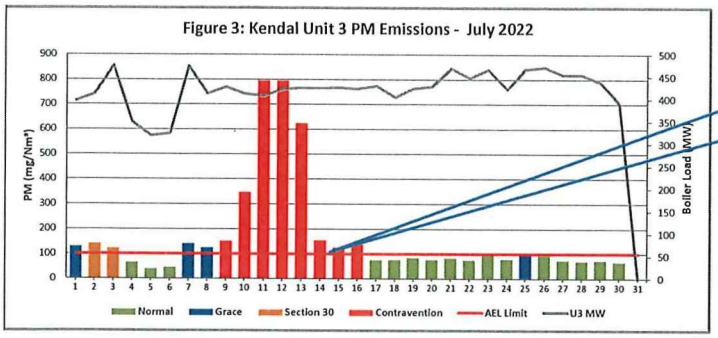
Unit 1 dust emissions can be attributted to SO3 plant on hold mode due to low steam temperature, SO3 plant trip due to low sulphur flow. DHP off due to high compartment levels.



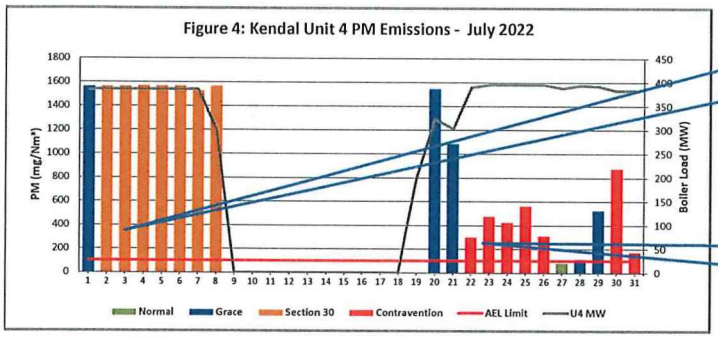
High emissions can attributted to SO3 plant trip due to sulphur flow low.

High emissions can attributted to SO3 plant on hold mode due to suphur block valve failing to open & trip due to sulphur flow low .

High emissions can attributted to DHP trip due to an ash leak at stream 1 bucket elevator, DHP off due to compartment levels full, SO3 plant on hold due to low sulphur flow, precip converyor 13,14, 22, 24 chocked, SO3 plant trip due to converter temp high, SO3 plant on hold mode due to steam temp low, DHP trip due to stream 2 second collecting conveyor motor trip.

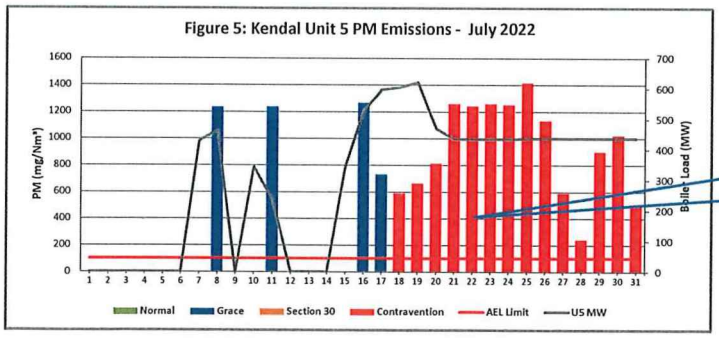


High PM emissions can be attributed to DHP trip due to high compartment level, various precip fields under performing, SO3 trip and on hold mode due to steam leak and sulphur flow low, precip conv 14 chocked.

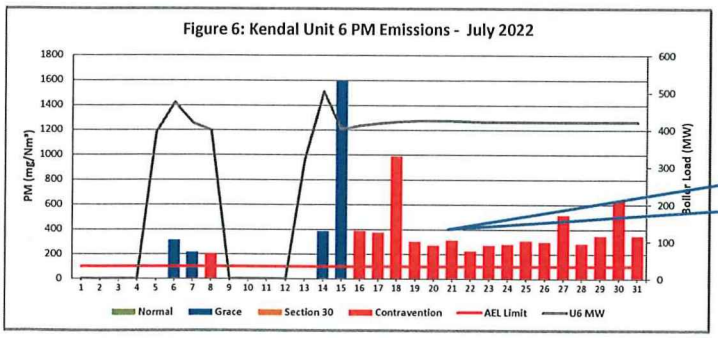


High PM emissions can be attributed to DHP off due to stream 2 bucket elevator blocked chute, precip conveyor 14 trip on overload,SO3 plant on hold mode due to steam leak, SO3 plant tripped due to no sulphur flow, precip conveyor 22 and 24 tripping.

High PM emissions can be attributed to DHP off due to stream 2 bacKet elevator blocked chute,precip chain conveyor 11 fail to start, DHP trip due to compartment levels high, precip chain Conveyor 24 kept tripping, SO3 plant trip due to low sulphur flow.



High PM emissions can be attributed to DHP trip due to high compatments level, precip conveyor 14, 24 kept on triping, SO3 plant trip due to low back end temperatures.



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

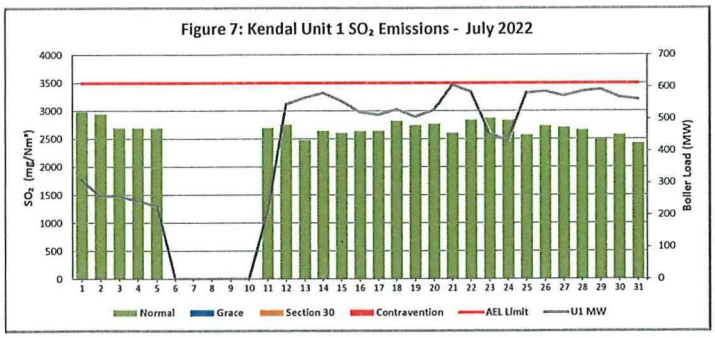


Figure 7: Kendal Unit 1 SO_2 Emissions - July 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW

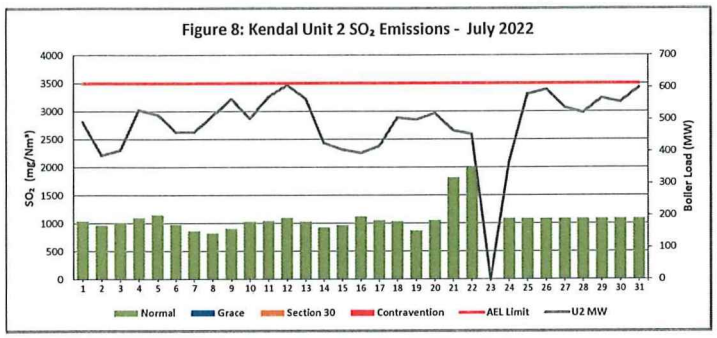


Figure 8: Kendal Unit 2 SO_2 Emissions - July 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

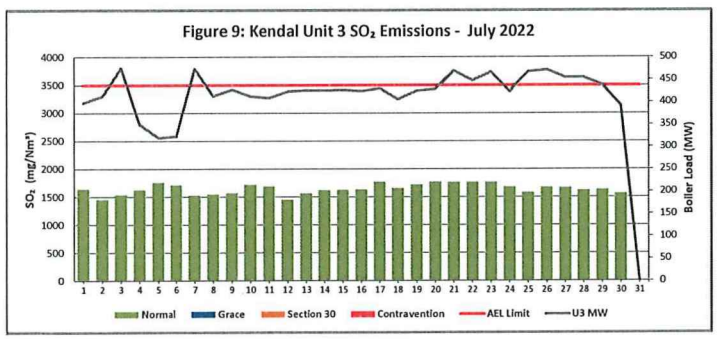


Figure 9: Kendal Unit 3 SO_2 Emissions - July 2022
SO_2 (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

Figure 10: Kendal Unit 4 SO_2 Emissions - July 2022

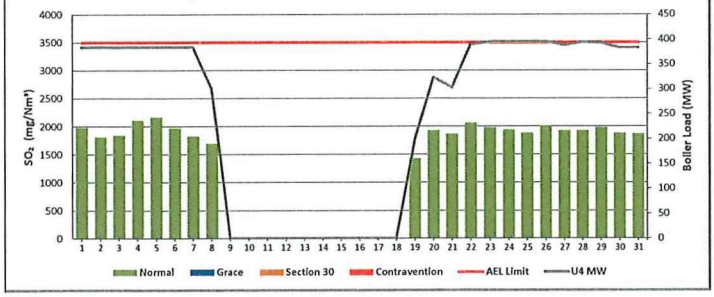


Figure 11: Kendal Unit 5 SO_2 Emissions - July 2022

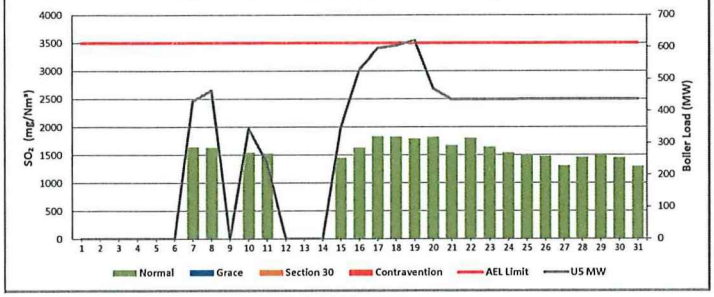


Figure 12: Kendal Unit 6 SO_2 Emissions - July 2022

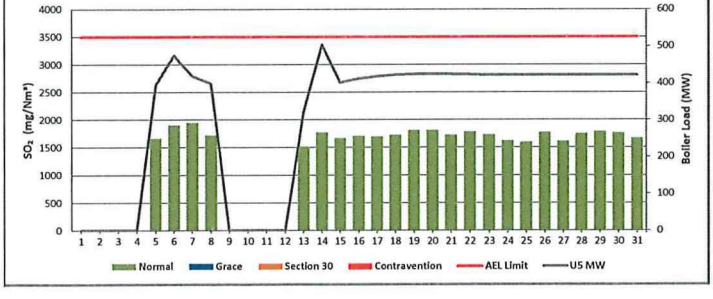


Figure 13: Kendal Unit 1 NOx Emissions - July 2022

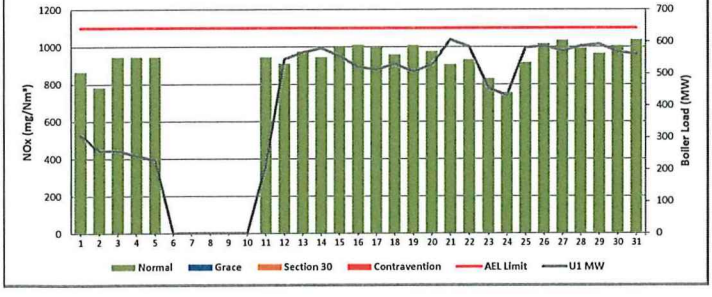


Figure 14: Kendal Unit 2 NOx Emissions - July 2022

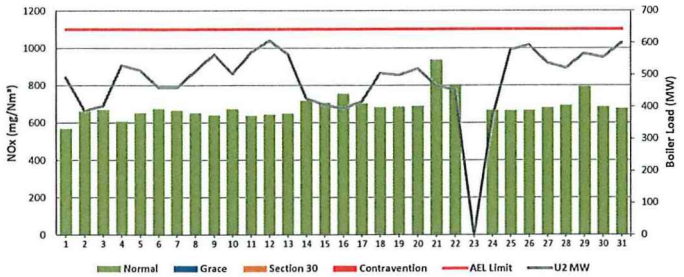


Figure 15: Kendal Unit 3 NOx Emissions - July 2022

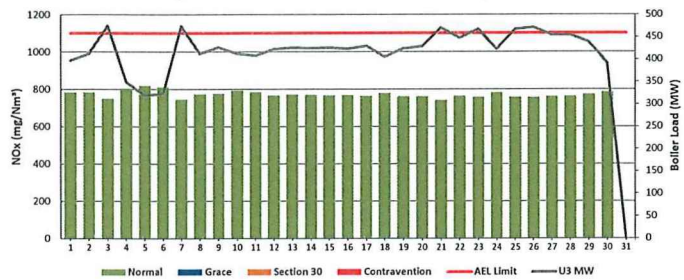


Figure 16: Kendal Unit 4 NOx Emissions - July 2022

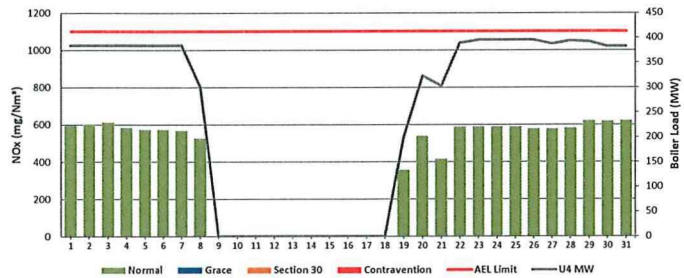


Figure 17: Kendal Unit 5 NOx Emissions - July 2022

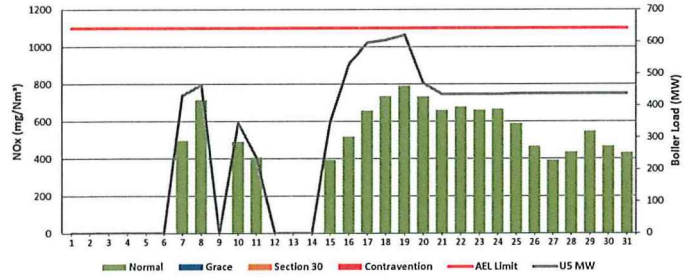
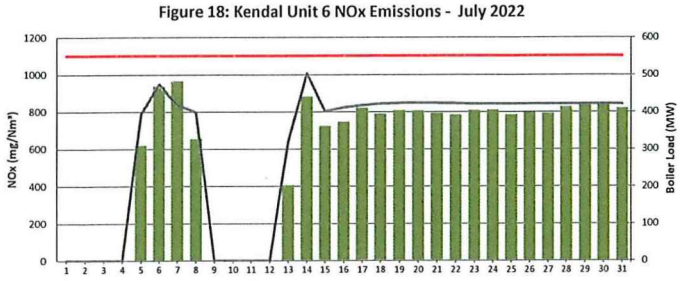


Figure 18: Kendal Unit 6 NOx Emissions - July 2022



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

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

$\eta = 1 - \frac{(DustEmissionFromAQR\ ReportDustMonitor(tons)}{(CoalBurnt(tons) * \%AshContent * 80\%)} \times 100$

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 99.325% over a period of time e.g 24hours
The formula is as follows:
= (1 – (count hours above 99.325%/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
- Unit 5 Monitor still using the old monitor correlation. After new correlations are done, new correlation factors will be implemeted and backfitted to the date of monitor installation.
- Surrogate values were used for Unit 2,3,5 and 6 where dust monitors were maxing out (>99.325%). Surrogate values were taken from the upset test condition reports.
- Avarage emissions for Unit 2 NOx, CO2 and Unit 3 NOx were used from QAL 2 report.
- For Unit 2 SOx, Unit 4 CO2, Unit 4, Unit 5 and Unit 6 moisture, Unit 4 and Unit 6 pressure where the monitors were frozen; avarage values from the availabe data were used.

- Unit 1
- Findings: The high emissions can be attributed to SO3 plant on hold mode due to low steam temperature, SO3 plant trip due to low sulphur flow and DHP off due to high compartment levels.
- Resolution: Plant repaired

- Unit 2
- Findings: High emissions can attributted to DHP trip due to an ash leak at stream 1 bucket elevator, DHP off due to compartment levels full, SO3 plant on hold due to low sulfur flow, precip conveyor 13,14, 22, 24 chocked, SO3 plant trip due to converter temp high, SO3 plant on hold mode due to steam temp low, and DHP trip due to stream 2 second collecting conveyor motor trip.
- Resolution: Plant repaired.

- Unit 3
- Findings: High PM emissions can be attributed to DHP trip due to high compartment levels, various precip fields under performing, SO3 plant trip and on hold mode due to steam leak and sulphur flow low, and precip conveyor 14 chocked.
- Resolution: The plant was repaired.

- Unit 4
- High PM emissions can be attributed to DHP off due to stream 2 bucket elevator blocked chute, precip conveyor 14 trip on overload,SO3 plant on hold mode due to steam leak, SO3 plant trip due to no sulphur flow, precip conveyor 22 and 24 tripping, and precip chain conveyor 11 failing to start.
- Resolution: The plant was repaired.

- Unit 5
- Findings: High PM emissions can be attributed to DHP trip due to high compatments level, precip conveyor 14, 24 kept on triping, and SO3 plant trip due to low back end temperatures.
- Resolution: The plant was repaired.

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