Eskom

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Date:
10 March 2025

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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 SEPTEMBER 2024.

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.

Late submission is due to the surrogation values that had to be recorded on all the monthly reports when the monitor has maxed out or giving erratic data for both PM and gases after the review of the initial Air Quality Reports.

Compiled by:

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Date: 10/03/2025

Supported by:

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KENDAL POWER STATION'S EMISSIONS REPORT FOR THE MONTH OF SEPTEMBER 2024

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Eskom

SEPTEMBER 2024

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 Sep-2024
	Coal	Tons	2 260 000	900 587
	Fuel Oil	Tons	5 000	6866.700
Production Rates	**Product / By-Product Name**	**Units**	**Maximum Production Capacity Permitted**	**Indicative Production Rate Sep-2024**
	Energy	GWh	2 963.520	1 509.174
	Ash	Tons	770 000	311 152.809
	RE Ash	kg/MWh	not specified	4.699

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)	18.090
Sulphur Content	%	<1 (%)	0.740
Ash Content	%	40 (%)	34.550

3 EMISSION LIMITS (mg/Nm^3)

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 Sep-2024	Technology Type	SO_3 Ulilization Sep-2024
Unit 1	*ESP + SO_3*	*99.334%*	*SO_3*	*63.3%*
Unit 2	*ESP + SO_3*	*94.081%*	*SO_3*	*63.3%*
Unit 3	*ESP + SO_3*	*99.659%*	*SO_3*	*80.0%*
Unit 4	*ESP + SO_3*	*99.811%*	*SO_3*	*83.3%*
Unit 5	*ESP + SO_3*	*90.555%*	*SO_3*	*96.7%*
Unit 6	*ESP + SO_3*	*99.634%*	*SO_3*	*70.0%*

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

There is no Sulphur value for SO3 utilization due to switch failure on the server, however DCS signals used for its trippong alarms were used to get its utilization values. Sulphur flow will be available once we have commissioned the new PI system.

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO_2	NO	O_2
Unit 1	*98.8*	*100.0*	*99.8*	*0.0*
Unit 2	*71.9*	*100.0*	*100.0*	*99.9*
Unit 3	*80.5*	*0.0*	*100.0*	*59.5*
Unit 4	*100.0*	*100.0*	*97.3*	*0.0*
Unit 5	*40.0*	*0.0*	*100.0*	*100.0*
Unit 6	*91.8*	*40.6*	*40.6*	*99.9*

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

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of September 2024

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	243.2	2 341	1 305
Unit 2	1 749.9	1 627	819
Unit 3	173.6	2 621	686
Unit 4	80.1	3 305	932
Unit 5	4 699.1	3 012	1 410
Unit 6	145.3	2 550	1 179
SUM	7 091.13	15 455	6 331

Table 6.2: Operating days in compliance to PM AEL Limit - September 2024

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm^3)
Unit 1	7	7	0	7	14	200.4
Unit 2	7	6	0	8	14	2 346.6
Unit 3	11	4	0	9	13	127.6
Unit 4	29	0	0	0	0	55.5
Unit 5	0	0	0	29	29	2 972.5
Unit 6	16	5	0	4	9	128.9
SUM	70	22	0	57	79	

Table 6.3: Operating days in compliance to SO_2 AEL Limit - September 2024

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SO_2 (mg/Nm^3)
Unit 1	23	0	0	0	0	1 762.4
Unit 2	23	0	0	0	0	1 542.5
Unit 3	27	0	0	0	0	1 575.9
Unit 4	30	0	0	0	0	2 160.6
Unit 5	30	0	0	0	0	1 700.1
Unit 6	26	0	0	0	0	1 708.3
SUM	159	0	0	0	0	

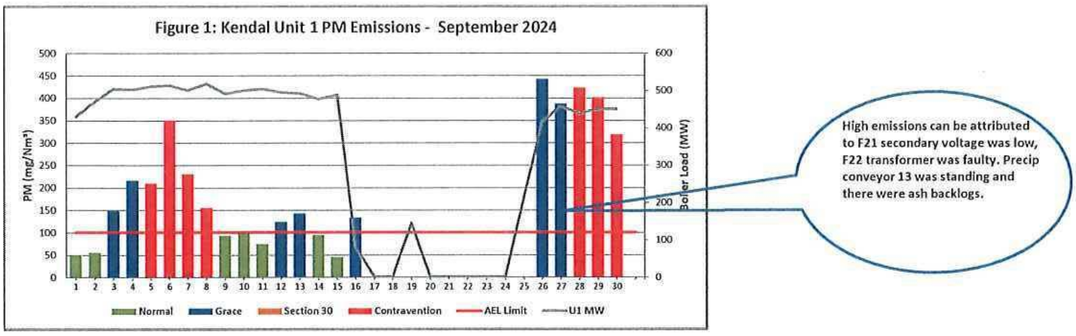
Table 6.4: Operating days in compliance to NOx AEL Limit - September 2024

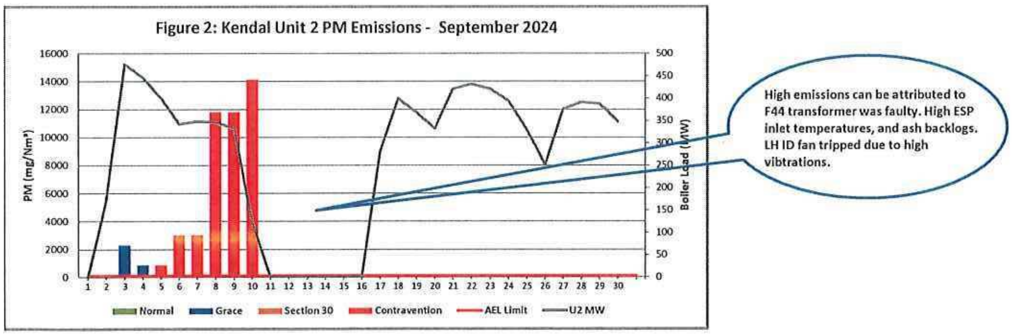
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	23	0	0	0	0	978.0
Unit 2	23	0	0	0	0	765.8
Unit 3	27	0	0	0	0	406.2
Unit 4	30	0	0	0	0	591.3
Unit 5	30	0	0	0	0	789.5
Unit 6	26	0	0	0	0	779.9
SUM	159	0	0	0	0	

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	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





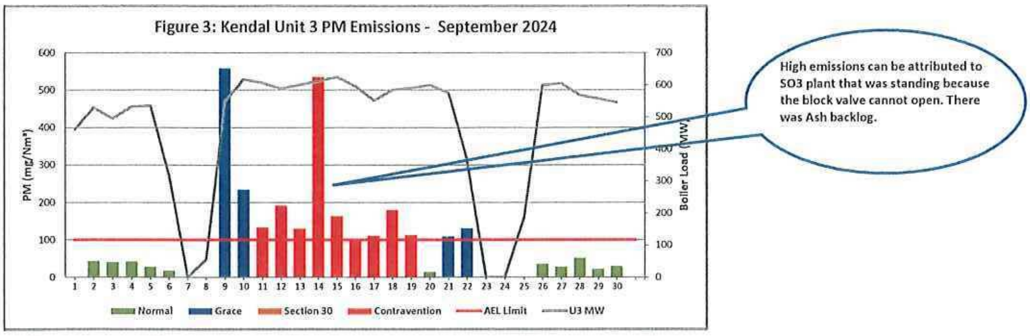


Figure 3: Kendal Unit 3 PM Emissions - September 2024
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW
High emissions can be attributed to SO3 plant that was standing because the block valve cannot open. There was Ash backlog.

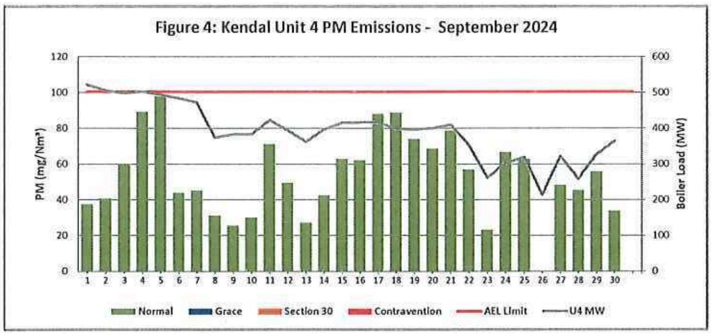


Figure 4: Kendal Unit 4 PM Emissions - September 2024
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

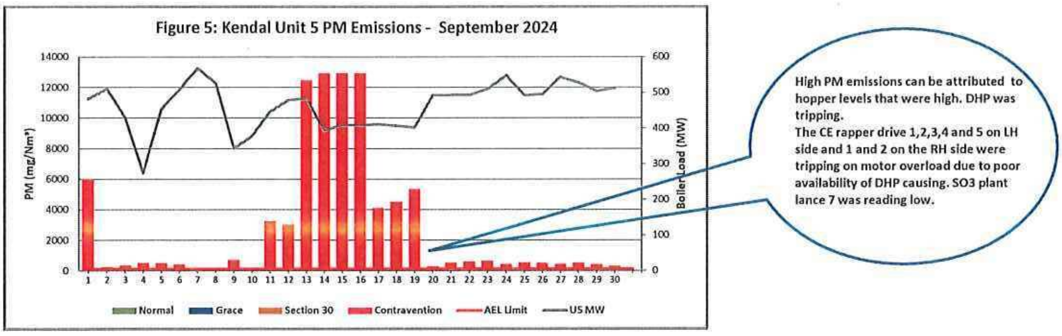


Figure 5: Kendal Unit 5 PM Emissions - September 2024
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U5 MW
High PM emissions can be attributed to hopper levels that were high. DHP was tripping.
The CE rapper drive 1,2,3,4 and 5 on LH side and 1 and 2 on the RH side were tripping on motor overload due to poor availability of DHP causing. SO3 plant lance 7 was reading low.

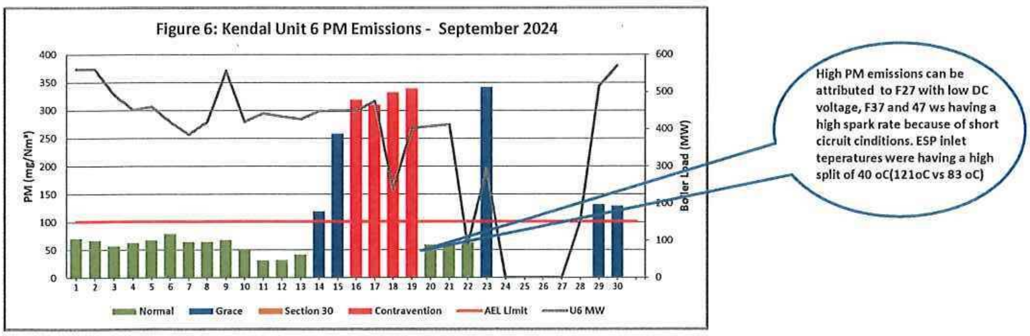


Figure 6: Kendal Unit 6 PM Emissions - September 2024
PM (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U6 MW
High PM emissions can be attributed to F27 with low DC voltage, F37 and 47 ws having a high spark rate because of short circuit cinditions. ESP inlet teperatures were having a high split of 40 oC(121oC vs 83 oC)

Figure 7: Kendal Unit 1 SO_2 Emissions - September 2024

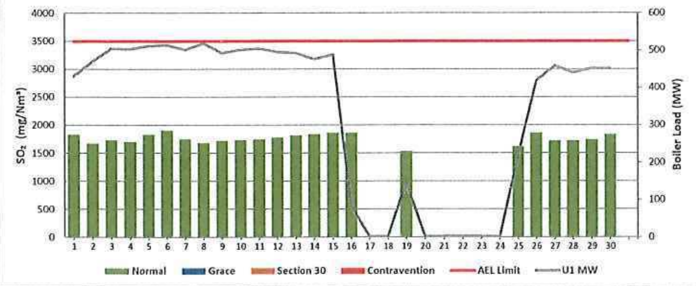


Figure 8: Kendal Unit 2 SO_2 Emissions - September 2024

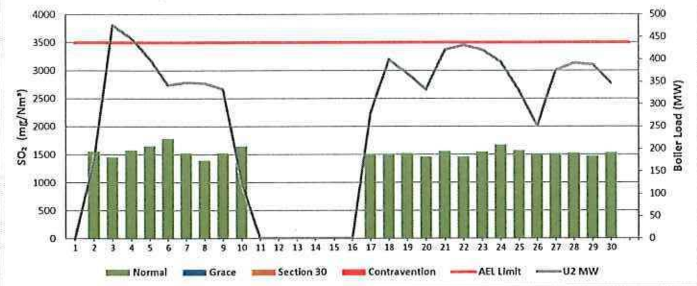


Figure 9: Kendal Unit 3 SO_2 Emissions - September 2024

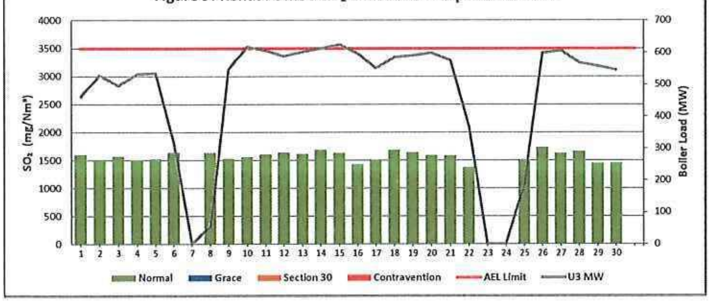


Figure 10: Kendal Unit 4 SO_2 Emissions - September 2024

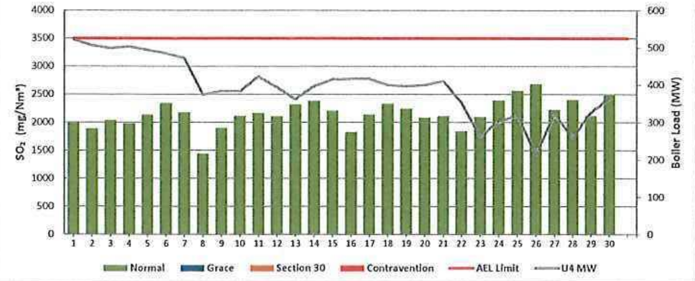


Figure 11: Kendal Unit 5 SO_2 Emissions - September 2024

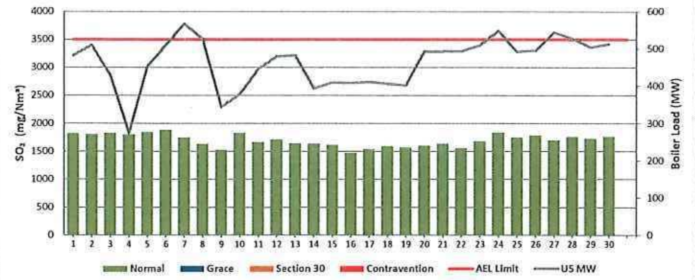


Figure 12: Kendal Unit 6 SO_2 Emissions - September 2024

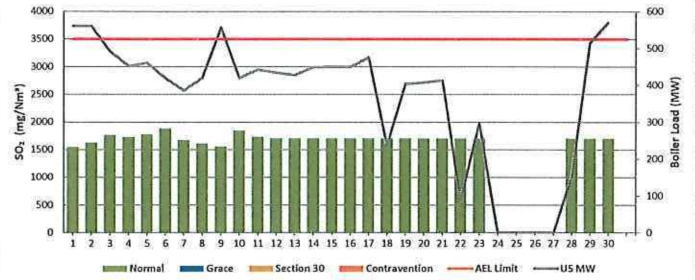


Figure 13: Kendal Unit 1 NOx Emissions - September 2024

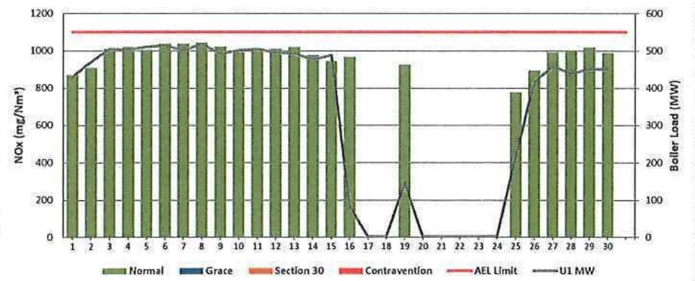


Figure 14: Kendal Unit 2 NOx Emissions - September 2024

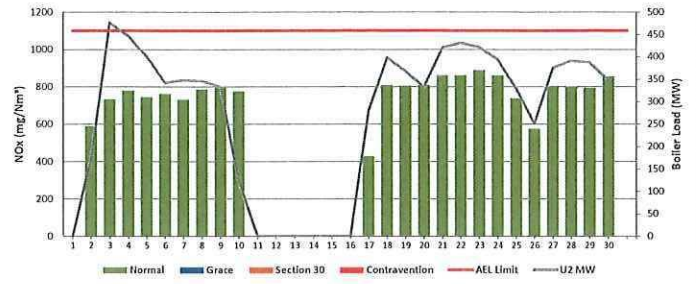


Figure 15: Kendal Unit 3 NOx Emissions - September 2024

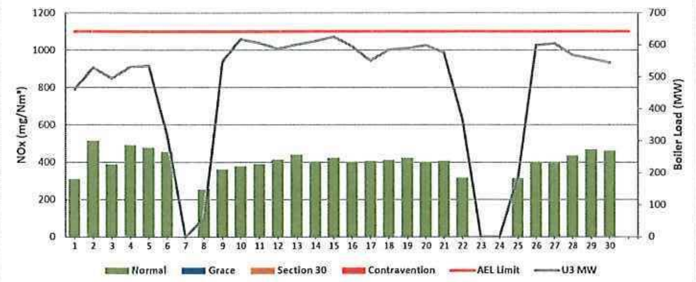


Figure 16: Kendal Unit 4 NOx Emissions - September 2024

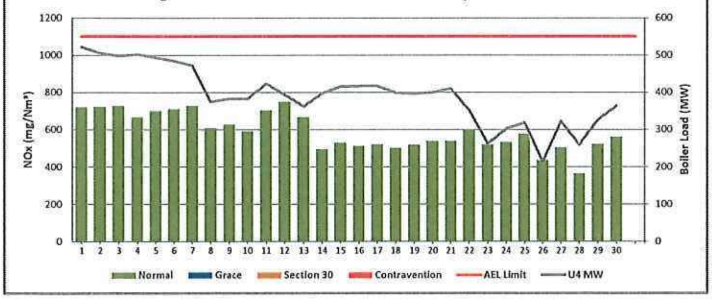


Figure 17: Kendal Unit 5 NOx Emissions - September 2024

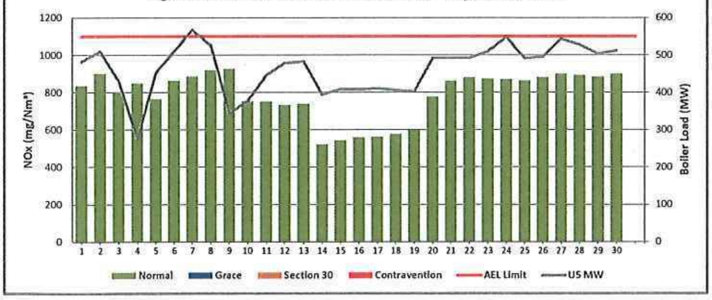
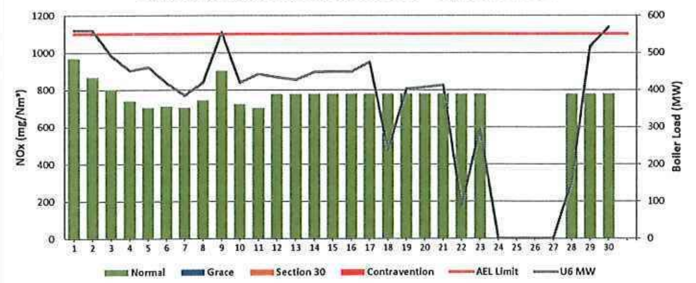


Figure 18: Kendal Unit 6 NOx Emissions - September 2024



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

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

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

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

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 98% 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 some units due to defective CEMS monitors and velocity correction factors were set M=1 and C=0
- Unit 1,2 and 5 maxed out, meaning the emissions were higher than what the monitor was correlated for, in which case we use surrogate values. This is attributed to abnormal plant conditions.
- Please note that the reported figures in tonnage calculation are the figures after the station usd the maxing out quantification exercise which is the use of "surrogate values" on days when the monitor maxed out.
- Flow was not working for the whole month because of sensors that are faulty and the sensors have to be replaced on all the units. The process for procuring new sensors is in progress.
- Correlation curves for units 1,4 and 5 were changed to suite changes of the data signals from *AAA* to *HME* data values because of the damaged cables for *AAA* signal giving vaues that were not reliable.
- Surrogation values were recalculated after updating raw data based on curves update.

- The QAL 2 average values for gaseous were used as raw data in cases where the monitor had an error, were used as surogation values.

- Unit 1

Findings: field 22 transformer that was faulty, DHP that was running with the first knife gates closed on PCP 11-24. The DHP was also standing due to compartment high levels..
- Resolution: Plant repaired

- Unit 2

Findings: the DHP that was standing will all kg's closed due to compartments high level. PCP 11 to 24 kg1&2 are still all shut. Field 44 transformer faulty.
Resolution: Plant repaired.

- Unit 3
- Findings: Unit was compliant

- Unit 4
- Findings: High PM emissions can be attributed to the SO3 plant that was off due to Back End Temperature Low, field 21 and 43 secondary voltage that was low, field 17 and 26 was faulty, DHP stopped due to ash spillages, unit was on Fuel oil support, SO3 was on hold mode due to no sulphur flow, DHP stream 2 second collecting conveyor tripped and RH prcip fields 32,33,35 & 43 discharge emitter fault.
- Resolution: Plant repaired.

- Unit 5
- Findings: High PM emissions can be attributed unit on Light up - Cold Start, unit Fuel oil support and DHP was standing with all knife gates shut.
- Resolution: Plant repaired.

- Unit 6
- Findings: High PM emissions can be attributed to unit on Fuel oil support, the SO3 plant that was on hold mode due to low steam temperature, Field 16, 17, 26 27 DC Volage was low, Precip 12 - 24 was not available and SO3 lance 8 was not available.
- Resolution: Plant repaired.