Eskom

Mrs Mpho Nembilwi
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Date
29 September 2021

Enquiries S Chokoe
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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 AUGUST 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: 29/09/2021

Supported by:

Solly Chokoe
ACTING ENVIRONMENTAL MANAGER- KENDAL

Date: 30/09/2021

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

Verified by:

Date: 29/09/2021

Fulufhelo Nganke
BOILER ENGINEERING: SYSTEM ENGINEER- KENDAL

Validated by:

Date 30/09/2021

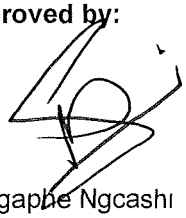
Tendani Rasivhetshele
ACTING BOILER ENGINEERING MANAGER-KENDAL

Supported by:

Date 30/09/2021

Malibongwe Mabizela
ACTING ENGINEERING MANAGER-KENDAL

Approved by:



Date 30/09/2021

Yangaphe Ngcashi
GENERAL MANAGER-KENDAL

Eskom

AUGUST 2021 REV 01

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 Aug-2021
	Coal	Tons	*2 260 000*	*966 888*
	Fuel Oil	Tons	*5 000*	*2465.04*
Production Rates	**Product / By-Product Name**	**Units**	**Maximum Production Capacity Permitted**	**Production Rate Aug-2021**
	Energy	GWh(MW)	*4380*	*1 539 056.00*
	Ash	Tons	*770 000*	*313 658.5*
	RE Ash	kg/MWh	*not specified*	*0.560*

2 ENERGY SOURCE CHARACTERISTICS

Coal Characteristic	Units	Stipulated Range	Monthly Average Content
Sulphur Content	%	*<1 (%)*	*0.960*
Ash Content	%	*40 (%)*	*32.440*

3 EMISSION LIMITS (mg/Nm³)

Associated Unit/Stack	PM	SOx	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 ABATEMET TECHNOLOGY (%)

Associated Unit/Stack	Technology Type	Efficiency Aug-2021	Technology Type	Utlization Aug-2021
Unit 1	ESP + SO_3	99.9%	SO_3	87.5%
Unit 2	ESP + SO_3	99.9%	SO_3	97.7%
Unit 3	ESP + SO_3	99.7%	SO_3	46.0%
Unit 4	ESP + SO_3	99.8%	SO_3	94.8%
Unit 6	ESP + SO_3	Off-line	SO_3	Off-line

Unit 3 low sulphur utilisation can be attributed to SO3 plant that was tripping because of high burner outlet temperatures that went above 730 degree celcius because of high ESP inlet temperature operating at 135 degree celcious

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

Note: Unit 5 PM and gaseous emissions are not included in the report because Unit 5 was still under comission and correlations and parallel tests were still being done. Parallel tests were completed on the 11 September 2021 and correlations were completed on 23 September 2021. Awaiting results for both tests.

5 MONITOR RELIABILITY (%)

Associated Unit/Stack	PM	SO_2	NO	O_2
Unit 1	100.0	100.0	100.0	100.0
Unit 2	100.0	100.0	98.6	100.0
Unit 3	99.7	100.0	100.0	100.0
Unit 4	100.0	100.0	99.9	99.7
Unit 5	63.6	28.8	28.8	86.7
Unit 6	Off-line	Off-line	Off-line	Off-line

Note: Monitor reliability for unit 5 was low due to defective monitors

6 EMISSION PERFORMANCE

Table 6.1: Monthly tonnages for the month of August 2021

Associated Unit/Stack	PM (tons)	SO_2 (tons)	NO_x (tons)
Unit 1	38.4	4 455	1 295
Unit 2	61.1	3 333	1 230
Unit 3	162.6	3 686	1 119
Unit 4	79.7	2 797	1 006
Unit 6	Off-line	Off-line	Off-line
SUM	341.72	14 271	4 651

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

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average PM (mg/Nm³)
Unit 1	31	0	0	0	0	19.0
Unit 2	27	2	0	0	2	55.3
Unit 3	17	7	0	7	14	104.6
Unit 4	25	3	0	0	3	52.0
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	100	12	0	7	19	

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

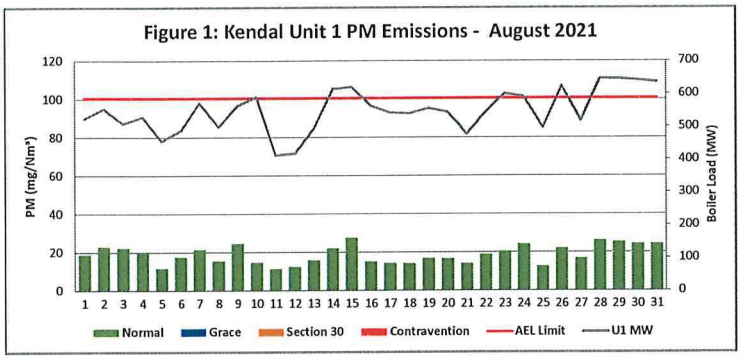
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm³)
Unit 1	30	0	0	1	1	2 838.9
Unit 2	31	0	0	0	0	2 299.6
Unit 3	31	0	0	0	0	1 985.0
Unit 4	29	0	0	0	0	2 038.5
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	121	0	0	1	1	

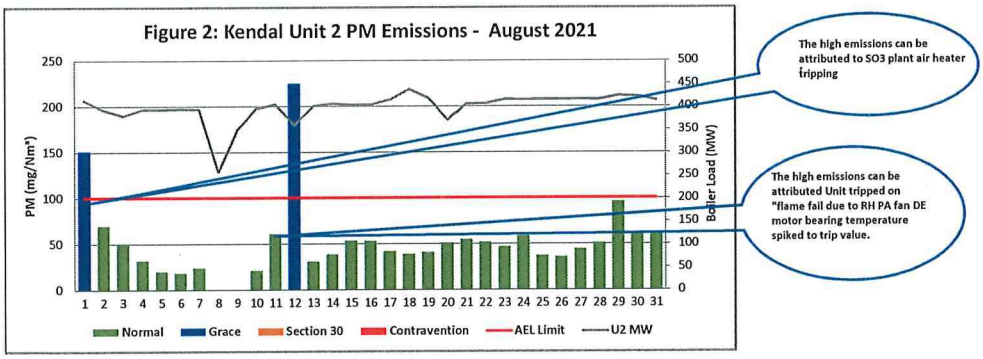
Table 6.4: Operating days in compliance to NOx AEL Limit - August 2021

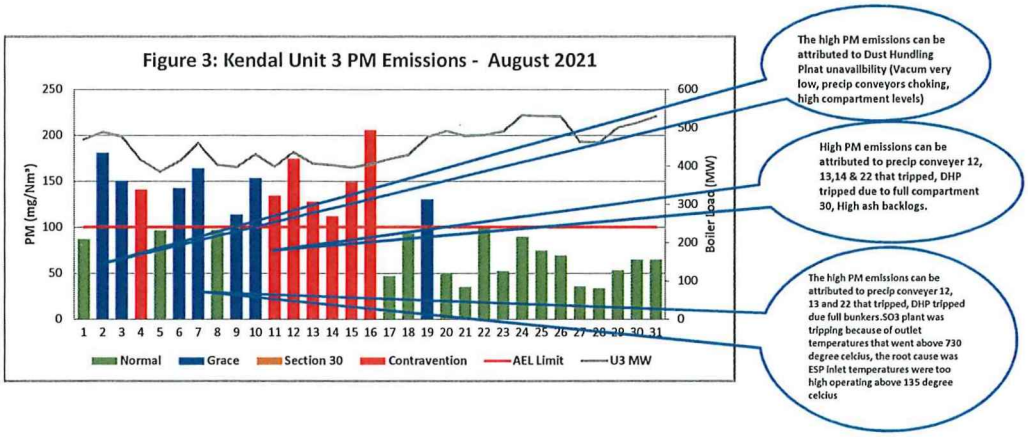
Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
Unit 1	31	0	0	0	0	832.2
Unit 2	31	0	0	0	0	830.8
Unit 3	31	0	0	0	0	600.1
Unit 4	29	0	0	0	0	736.8
Unit 6	Off-line	Off-line	Off-line	Off-line	Off-line	Off-line
SUM	122	0	0	0	0	

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



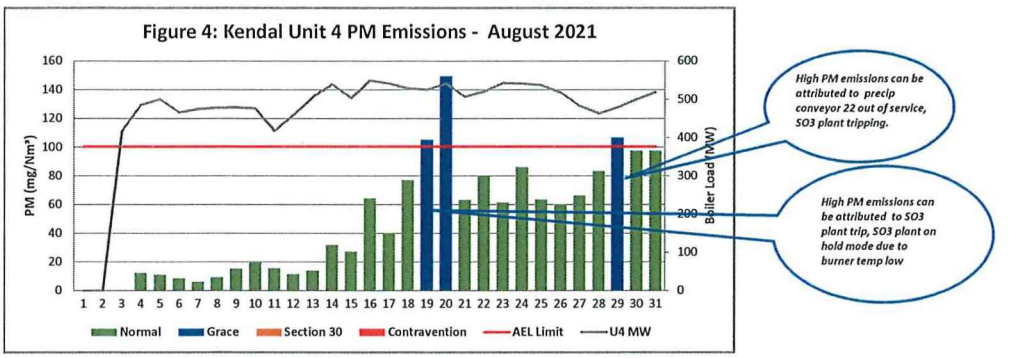




The high PM emissions can be attributed to Dust Handling Plnat unavailbility (Vacum very low, precip conveyors choking, high compartment levels)

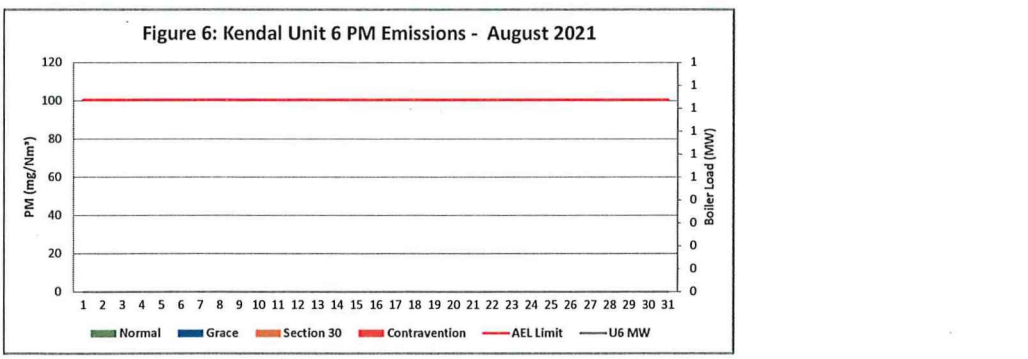
High PM emissions can be attributed to precip conveyer 12, 13,14 & 22 that tripped, DHP tripped due to full compartment 30, High ash backlogs.

The high PM emissions can be attributed to precip conveyer 12, 13 and 22 that tripped, DHP tripped due full bunkers.SO3 plant was tripping because of outlet temperatures that went above 730 degree celcius, the root cause was ESP inlet temperatures were too high operating above 135 degree celcius



High PM emissions can be attributed to precip conveyor 22 out of service, SO3 plant tripping.

High PM emissions can be attributed to SO3 plant trip, SO3 plant on hold mode due to burner temp low



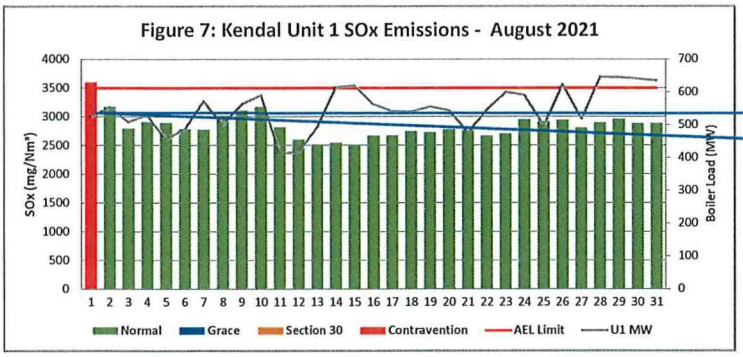


Figure 7: Kendal Unit 1 SOx Emissions - August 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW
Unit 1 high SOx emissions can be attributed to high coal sulphur content

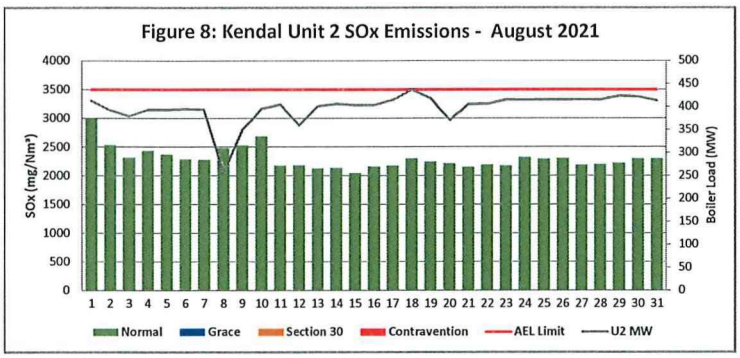


Figure 8: Kendal Unit 2 SOx Emissions - August 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U2 MW

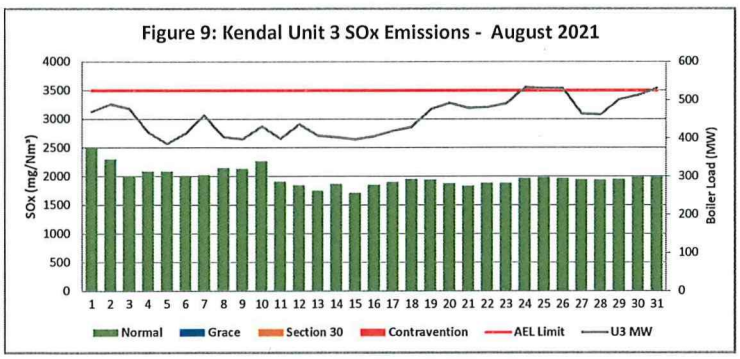


Figure 9: Kendal Unit 3 SOx Emissions - August 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U3 MW

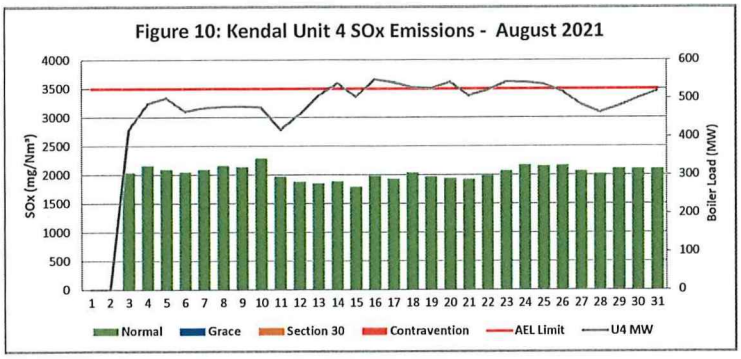


Figure 10: Kendal Unit 4 SOx Emissions - August 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U4 MW

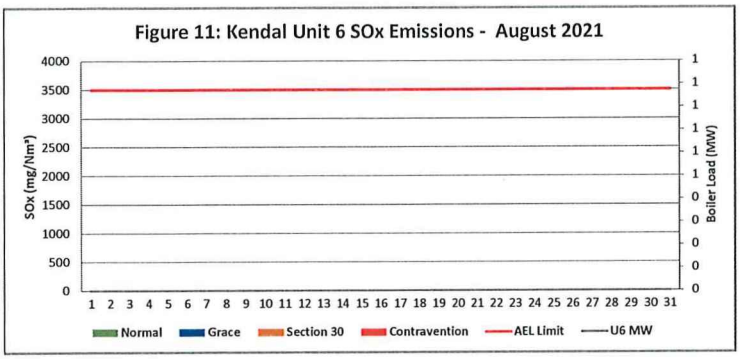


Figure 11: Kendal Unit 6 SOx Emissions - August 2021
SOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U6 MW

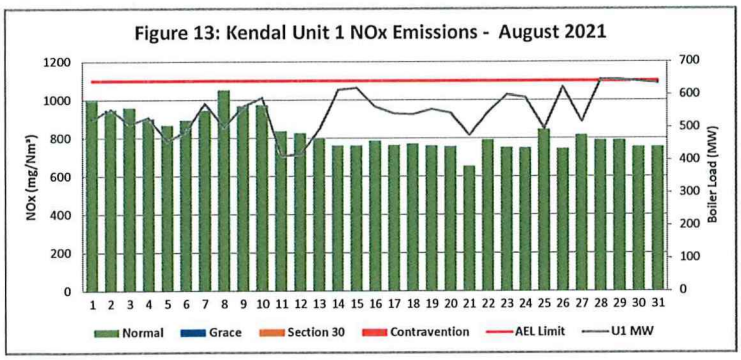
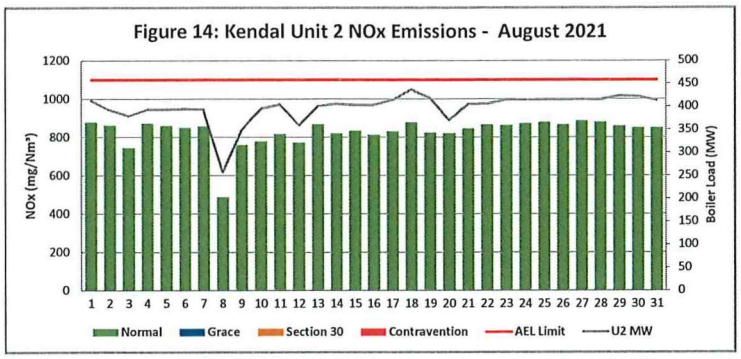
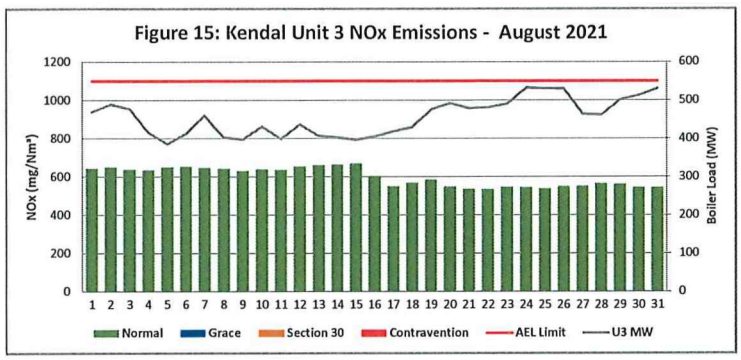
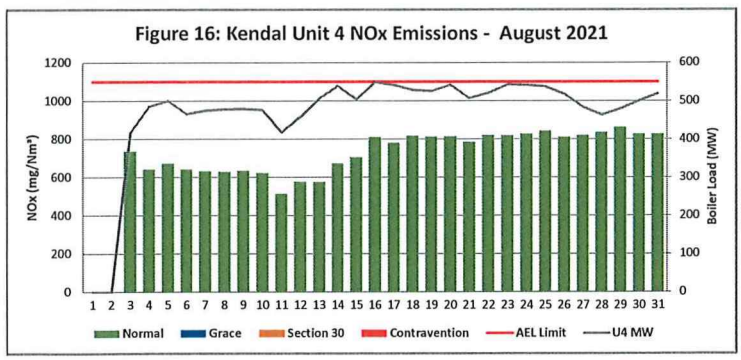
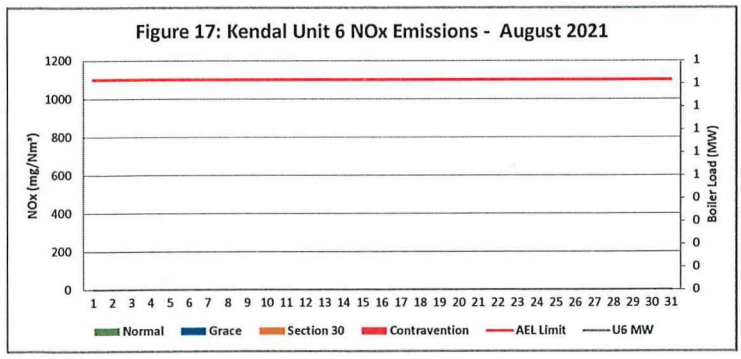


Figure 13: Kendal Unit 1 NOx Emissions - August 2021
NOx (mg/Nm³)
Boiler Load (MW)
Normal
Grace
Section 30
Contravention
AEL Limit
U1 MW









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

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

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

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 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, 3, 4 due to defective CEMS monitors and velocity correction factors were set M=1 and C=0
- *Avarage emissions for Unit 1 & Unit 3 pressure was used from the QAL2 parallel report due to defective analysers*
- Unit 1 high SOx emissions can be attributed to high coal sulphur content

- Unit 6 was still offload during this month for repairs to address emissions issues

Unit 2
Findings The high emissions can be attributed to SO3 plant air heater tripping and unit trip on the
Resolution SO3 plant was restored abck to service

Unit 3
Findings The high PM emissions can be attributed to Dust Hundling Plant DHP) i e unavailbility (Vacum very low, precip conveyors choking, high compartment levels)
Resolution The DHP was returned back to service after repairs

Unit 4
Findings High PM emissions can be attributed to precip conveyor 22 out of service, SO3 plant tripping
Resolution The plant was repaired

Unit 5
Note Unit 5 PM and gaseous emissions are not included in the report because Unit 5 was still under comission and correlations and parallel tests were still being done Parallel tests were completed on the 11 September 2021 and correlations were completed on 23 September 2021 Awaiting results for both tests Once the tests results are received and implemented, the reports will be *resubmitted with unit 5 emissions*