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Date:
26 April 2024

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Ref: 17/4/AEL/MP312/11/09

Dear Ms. Simelane

KRIEL POWER STATION'S MONTHLY STACK EMISSIONS REPORT FOR THE MONTH OF MARCH 2024

This serves as the monthly report required in terms of Section 7.4 in Kriel Power Station's Atmospheric Emission License 17/4/AEL/MP312/11/09. The emissions are for the month of March 2024. Verified emissions of particulates matter, SO₂ and NO_x (as NO₂) are also included.

Raw Materials and Products

Table 1: Quantity of Raw Materials and Products used/produced for the month of March 2024

Raw Materials and Products used	Raw Material Type	Units	Maximum Permitted Consumption / Rate (Quantity)	Consumption / Rate in Month of March 2024
	Coal	Tons/month	1 227 600	673 566.200
	Fuel Oil	Tons/month	5 000	6535.152
Production Rates	Product/ By-Product Name	Unit	Maximum Production Capacity Permitted (Quantity)	Production Rate in Month of March 2024
	Ash	Tons/month	not specified	177 821.477
	RE PM	kg/MWh	not specified	4.111

1/...

Abatement Technology

Table 2: Abatement Equipment Control Technology for March 2024.

Associated Unit/Stack	Technology Type	Actual Efficiency (%)	Utilisation
		March 2024	March 2024
Unit 1	ESP	99.89%	100.00%
Unit 2	ESP	98.90%	100.00%
Unit 3	ESP	97.62%	100.00%
Unit 4	ESP	Outage	Outage
Unit 5	ESP	89.54%	100.00%
Unit 6	ESP	94.44%	100.00%

Energy Source Characteristics

Table 3: Energy Source Material Characteristics for the month of March 2024

Characteristic	Stipulated Range (Unit)	Monthly Average Content
Sulphur Content	0.6-1.2 (%)	0.760
Ash Content	27-32 (%)	26.400

Monthly Monitor Reliability

Associated Unit/Stack	PM (%)	SOx (%)	NOx (%)
North	76.52	87.10	87.10
South	60.61	97.14	100.00

Emissions Reporting

Table 6.5: Graph 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

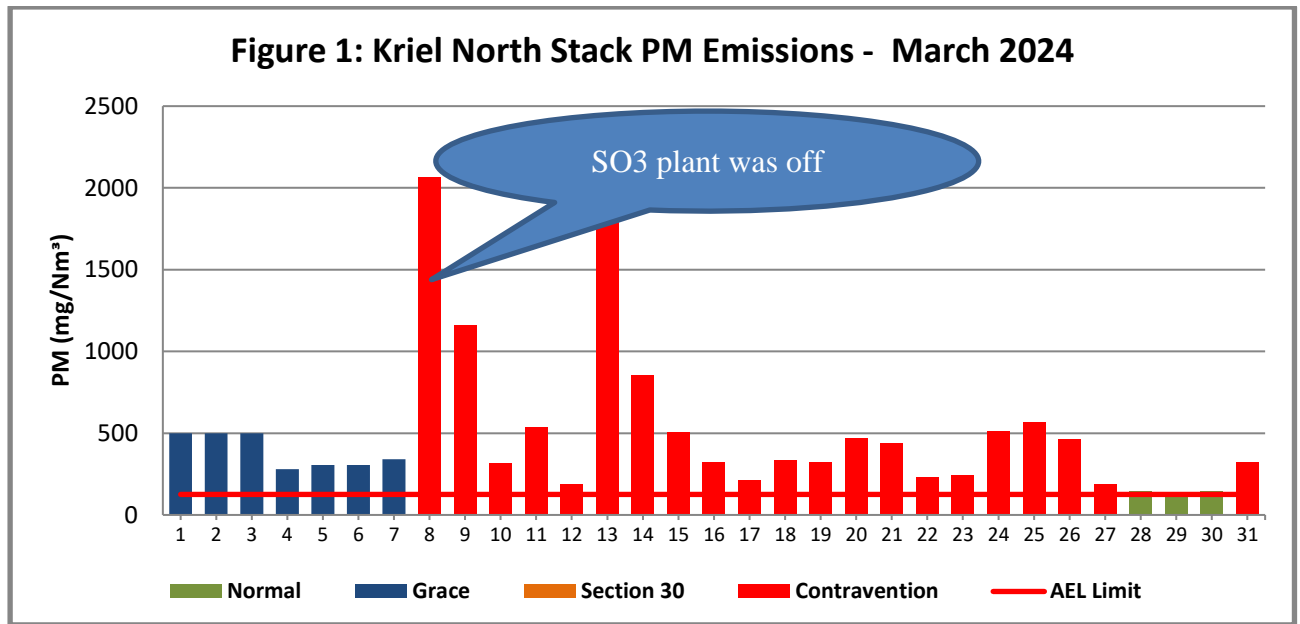


Figure 1: PM emissions for the month of March 2024 against emission limit for the North Stack. Monthly average was 498.5 mg/Nm³.

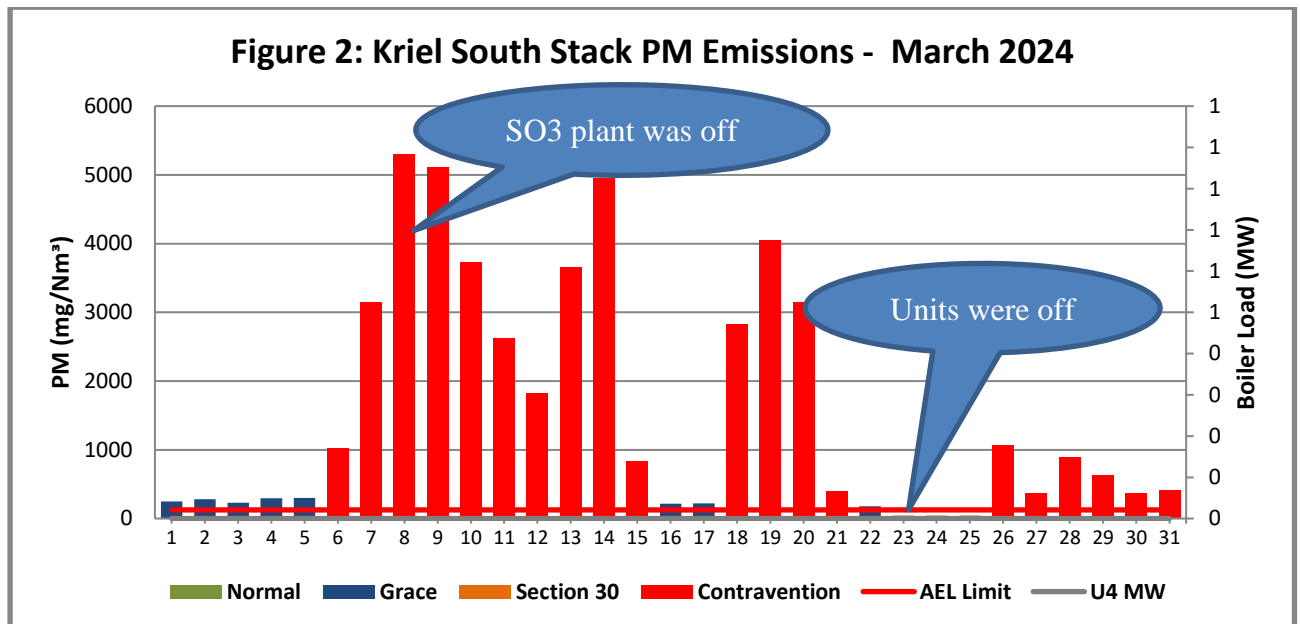


Figure 2: PM emissions for the month of March 2024 against emission limit for the South Stack. Monthly average was 1564.3 mg/Nm³.

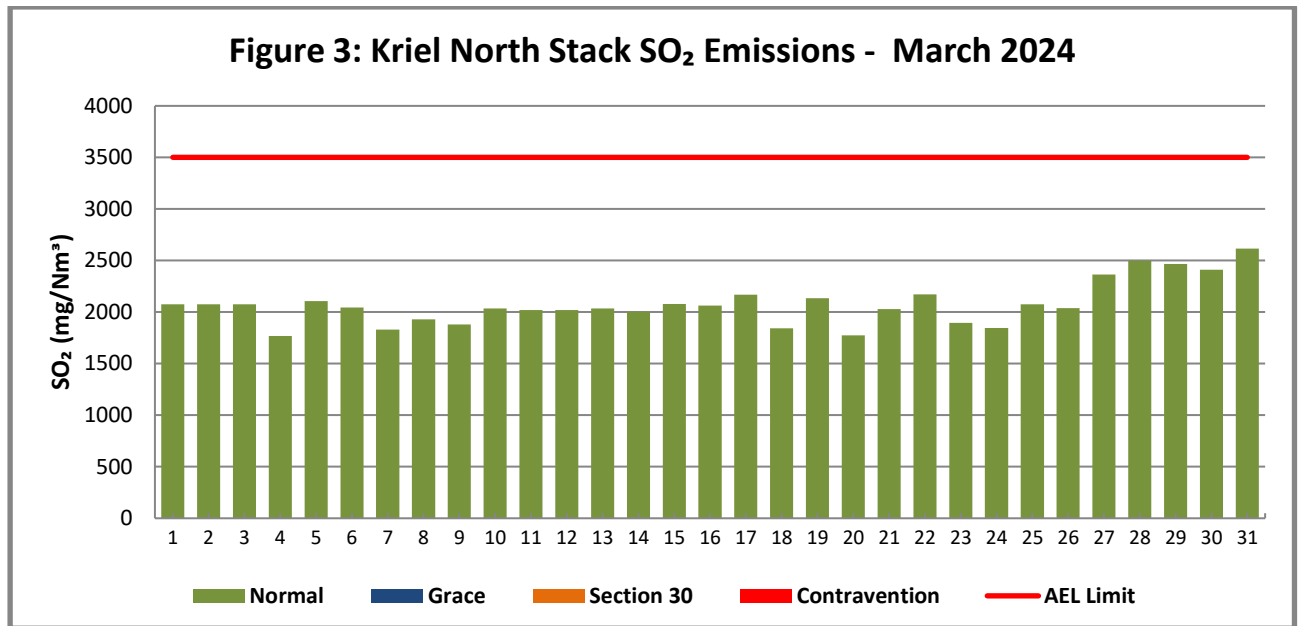


Figure 3. SO₂ emissions for the month of March 2024 against emission limit for the North Stack. The SO_x Limit is 3500mg/Nm³.

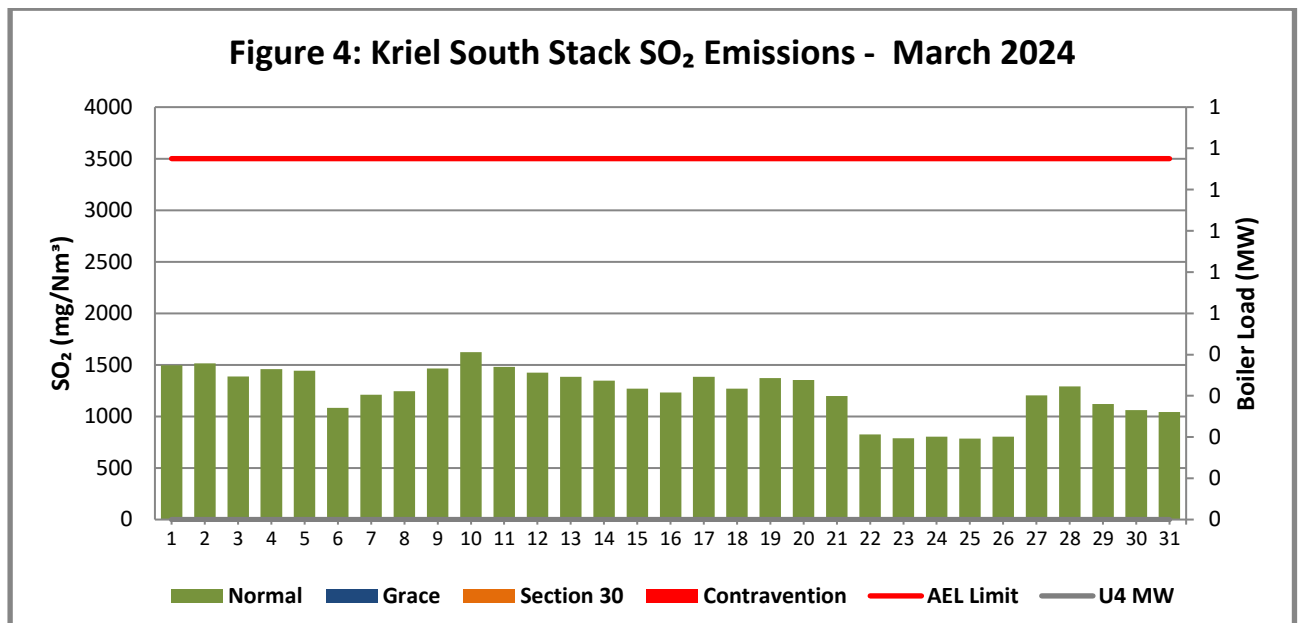


Figure 4. SO₂ emissions for the month of March 2024 against emission limit for the South Stack. The SO_x Limit is 3500mg/Nm³.

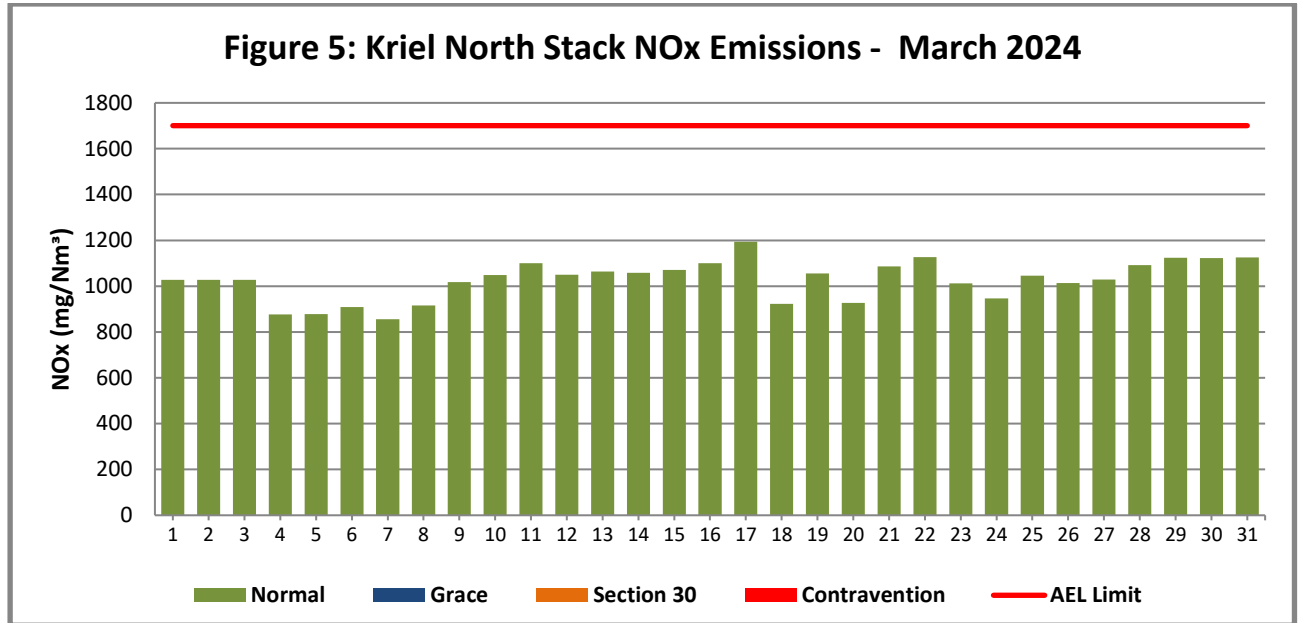


Figure 5. NO_x emissions for the month of March 2024 against emission limit for the North Stack. The NO_x Limit is 1600mg/Nm³.

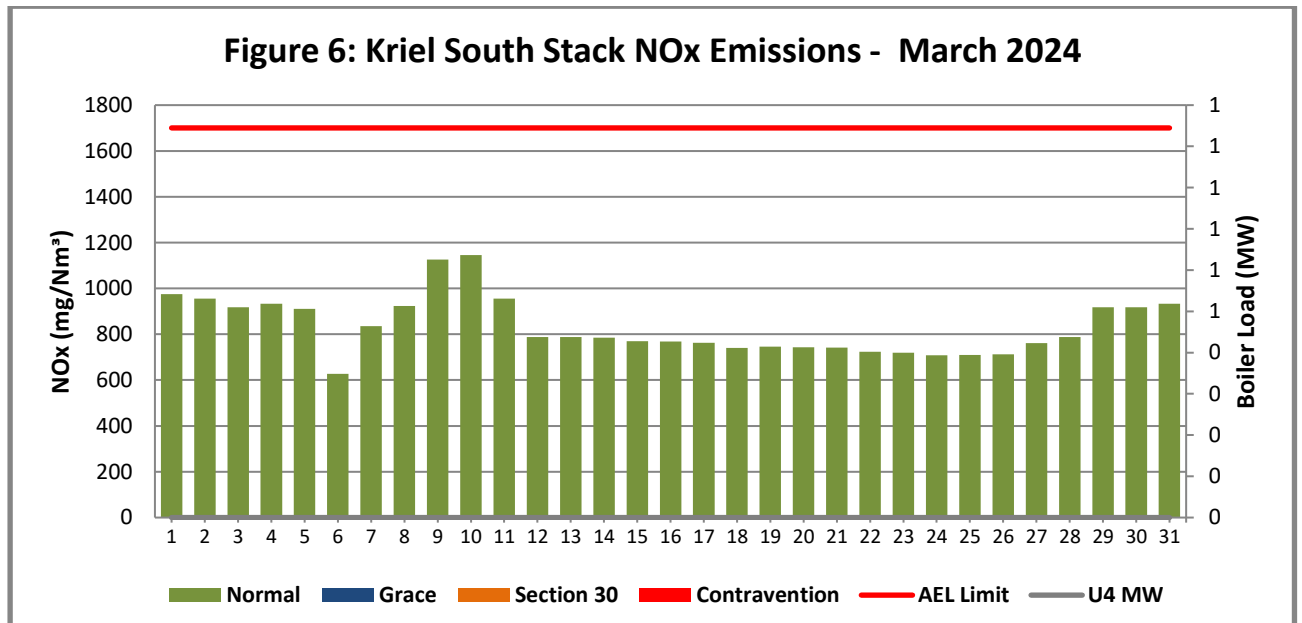


Figure 6. NO_x emissions for the month of March 2024 against emission limit for the South Stack. The NO_x Limit is 1600mg/Nm³.

Table 4: Monthly tonnages for the month March 2024

Unit	PM (tons)	SO ₂ (tons)	NO ₂ (tons)
SUM	4 998.8	8 450.1	4 703.5

Table 5: Each unit and respective days operating under normal operation and section 31 days respectively.

Table 5.1: Operating days in non-compliance to PM AEL Limit – March 2024

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Monthly Limit Exceedance	Average PM (mg/Nm³)
North	03	07	0	21	31	498.5
South	03	08	0	20	31	1564.3

Table 5.2: Operating days in compliance to SOx AEL Limit - March 2024

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm³)
North	31	0	0	0	0	2 076.5
South	31	0	0	0	0	1 237.9

Table 5.3: Operating days in compliance to NOx AEL Limit – March 2024

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm³)
North	31	0	0	0	0	1 027.5
South	31	0	0	0	0	833.2

Light up information

Table 6: PM Start-up information for the month of March 2024

North Stack	Event 1		Event 2		Event 3		Event 4	
Unit No.	Unit 1		Unit 2		no event		Unit 3	
Breaker Open (BO)	BO previously	BO previously	5:10 am	2024/03/07	7:20 pm	2024/03/18	3:30 am	2024/03/04
Draught Group (DG) Shut Down (SD)	n/a	n/a	6:05 pm	2024/03/07	DG did not trip or SD	DG did not trip or SD	3:35 pm	2024/03/04
BO to DG SD (duration)	n/a	DD:HH:MM	00:12:55	DD:HH:MM	n/a	DD:HH:MM	00:12:05	DD:HH:MM
Fires in time	2:25 pm	2024/03/25	12:45 am	2024/03/13			11:05 am	2024/03/07
Synch. to Grid (or BC)	6:30 pm	2024/03/25	11:00 am	2024/03/13			8:35 pm	2024/03/07
Fires in to BC (duration)	00:04:05	DD:HH:MM	00:10:15	DD:HH:MM		DD:HH:MM	00:09:30	DD:HH:MM
Emissions below limit from BC (end date)	not > limit	not > limit		#N/A			not > limit	not > limit

Emissions below limit from BC (duration)	n/a	DD:HH:MM	n/a	DD:HH:MM		DD:HH:MM	n/a	DD:HH:MM
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North Stack ...Cont.	Event 1		Event 2		Event 3		Event 4	
Unit No.	Unit 1		no event		no event		no event	
Breaker Open (BO)	8:20 am	2024/03/31						
Draught Group (DG) Shut Down (SD)	9:15 am	2024/03/31						
BO to DG SD (duration)	00:00:55	DD:HH:MM		DD:HH:MM		DD:HH:MM		DD:HH:MM
Fires in time								
Synch. to Grid (or BC)								
Fires in to BC (duration)		DD:HH:MM		DD:HH:MM		DD:HH:MM		DD:HH:MM
Emissions below limit from BC (end date)								
Emissions below limit from BC (duration)		DD:HH:MM		DD:HH:MM		DD:HH:MM		DD:HH:MM

South Stack	Event 1		Event 2		Event 3		Event 4	
Unit No.	no event		Unit 5		no event		Unit 6	
Breaker Open (BO)			12:30 am	2024/03/21	8:50 pm	2024/03/05	2:35 am	2024/03/15
Draught Group (DG) Shut Down (SD)			2:30 pm	2024/03/21	DG did not trip or SD	DG did not trip or SD	3:15 pm	2024/03/15
BO to DG SD (duration)		DD:HH:MM	00:14:00	DD:HH:MM	n/a	DD:HH:MM	00:12:40	DD:HH:MM
Fires in time			6:30 am	2024/03/25			4:20 am	2024/03/20
Synch. to Grid (or BC)			11:25 pm	2024/03/25			6:05 pm	2024/03/20
Fires in to BC (duration)		DD:HH:MM	00:16:55	DD:HH:MM		DD:HH:MM	00:13:45	DD:HH:MM
Emissions below limit from BC (end date)			not > limit	not > limit			not > limit	not > limit
Emissions below limit from BC (duration)		DD:HH:MM	n/a	DD:HH:MM		DD:HH:MM	n/a	DD:HH:MM

South Stack ...Cont.	Event 1		Event 2		Event 3		Event 4	
Unit No.	Unit 6		no event		no event		no event	
Breaker Open (BO)	1:30 pm	2024/03/28						
Draught Group (DG) Shut Down (SD)	1:55 am	2024/03/29						

BO to DG SD (duration)	00:12:25	DD:HH:MM		DD:HH:MM		DD:HH:MM		DD:HH:MM
Fires in time	4:45 am	2024/03/31						
Synch. to Grid (or BC)								
Fires in to BC (duration)		DD:HH:MM		DD:HH:MM		DD:HH:MM		DD:HH:MM
Emissions below limit from BC (end date)	<i>not > limit</i>	<i>not > limit</i>						
Emissions below limit from BC (duration)		DD:HH:MM		DD:HH:MM		DD:HH:MM		DD:HH:MM

Complaints Register

Table 9: Complaints for the month of March 2024.

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	Date by which measure will be implemented
There was no complaint related to air quality received during the month of March 2024.					

General

The particulate matter (PM10) emissions on the North Common Stack exceeded the **monthly limit**; on average emissions figure of **498.5 mg/Nm³** and also the South Common Stack also exceeded the **monthly limit** on the recorded PM10 monthly average figure of **1564.3 mg/Nm³**. The gaseous (NOx & SOx) emissions on both the North and the South Stack were within their monthly limit, during the month of March 2024; refer to graphs above.

NB: The rest of the information demonstrating compliance with the emissions license conditions is supplied in the annual emission reports sent to your office.

Kriel Power Station's List of NEMA Section 30 Incidents for 2023/2024 Financial Year

Month	Description of Section 30 Incidents - including the reference number	Root Cause (s)	Status of S30 Incident with DEFF (open or closed)	Remarks
April-2023	South Stack High Emissions	Unit 4 A EFP plant breakdown causing half load conditions, which calls for operating the unit with fuel oil support to badly impacting	Open	

		the stack emissions		
May - 2023	North Stack High Emissions	Unit 4 A EFP plant breakdown causing half load conditions which calls for operating the unit with fuel oil support to badly impacting the stack emissions	Open	
May - 2023	South Stack High Emissions	Unit 4 A EFP plant breakdown causing half load conditions which calls for operating the unit with fuel oil support to badly impacting the stack emissions	Open	
June – 2023	North Stack High Emissions	Units operating at half load conditions which affects the sulphur dosing and causes the plant to operate with fuel oil support because of high turbine back pressure, low final feedwater temperature, high works power loss from high usage of electric feed pump and dust handling plant because of dust transportation resulting in high stack emissions	Open	
June - 2023	South Stack High Emissions	Units operating at half load conditions	Open	

		which affects the sulphur dosing and causes the plant to operate with fuel oil support because of high turbine back pressure, low final feedwater temperature, high works power loss from high usage of electric feed pump and dust handling plant because of dust transportation resulting in high stack emissions		
July - 2023	North Stack High Emissions	The north stack emissions daily average has significantly reduced as results of shutting of unit 2 outage for the planned GO outage. However, due to the isolation of cooling tower number 2 for the cooling tower fills replacement project, unit 3 is operating at low loads to condenser vacuum high. The half load conditions mean supporting the unit with oil burners to support combustion and sulphur trioxide (SO ₃) not in service. The south stack PM emission daily average has significantly		

		reduced since synchronisation of units from half station shutdown.		
Aug - 2023	North Stack High Emissions	The north stack emissions exceedance was due to RH1 and RH2 poor field performance (high spark rates) which resulted in ESP reduced collection efficiency. The reduced field performance on the first field was as results of high hoppers, which resulted from an ash backlog on the dust handling plant.		
Sep - 2023	North Stack High Emissions	The North Stack emissions exceedance was due the increase of hopper alarms to 24 on Unit 1 due to blow tanks which were not available. Blow tank 1 2 discharge seal was damaged and blow tank 1 2 was leaking on the vent. Consequently, the electrostatic precipitators (ESP) performance decreased because of accumulation inside the fields.		
Oct - 2023	North Stack high Emissions	Requested grace period to exceed the limit after the		

		installation of New Abatement Technology HFTs. The station will undertake new Correlation curve and back fit accordingly and report accurately.		
Oct - 2023	South Stack High Emissions	The ESP fields performance continued to deteriorate, with the collection efficiency below 40%. It was noted that there was significant drop in fields performance on the RHS only. The RHS poor fields performance was as results of the failure of the DE rapping system. During commissioning of the 5B transformer which was replaced on the 29th of September 2023, the phasing was not verified, and motor directions checks were not conducted thereafter. This then resulted in motor rotating in the wrong directions and consequently the failure of torque insulators which rendered most DE rappers not available. It should be noted there were other causes that contributed to the high		

		emissions, this includes the saturation of the ID fans and poor dust handling plant availability as results of failure of the overland conveyors and blow tanks.		
Nov - 2023	North High Stack Emissions	It was due to the loss of two main electric conveying air compressors, namely Demag 5 & 6. Both compressors experienced rotor crushing and bearing seizure due to inadequate oil in the mechanical components during operation. Due to a decrease in the volumetric flow rate from the compressors, the dry dust pipes and collecting vessels experienced blockages.		
Nov - 2023	South High Stack Emissions	PM emissions daily average increased due to hopper alarms which resulted from unstable conveying air from time to time. The effect of unstable conveying air resulted in sustained hopper alarms that failed to clear. As result there was a high ash accumulation and hang ups		

		<p>inside the fields. The hang ups bridged the Discharge electrode and Collecting Electrodes plates which results in arcing and undervoltage trips. The high ash accumulation further affected the CE rapping system. The ash accumulation and hang ups resulted in a drop in ESP collection efficiency to below 30 % and consequently high PM emissions.</p>		
Dec - 2023	North High Stack Emissions	<p>Accumulation of hopper levels when the ash discharge rate from the fly ash hopper is lower than the rate at which ash accumulates within the fly ash hopper. This issue stemmed from the loss of two main electric conveying air compressors, namely Demag 5 & 6.</p>		
Dec - 2023	South High Stack Emissions	<p>Compressors experienced rotor crushing and bearing seizure due to inadequate oil in the mechanical components during operation. Due to a decrease in the volumetric flow rate from the</p>		

		compressors, the dry dust pipes and collecting vessels experienced blockages.		
Jan - 2024	North High Stack Emissions	Reduced ESP collection efficiency due to fly ash accumulation inside the fields, Dust accumulation of the Discharge electrodes resulting in high spark rates and field tripping on undervoltage, and		
Jan - 2024	South High Stack Emissions	Failure of the 18A and 18B conveyor belt & failure of blow tanks to start due to ESP fields poor performance due to ash accumulation that occurred as results of high hopper alarms.		
Feb - 2024	North and South High Stack Emissions	Due to the fluctuation of conveying and service air. Units 2,3,5 and 6 were on load with hopper alarms, 17, 13,14 and 17 due compressor fluctuation and mobile compressor kept on tripping on low diesel. The compressor has been unstable for		

		<p>a while as we had lost a lot of electric compressors due to damage. Hopper alarms went up to 19, 19 and 30 on Unit 3, 5 and 6 on load the hopper alarms went up to 19, 19 and 30 due to unstable Demag Pressure and compressors tripping.</p>		
Mar - 2024	North and South High Stack Emissions	<p>Due unavailability of SO3 plant and unavailability of HP pumps and overland conveyor belts due to ESP fields poor performance leading to ash accumulation that occurred as results of high hopper alarms.</p>		