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Date:  
 19 January 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 NOVEMBER 2023**

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 November 2023. Verified emissions of particulates matter, SO<sub>2</sub> and NO<sub>x</sub> (as NO<sub>2</sub>) are also included.

**Raw Materials and Products**

**Table 1:** Quantity of Raw Materials and Products used/produced for the month of November 2023

Raw Materials and Products used	Raw Material Type	Units	Maximum Permitted Consumption / Rate (Quantity)	Consumption / Rate in Month of November 2023
	Coal	Tons/month	1 227 600	673 566.200
	Fuel Oil	Tons/month	5 000	5 651.396
Production Rates	Product/ By-Product Name	Unit	Maximum Production Capacity Permitted (Quantity)	Production Rate in Month of November 2023
	Ash	Tons/month	not specified	177 821.477
	RE PM	kg/MWh	not specified	1.046

1/...

## Abatement Technology

**Table 2:** Abatement Equipment Control Technology for November 2023.

Associated Unit/Stack	Technology Type	Actual Efficiency (%)	Utilisation
		November 2023	November 2023
Unit 1	ESP	98.34%	1.05%
Unit 2	ESP	99.45%	100.00
Unit 3	ESP	99.04%	94.01%
Unit 4	ESP	99.19%	100.00
Unit 5	ESP	98.64%	100.00%
Unit 6	ESP	Outage	Outage

## Energy Source Characteristics

**Table 3:** Energy Source Material Characteristics for the month of November 2023





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 (%)	SO <sub>x</sub> (%)	NO <sub>x</sub> (%)
North	68.85	84.23	94.00
South	51.84	100.00	100.00

## Emissions Reporting

**Table 6.5:** Graph 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

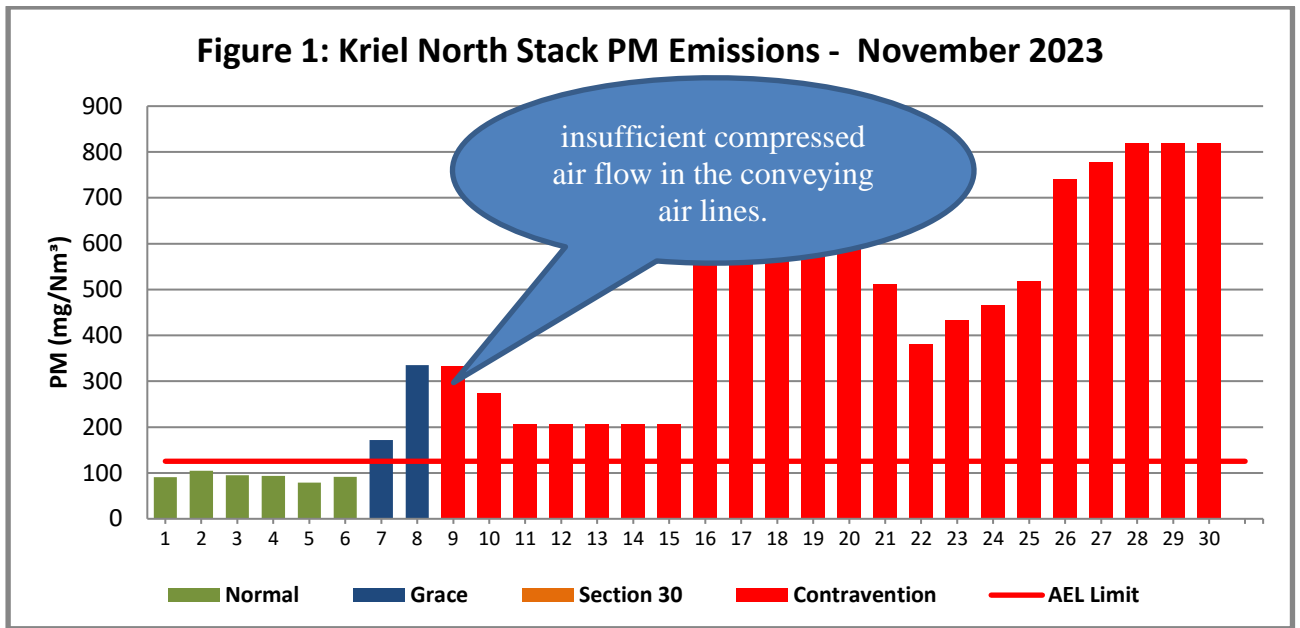


Figure 1: PM emissions for the month of November 2023 against emission limit for the North Stack. Monthly average was 410.4 mg/Nm<sup>3</sup>.

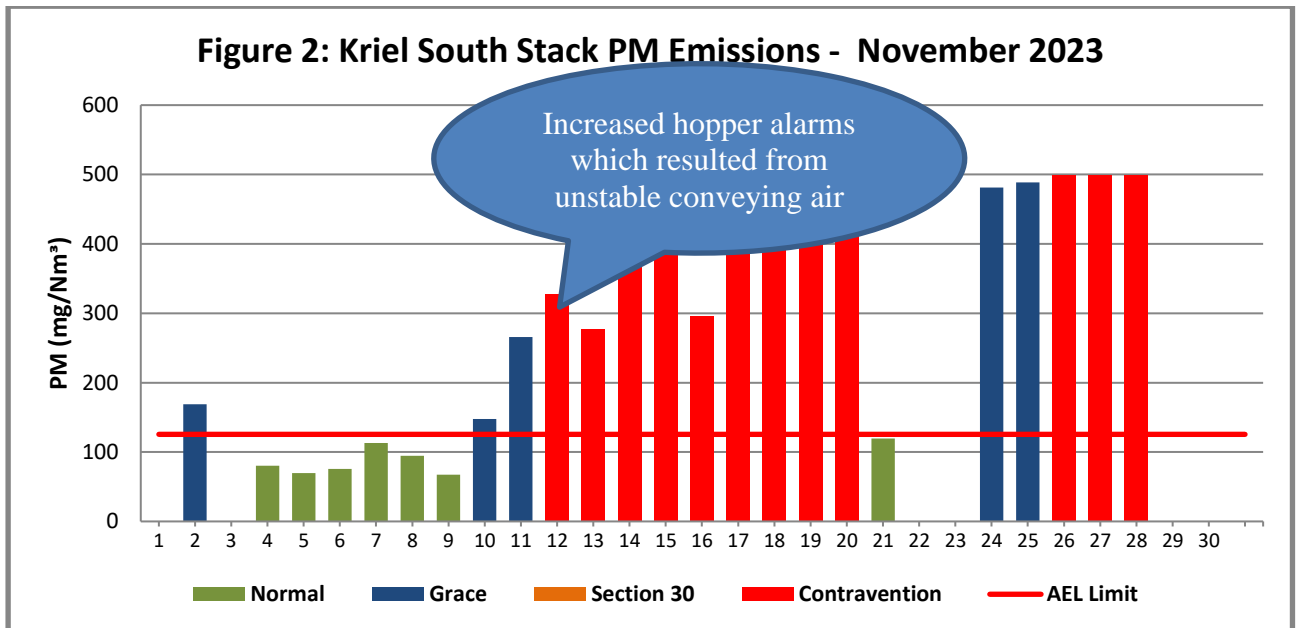


Figure 2: PM emissions for the month of November 2023 against emission limit for the South Stack. Monthly average was 305.3 mg/Nm<sup>3</sup>.

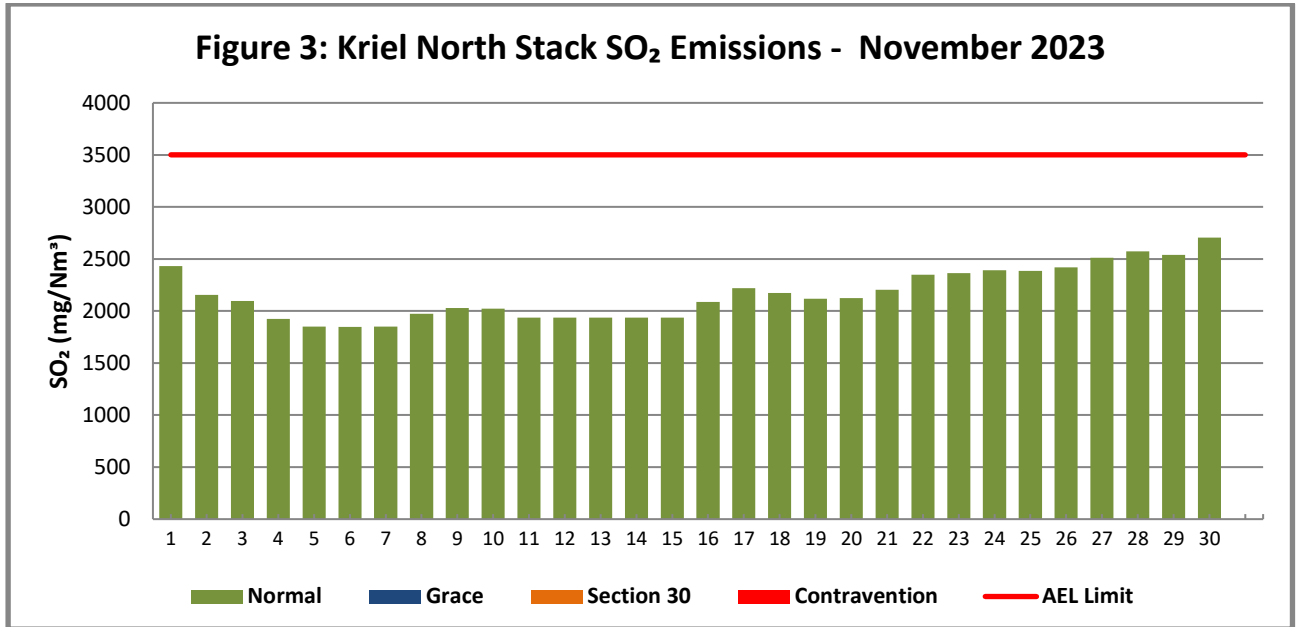


Figure 3. SO<sub>2</sub> emissions for the month of November 2023 against emission limit for the North Stack. The SO<sub>x</sub> Limit is 3500mg/Nm<sup>3</sup>.

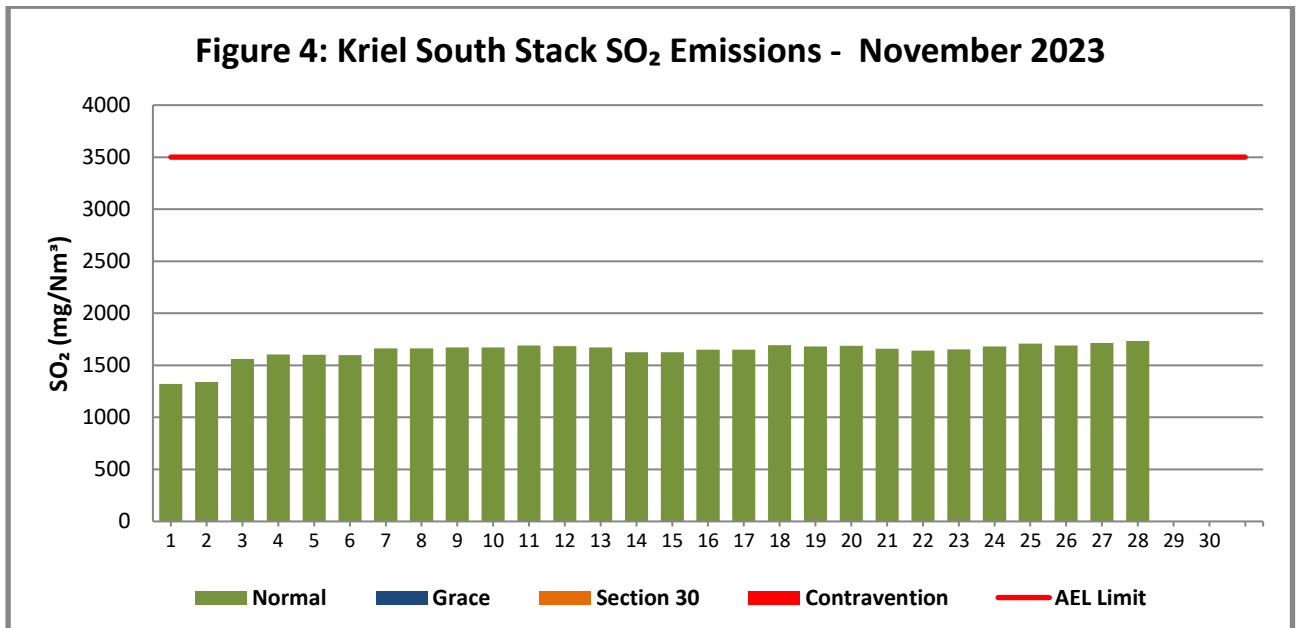


Figure 4. SO<sub>2</sub> emissions for the month of November 2023 against emission limit for the South Stack. The SO<sub>x</sub> Limit is 3500mg/Nm<sup>3</sup>.

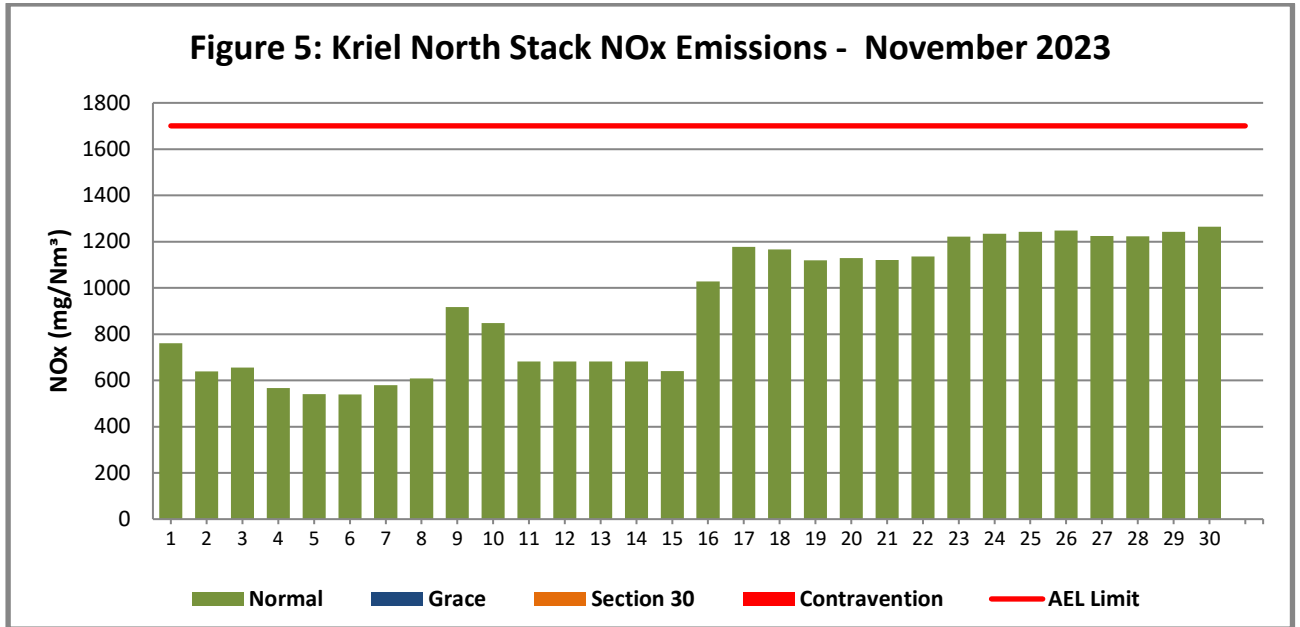


Figure 5. NO<sub>x</sub> emissions for the month of November 2023 against emission limit for the North Stack. The NO<sub>x</sub> Limit is 1600mg/Nm<sup>3</sup>.

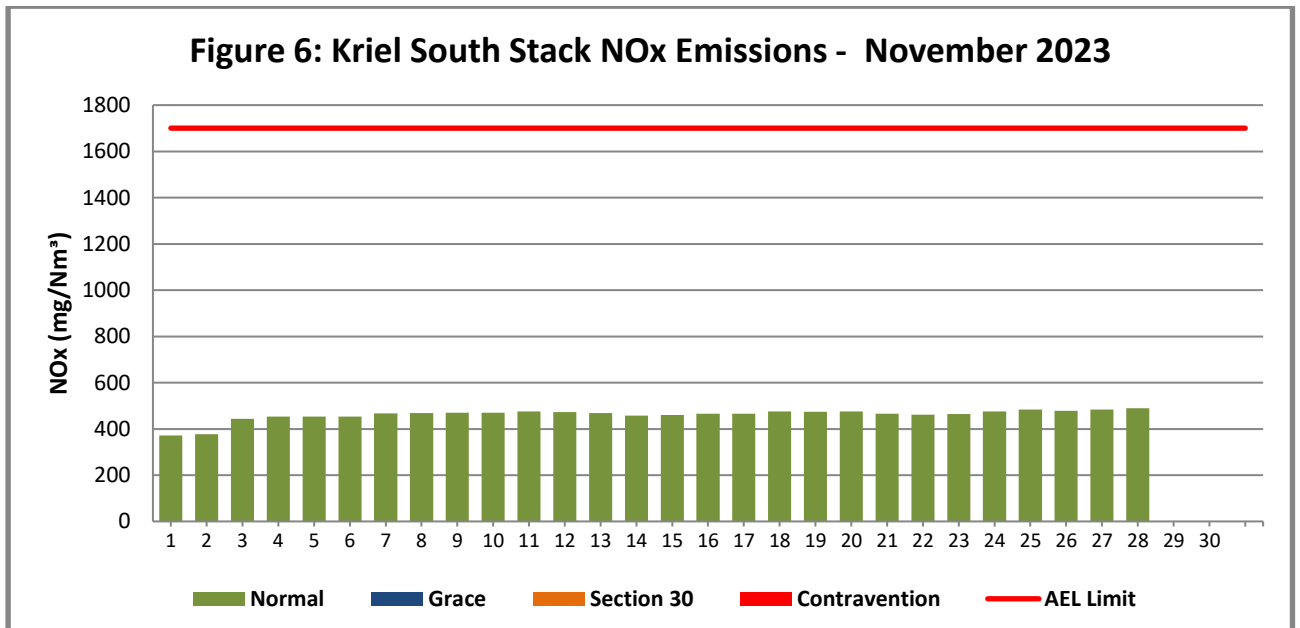


Figure 6. NO<sub>x</sub> emissions for the month of November 2023 against emission limit for the South Stack. The NO<sub>x</sub> Limit is 1600mg/Nm<sup>3</sup>.

Table 4: Monthly tonnages for the month November 2023

Unit	PM (tons)	SO <sub>2</sub> (tons)	NO <sub>2</sub> (tons)
SUM	1 271.3	7 084.5	2 684.8

**Table 5:** Each unit and respective days operating under normal operation and section 30 days respectively.

Table 5.1: Operating days in non-compliance to PM AEL Limit – November 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Monthly Limit Exceedance	Average PM (mg/Nm <sup>3</sup> )
North	06	02	0	22	24	410.4
South	07	05	0	12	17	305.3

Table 5.2: Operating days in compliance to SOx AEL Limit - November 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm <sup>3</sup> )
North	30	0	0	0	0	2 167.5
South	28	0	0	0	0	1 636.8

Table 5.3: Operating days in compliance to NOx AEL Limit – November 2023

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm <sup>3</sup> )
North	30	0	0	0	0	926.6
South	28	0	0	0	0	461.6

**Light up information**

**Table 6:** PM Start-up information for the month of November 2023

North Stack	Event 1		Event 2		Event 3		Event 4	
Unit No.	Unit 1		Unit 1		Unit 1		Unit 2	
Breaker Open (BO)	11:30 pm	2023/11/01	5:25 am	2023/11/03	9:10 pm	2023/11/05	8:05 pm	2023/11/07
Draught Group (DG) Shut Down (SD)	12:15 pm	2023/11/02	10:45 am	2023/11/04	10:05 pm	2023/11/06	2:20 am	2023/11/08
BO to DG SD (duration)	00:12:45	DD:HH:MM	01:05:20	DD:HH:MM	01:00:55	DD:HH:MM	00:06:15	DD:HH:MM
Fires in time	7:55 am	2023/11/08			11:10 pm	2023/11/19	6:40 pm	2023/11/19
Synch. to Grid (or BC)	2:40 am	2023/11/08			4:05 pm	2023/11/20	10:45 pm	2023/11/19
Fires in to BC (duration)	#####	DD:HH:MM		DD:HH:MM	00:16:55	DD:HH:MM	00:04:05	DD:HH:MM
Emissions below limit from BC (end date)	not > limit	not > limit			not > limit	not > limit	not > limit	not > limit
Emissions below limit from	n/a	DD:HH:MM		DD:HH:MM	n/a	DD:HH:MM	n/a	DD:HH:MM

BC (duration)								
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North Stack ...Cont.	Event 1		Event 2		Event 3		Event 4	
Unit No.	Unit 3		Unit 1		Unit 2		Unit 2	
Breaker Open (BO)	5:35 pm	2023/11/15	7:40 pm	2023/11/19	6:40 am	2023/11/07	6:15 am	2023/11/09
Draught Group (DG) Shut Down (SD)	<i>DG did not trip or SD</i>	<i>DG did not trip or SD</i>	7:55 pm	2023/11/19	10:15 pm	2023/11/07	11:30 am	2023/11/09
BO to DG SD (duration)	<i>n/a</i>	DD:HH:MM	00:00:15	DD:HH:MM	00:15:35	DD:HH:MM	00:05:15	DD:HH:MM
Fires in time	8:00 am	2023/11/24						
Synch. to Grid (or BC)	7:00 pm	2023/11/24						
Fires in to BC (duration)	00:11:00	DD:HH:MM		DD:HH:MM		DD:HH:MM		DD:HH:MM
Emissions below limit from BC (end date)	<i>not &gt; limit</i>	<i>not &gt; limit</i>						
Emissions below limit from BC (duration)	<i>n/a</i>	DD:HH:MM		DD:HH:MM		DD:HH:MM		DD:HH:MM

South Stack	Event 1		Event 2		Event 3		Event 4	
Unit No.	Unit 4		Unit 5		Unit 5		Unit 5	
Breaker Open (BO)	1:45 am	2023/11/21	6:00 am	2023/11/21	3:10 pm	2023/11/21	5:30 am	2023/11/22
Draught Group (DG) Shut Down (SD)	2:15 am	2023/11/21	2:20 pm	2023/11/21	4:05 am	2023/11/22	9:30 am	2023/11/22
BO to DG SD (duration)	00:00:30	DD:HH:MM	00:08:20	DD:HH:MM	00:12:55	DD:HH:MM	00:04:00	DD:HH:MM
Fires in time	11:30 am	2023/11/05	4:40 am	2023/11/01			10:20 am	2023/11/22
Synch. to Grid (or BC)	6:00 am	2023/11/06	3:40 pm	2023/11/01			4:30 am	2023/11/23
Fires in to BC (duration)	00:18:30	DD:HH:MM	00:11:00	DD:HH:MM		DD:HH:MM	00:18:10	DD:HH:MM
Emissions below limit from BC (end date)	<i>not &gt; limit</i>	<i>not &gt; limit</i>	<i>not &gt; limit</i>	<i>not &gt; limit</i>			12:20 am	2023/11/28
Emissions below limit from BC (duration)	<i>n/a</i>	DD:HH:MM	<i>n/a</i>	DD:HH:MM		DD:HH:MM	04:19:50	DD:HH:MM

South Stack ...Cont.	Event 1		Event 2		Event 3		Event 4	
Unit No.	Unit 6		no event		Unit 5		Unit 5	
Breaker Open (BO)	10:15 am	2023/11/22	4:30 pm	2023/11/02	8:05 pm	2023/11/21	12:20 am	2023/11/28
Draught Group (DG) Shut Down (SD)	12:00 pm	2023/11/22	DG did not trip or SD	DG did not trip or SD	11:25 pm	2023/11/21	1:05 pm	2023/11/28
BO to DG SD (duration)	00:01:45	DD:HH:MM	n/a	DD:HH:MM	00:03:20	DD:HH:MM	00:12:45	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

**Complaints Register**

**Table 9:** Complaints for the month of November 2023.

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 November 2023.					

**General**

The particulate matter (PM10) emissions on the North Common Stack exceeded the **monthly limit**; on average emissions figure of **410.4 mg/Nm<sup>3</sup>** while South Common Stack also exceeded the **monthly limit** on the recorded PM10 monthly average figure of **305.3 mg/Nm<sup>3</sup>**. The gaseous (NOx & SOx) emissions on the North and South common Stacks were within the **daily limit** during the month of November 2023; 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,	Open	



		which calls for operating the unit with fuel oil support to badly impacting the stack emissions		
<b>May - 2023</b>	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	
<b>May - 2023</b>	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	
<b>June - 2023</b>	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	Open	

		resulting in high stack emissions		
<b>June - 2023</b>	South 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	
<b>July - 2023</b>	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 (SO3) not in		

		service. The south stack PM emission daily average has significantly reduced since synchronisation of units from half station shutdown.		
<b>Aug - 2023</b>	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.		
<b>Sep - 2023</b>	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.		
<b>Oct - 2023</b>	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.		
<b>Oct - 2023</b>	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		

		<p>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.</p>		
<p><b>Nov - 2023</b></p>	<p>North High Stack Emissions</p>	<p>It was due to the loss of two main electric conveying air compressors, namely Demag 5 &amp; 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.</p>		
<p><b>Nov - 2023</b></p>	<p>South High Stack Emissions</p>	<p>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</p>		

		alarms that failed to clear. As result there was a high ash accumulation and hang ups 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.		
<b>Dec - 2023</b>				
<b>Jan - 2024</b>				
<b>Feb - 2024</b>				
<b>Mar - 2024</b>				