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Date:
 26 April 2022

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

Dear Ms Nembilwi

KRIEL POWER STATION'S MONTHLY STACK EMISSIONS REPORT FOR THE MONTH OF MARCH 2022

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 2022. 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 2022

Raw Materials and Products used	Raw Material Type	Units	Maximum Permitted Consumption / Rate (Quantity)	Consumption / Rate in Month of March 2022
	Coal	Tons/month	1 227 600	609 485
	Fuel Oil	Tons/month	5 000	3 535.10
Production Rates	Product/ By-Product Name	Unit	Maximum Production Capacity Permitted (Quantity)	Production Rate in Month of March 2022
	Ash	Tons/month	not specified	196
	RE PM	kg/MWh	not specified	0.21

1/...

Abatement Technology

Table 2: Abatement Equipment Control Technology for March 2022.

Associated Unit/Stack	Technology Type	Actual Efficiency (%)	Utilisation
		March 2022	March 2022
Unit 1	ESP	99.80%	100%
Unit 2	ESP	99.79%	85.3%
Unit 3	ESP	99.79%	92.3%
Unit 4	ESP	100%	89.5%
Unit 5	ESP	100%	78.5%
Unit 6	ESP	Outage	Outage

Energy Source Characteristics

Table 3: Energy Source Material Characteristics for the month of March 2022





Characteristic	Stipulated Range (Unit)	Monthly Average Content
Sulphur Content	0.6-1.2 (%)	0.98
Ash Content	21-36 (%)	25.51

Monthly Monitor Reliability

Associated Unit/Stack	PM (%)	SOx (%)	NOx (%)
North	95.67%	77.06%	6.54%
South	87.52%	99.91%	100%

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

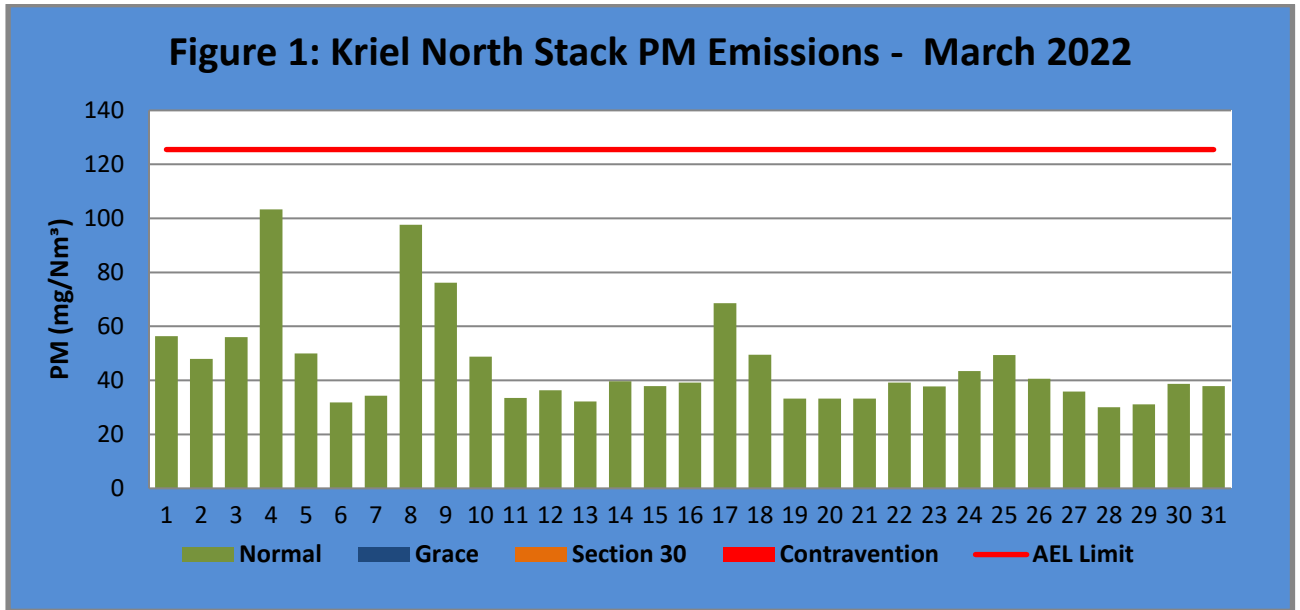


Figure 1: PM emissions for the month of March 2022 against emission limit for the North Stack. Monthly average was 45.9 mg/Nm³

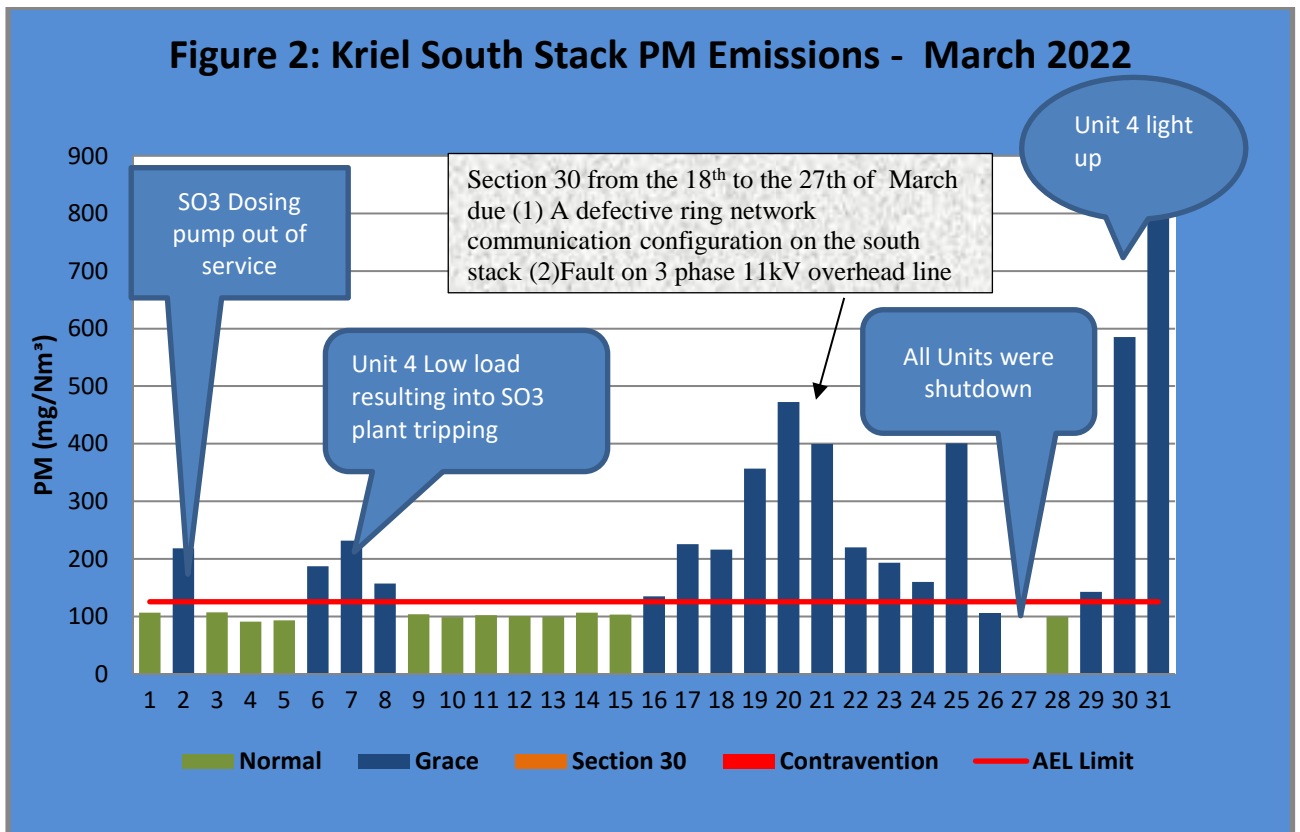


Figure 2: PM emissions for the month of March 2022 against emission limit for the South Stack. Monthly average was 214.2 mg/Nm³

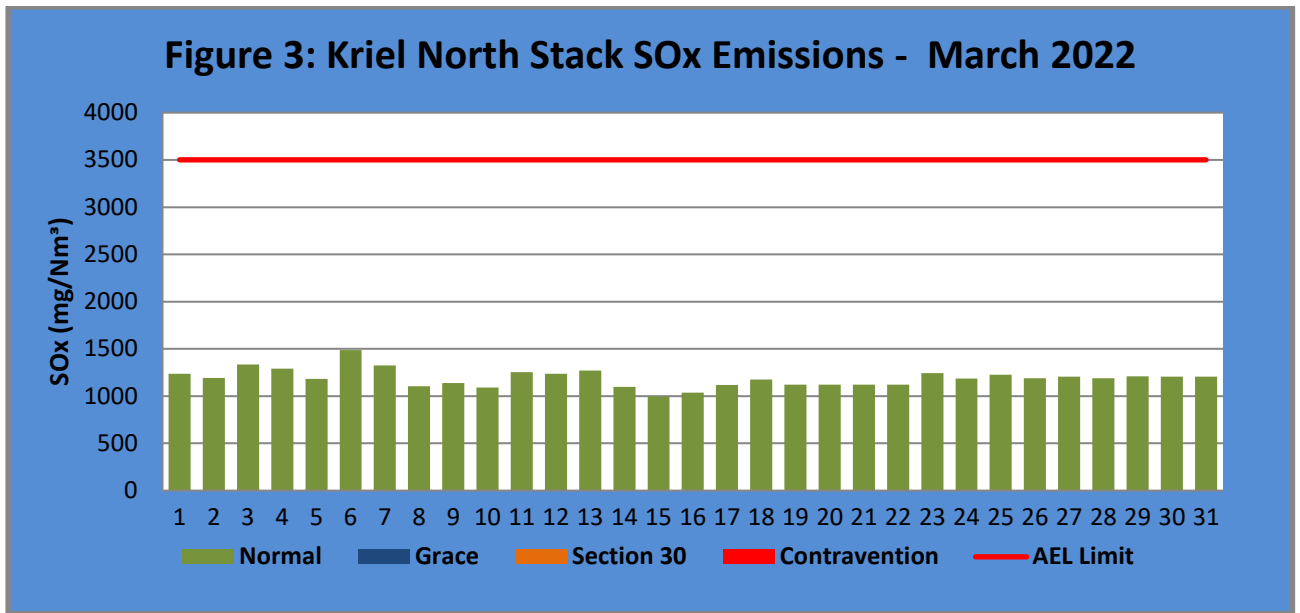


Figure 3. SO₂ emissions for the month of March 2022 against emission limit for the North Stack. The SO_x Limit is 3500mg/Nm³.

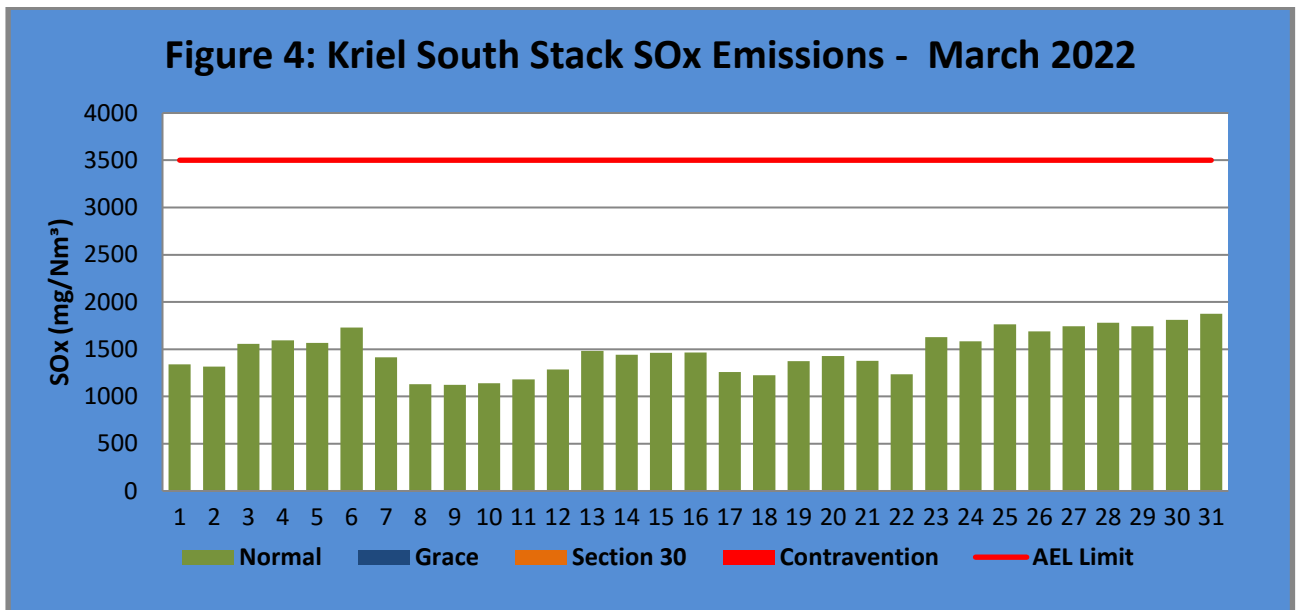


Figure 4. SO₂ emissions for the month of March 2022 against emission limit for the South Stack. The SO_x Limit is 3500mg/Nm³.

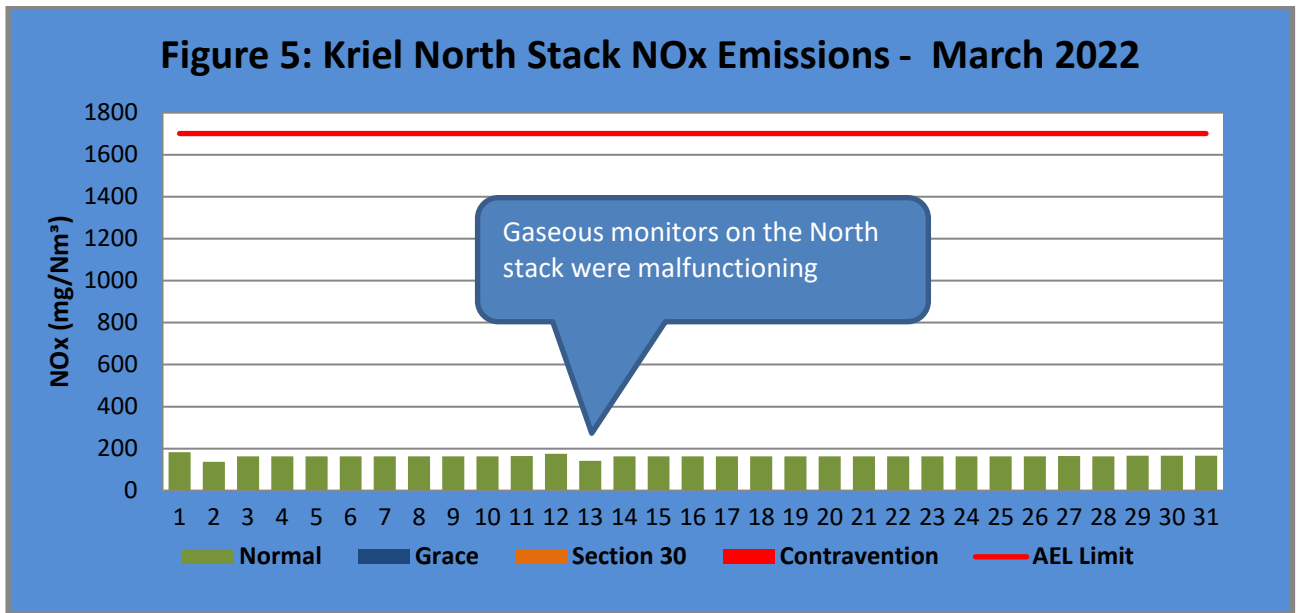


Figure 5. NO₂ emissions for the month of March 2022 against emission limit for the North Stack. The NO_x Limit is 1600mg/Nm³.

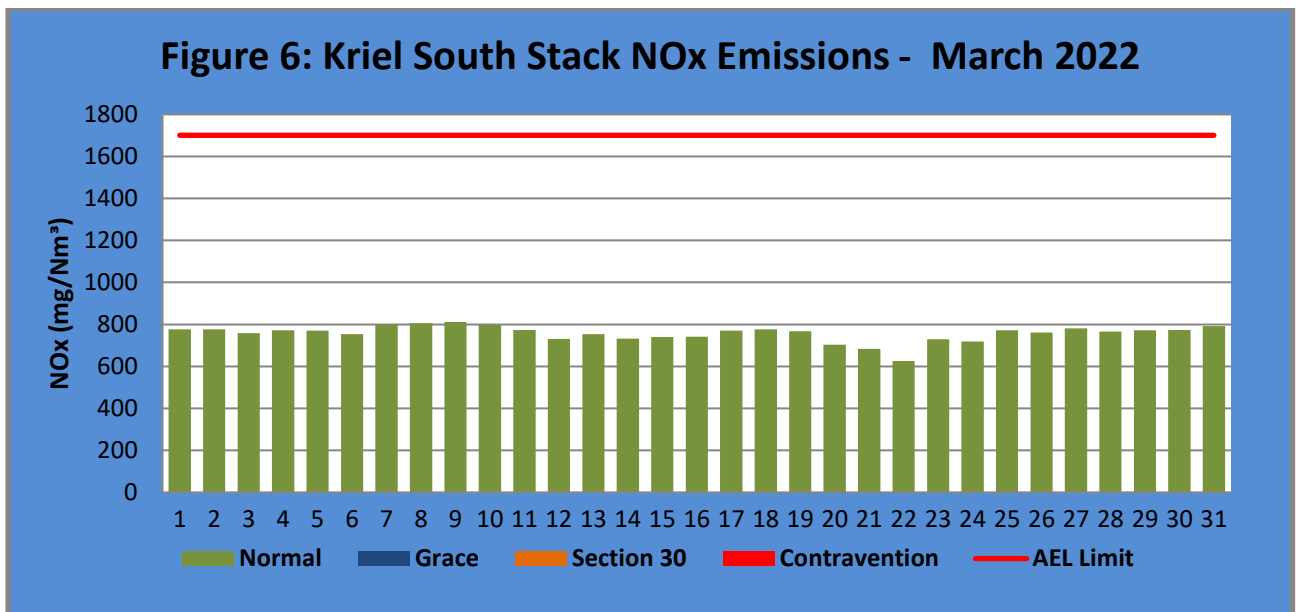


Figure 6. NO₂ emissions for the month of March 2022 against emission limit for the South Stack. The NO_x Limit is 1600mg/Nm³.

Table 4: Monthly tonnages for the month March 2022

Unit	PM (tons)	SO ₂ (tons)	NO ₂ (tons)
SUM	196.0	5 167.4	705.4

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

Table 5.1: Operating days in compliance to PM AEL Limit – March 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Monthly Limit Exceedance	Average PM (mg/Nm ³)
North	31	0	0	0	0	45.9
South	12	1	0	0	17	214.2

Table 5.2: Operating days in compliance to SOx AEL Limit - March 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average SOx (mg/Nm ³)
North	31	0	0	0	0	1 190.9
South	31	0	0	0	0	1 475.6

Table 5.3: Operating days in compliance to NOx AEL Limit – March 2022

Associated Unit/Stack	Normal	Grace	Section 30	Contravention	Total Exceedance	Average NOx (mg/Nm ³)
North	31	0	0	0	0	162.7
South	31	0	0	0	0	757.6

Light up information

Table 6: PM Start-up information for the month of March 2022

North Stack	Event 1		Event 2		Event 3	
Unit No.	Unit 2		Unit 3		Unit 3	
Breaker Open (BO)	11:40 PM	2022/03/11	4:15 AM	2022/03/27	12:00 PM	2022/03/30
Draught Group (DG) Shut Down (SD)	12:20 PM	2022/03/12	5:05 AM	2022/03/27	DG did not trip or SD	DG did not trip or SD
BO to DG SD (duration)	00:12:40	DD:HH:MM	00:00:50	DD:HH:MM	n/a	DD:HH:MM
Fires in time	8:35 PM	2022/03/15	1:50 AM	2022/03/29	12:00 PM	2022/03/30
Synch. to Grid (or BC)	3:00 PM	2022/03/16	8:15 AM	2022/03/29	5:20 PM	2022/03/30
Fires in to BC (duration)	00:18:25	DD:HH:MM	00:06:25	DD:HH:MM	00:05:20	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 BC (duration)	n/a	DD:HH:MM	n/a	DD:HH:MM	n/a	DD:HH:MM

South Stack	Event 1		Event 2		Event 3		Event 4	
Unit No.	Unit 4		Unit 5		Unit 5		Unit 4	
Breaker Open (BO)	8:45 PM	2022/03/14	9:20 PM	2022/03/18	8:35 PM	2022/03/23	7:20 AM	2022/03/26
Draught Group (DG) Shut Down (SD)	DG did not trip or SD	DG did not trip or SD	10:00 AM	2022/03/19	9:15 PM	2022/03/23	7:10 PM	2022/03/26
BO to DG SD (duration)	n/a	DD:HH:MM	00:12:40	DD:HH:MM	00:00:40	DD:HH:MM	00:11:50	DD:HH:MM
Fires in time	8:45 PM	2022/03/14	12:45 AM	2022/03/24	7:15 PM	2022/03/26	11:55 AM	2022/03/28
Synch. to Grid (or BC)	4:15 PM	2022/03/15	8:10 AM	2022/03/24	1:20 AM	2022/03/27	5:50 PM	2022/03/28
Fires in to BC (duration)	00:19:30	DD:HH:MM	00:07:25	DD:HH:MM	00:06:05	DD:HH:MM	00:05:55	DD:HH:MM
Emissions below limit from BC (end date)	not > limit	not > limit	not > limit	not > limit	not > limit	not > limit	not > limit	not > limit
Emissions below limit from BC (duration)	n/a	DD:HH:MM	n/a	DD:HH:MM	n/a	DD:HH:MM	n/a	DD:HH:MM

Complaints Register

Table 9: Complaints for the month of March 2022.

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 2022.					

General

The particulate matter (PM10) emissions on the North Common Stack were within the **monthly limit**; North stack recorded the monthly PM10 average emissions figure of **45.9 mg/Nm³** while South Common Stack exceeded the **monthly limit** and recorded PM10 monthly average figure of **214.2 mg/Nm³**. The gaseous (NOx & SOx) emissions on the north and south common stacks were also within the **daily limit** during the month of March 2022; refer to graphs above. However were monitors were defected

Hereunder is the sequence of events resulting into south stack experiencing high emissions during the months of March 2022:

1. On Friday, 18 March 2022 (at around 09:30), Operating Department noted an increase on South stack's emissions performance resulting on emissions averaging above the 125mg/Nm³ licenced limit. The matter was immediately reported and investigated by maintenance team.
2. The incident investigation team discovered that the issue was a circuit breaker at the south sulphur dosing pump house Programmable Logic Controller (PLC) that was found on trip position. The tripped circuit breaker resulted in a loss of communication to the SO₃ PLC which is connected to the ring network configuration connecting the unitised SO₃ PLCs to the sulphur dosing pump house PLC
3. This consequently affected the efficiency of the Electrostatic Precipitators (ESPs) on the south common stack.
4. This meant that the entire south side did not have any functioning SO₃ PLCs, and it further worsened the PM10 emissions performance on the South Common Stack
5. The maintenance team reset the tripped circuit breaker and restored power supply to the PLC
6. On Friday, 25 March 2022, (around 10:00) a defect on 3 phase 11kV overhead line 1 located at link 3 affected the Ash Water Return (AWR) boards resulting in power loss to both overland conveyors.
7. Upon investigation it was found that 11kV overhead line (OHL) 1 tripped on NOC3 Low (Non-direction Overcurrent) between two phases (fault magnitude about 5.6 kA), and the fault fed back to 11 Unit board 1A and tripped the incomer breaker for this board. The direct cause was due to the moisture ingress into the 11kV Ash Conveyor Board 1 that led to an electrical fault
8. This further worsened the PM10 emissions performance on the South common stack, with emissions hovering around 535mgNm³. During the 2 days that the overland conveyors did not remove dust, the silo levels (main silo and transfer silos) were at maximum resulting in high hopper levels and smoke stack emissions
9. The line was re-energised from an alternative supply 11kV (Kriel Colliery) , however, the ash conveyor boards 1 &2 now had defects meaning the overland conveyors did not have power still.
10. On Sunday, the 27 March 2022 (at around 17:00) the power was restored to the ash conveyor boards 1 &2 and the overland conveyors could be operated.

Notification of unavailability of online gaseous emissions monitor on the north emissions stack at Kriel Power station

1. On 7 March 2022, Kriel Power Station discovered that the NOx gaseous monitors on the North stack were malfunctioning.
2. The Original Equipment Manufacturer (OEM) contracted by Kriel Power Station to carry out the monthly calibrations for the power station’s gaseous monitors was notified and requested to investigate and resolve the issue. The OEM reported to site within 24 hours
3. The post- inspection report found that “The Monitor “Head” had a faulty Micro processor PCB; due to this problem the Cooler current inside the head is running at the max tolerated range and due to this all the temperatures are higher than tolerated spec, so EPA and the Supplier Codel made a few adjustments to some internal settings with the hope that it will solve the issue and stay stable”
4. “The Analyser will stay in-situ until the spare unit arrives from Codel the supplier within 6 to 8 weeks”

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 2021/2022 Financial Year

Month	Description of Section30 Incidents - including the reference number	Root Cause (s)	Status of S30 Incident with DEFF (open or closed)	Remarks
April– 2021	North Stack: Upset condition in Units 1,2 and 3 exceeded 48 hours Grace Period	1.Castlet Key System failure 2.Defective Pyrometers	Open	1 event reported
May – 2021	None			
June – 2021	None			
July – 2021	None			
Aug - 2021	None			
Sep – 2021	South Stack: Upset condition in Units 4,5 and 6 exceeded 48 hours grace period	Spark from loose electrical connection on the motor terminal at the South SO3 pump house resulting into flashover	Closed	1 event reported
Oct – 2021	None			
Nov – 2021	None			
Dec – 2021	North Stack: Upset condition in Units 1,2 and 3 exceeded 48 hours Grace Period South Stack: Upset condition in Units 4,5 and 5 exceeded 48 hours grace period	Air compressor failure resulting into inadequate air pressure Unit 6’s defective SO ₃ plant blower motor	Open Open	2 events reported
Jan – 2022	South Stack: Upset condition in Units 4,5 and 5 reported in the		Open	1 event reported

	month of December 2021 was further worsened by additional defects	<ul style="list-style-type: none"> -Unit 6's defective SO₃ plant blower motor -Air compressor failure resulting to inadequate air pressure -Defective circuit breaker resulting into loss of power supply to South Stack's SO₃ PLC 		
Feb – 2022	None			
Mar - 2022	South Stack: Upset condition in Units 4,5 and 6 exceeded 48 hours grace period	<ul style="list-style-type: none"> -A defective ring network communication configuration on the south stack -Fault on 3 phase 11kV overhead line 	Open	1 event reported