Eskom

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Date:
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Enquiries:
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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 December 2019

This serves as the monthly report required in terms of Section 7.2.1 in Kriel Power Station's Atmospheric Emission License 17/4/AEL/MP312/11/09. The emissions are for the month of December 2019. Verified emissions of particulates matter, SO_2 and NO_x (as NO_2) are also included.

Raw Materials and Products

Table 1: Quantity of Raw Materials and Products used/produced for the month of December 2019

Raw Materials and Products used	Raw Material Type	Units	Maximum Permitted Consumption/ Rate (Quantity)	Consumption/ Rate in Month of November 2019
	Coal	Tons/month	1 227 600	650 348
	Fuel Oil	Tons/month	5 000	9 104.6
Production Rates	**Product/ By-Product Name**	**Unit**	**Maximum Production Capacity Permitted (Quantity)**	**Production Rate in Month of November 2019**
	Ash	Tons/month	not specified	730.2
	RE PM	kg/MWh	not specified	0.60

1/…

Abatement Technology

Table 2: Abatement Equipment Control Technology for December 2019

Associated Unit/Stack	Technology Type	Actual Utilisation (%) December 2019
Unit 1	ESP	100.0%
Unit 2	ESP	100.0%
Unit 3	ESP	100.0%
Unit 4	ESP	80.0%
Unit 5	ESP	95.0%
Unit 6	ESP	96.9%

Energy Source Characteristics

Table 3: Energy Source Material Characteristics for the month of December 2019

Characteristic	Stipulated Range (Unit)	Monthly Average Content
CV Content	18-24 (MJ/kg)	
Sulphur Content	0.6-1.2 (%)	0.87
Ash Content	27-32 (%)	26.54

Monthly Monitor Reliability

Associated Unit/Stack	PM (%)	SOx (%)	NOx (%)
North	90.98%	93.93%	93.79%
South	98.12%	(Monitor Defected)	(Monitor Defected)

Emissions Reporting

GRAPH LEGEND	
	Final daily emissions average in mg/Nm^3 released within a particular day
	Final monthly emissions average in mg/Nm^3 released within the whole month
	Emissions limit as per the AEL

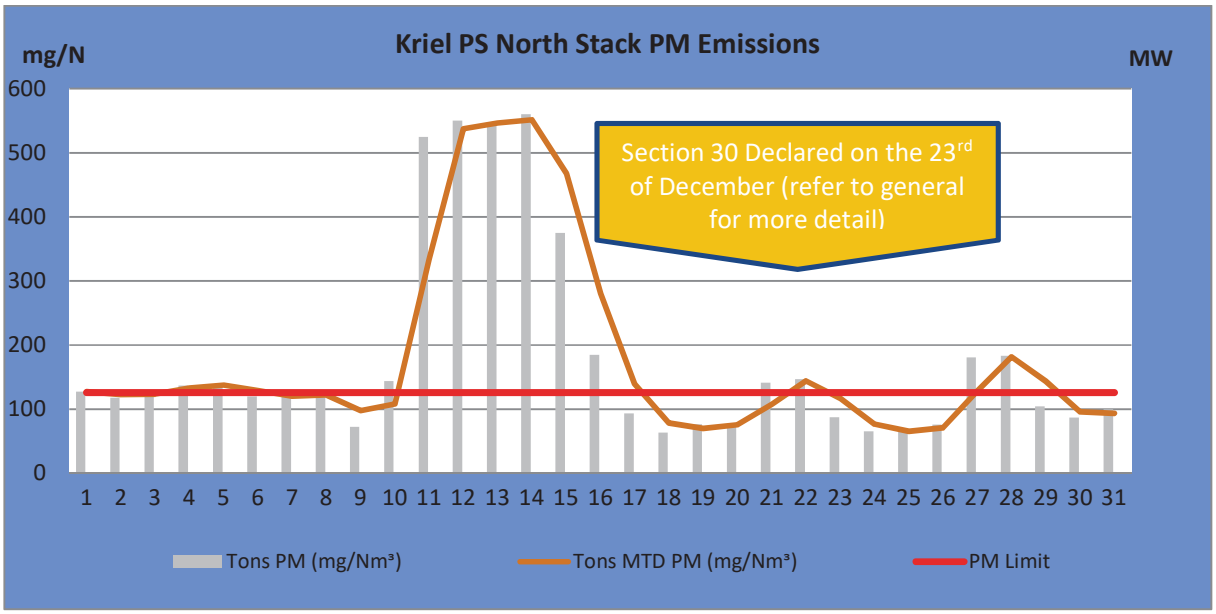

Figure 1: PM emissions (daily averages) for the month of December 2019 against emission limit for the North Stack

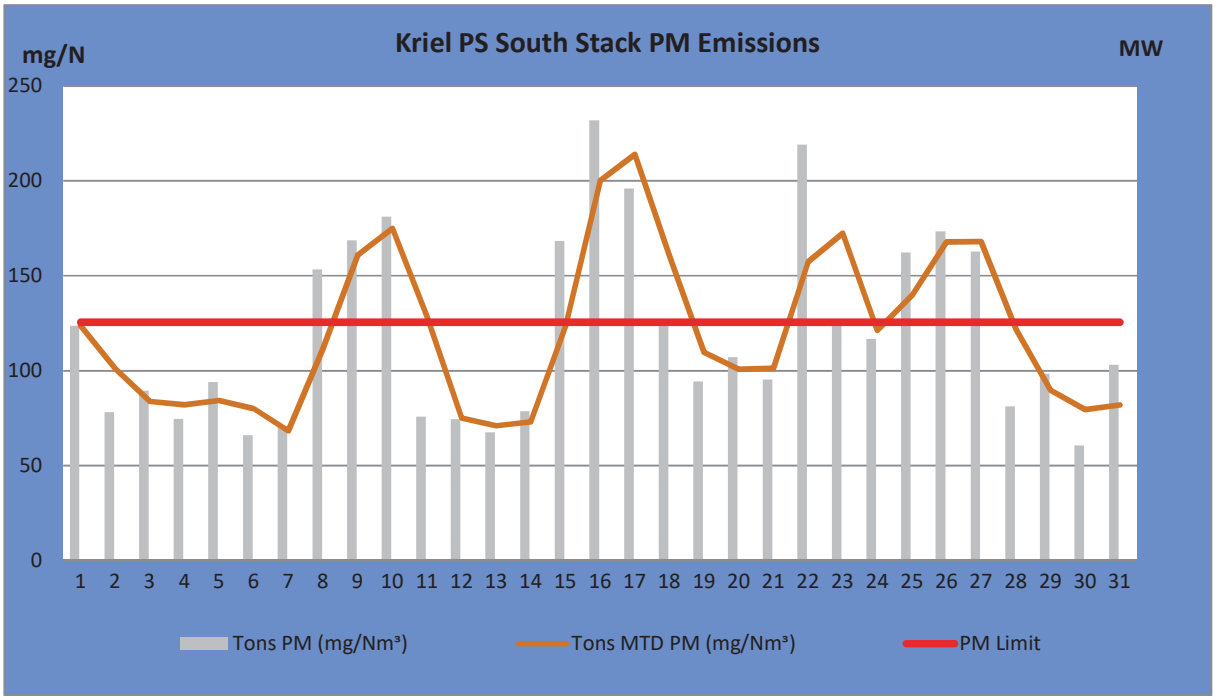

Figure 2: PM emissions (daily averages) for the month of December 2019 against emission limit for the South Stack

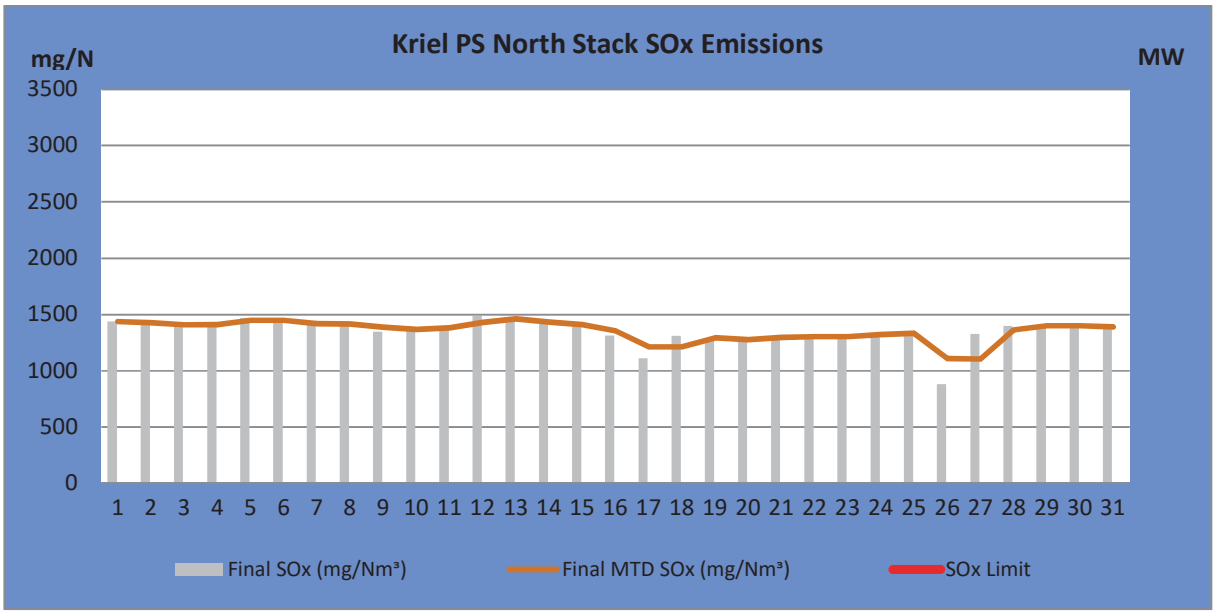

Figure 3. SO_2 emissions (daily averages) for the month of December 2019 against emission limit for the North Stack. SOx permitted maximum release rate is 3 500mg/Nm^3

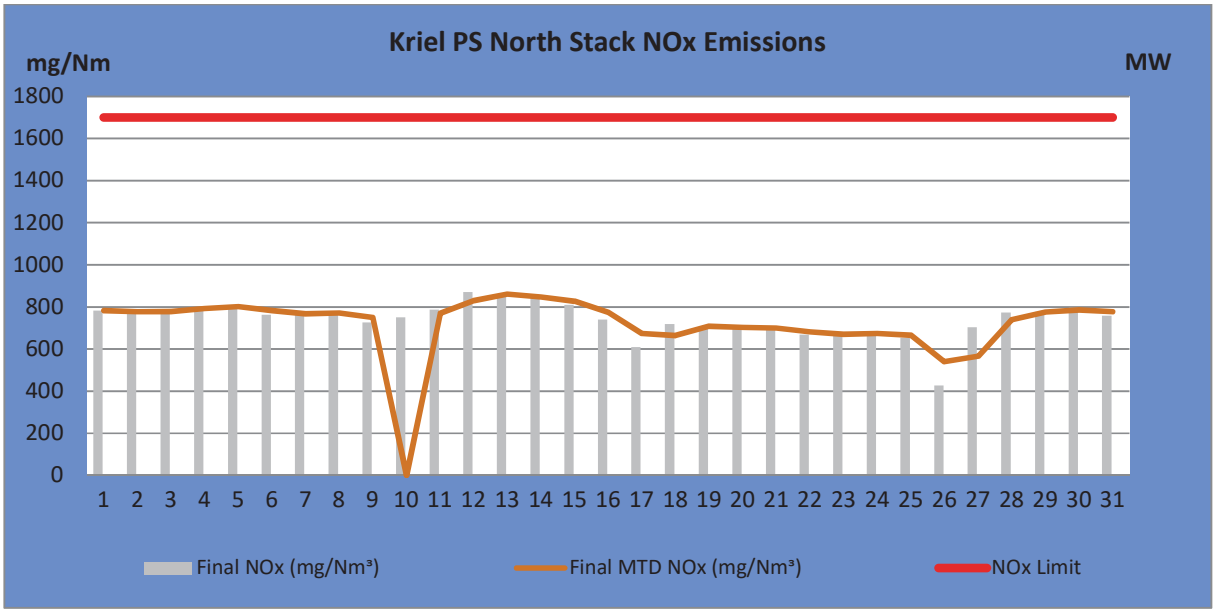

Figure 4: NO_2 emissions (daily averages) for the month of December 2019 against emission limit for the North Stack. NOx permitted maximum release rate is 1 600mg/Nm^3

South Stack Monitors

Gas Monitors were defective on the South Stack and therefore Unavailable from the 1st of December 2019 to the 31st of December 2019. The matter was reported to the licencing authority.

Table 4: Monthly tonnages for the month December 2019

Unit	PM (tons)	SO_2 (tons)	NO_2 (tons)	CO_2 (tons)
1	140.5	1 092.1	598.6	
2	88.6	499.3	279.2	
3	83.4	609.4	338.0	
4	157.4	4 199.2	3 626.1	
5	106.3	3 171.5	2 742.6	
6	154.0	3 770.5	3 117.5	
SUM	730.2	10 702.0	10 702	

	Operating Days (DD:HH:MM)			
Unit	Normal operation	In grace period	Under S 30	Unit off load
1	30:08:30	00:00:00	00:00:00	00:15:30
2	15:02:00	00:00:00	00:00:00	15:22:00
3	17:07:20	00:00:00	00:00:00	13:16:40
4	26:19:45	00:00:00	00:00:00	04:04:15
5	22:00:00	00:00:00	00:00:00	09:00:00
6	30:18:40	00:00:00	00:00:00	00:05:20

Light up information

Table 6: PM Start-up information for the month of December 2019

North Stack	Event 2		Event 4		Event 5	
Unit No.	Unit 1		Unit 3		Unit 3	
Fires in	10:05 AM	2019/12/09	8:15 AM	2019/12/07	1:40 AM	2019/12/14
Synchronisation with Grid	1:30 AM	2019/12/10	4:20 AM	2019/12/08	2:20 PM	2019/12/14
Emissions below limit from Sync (Date and Time)						
Fires in to synchronization	00:15:25		00:20:05		00:12:40	
Synchronization to < limit (Duration	did not go above limit		did not go above limit		did not go above limit	

North Stack	Event 6	
Unit No.	Unit 3	
Fires in	11:50 PM	2019/12/19
Synchronisation with Grid		
Emissions below limit from Sync		
Fires in to synchronization		
Synchronization to < limit	did not go above limit	

South Stack	No event
Unit No.	
Fires in	
Synchronisation with Grid	
Emissions below limit from Sync	
Fires in to synchronization	
Synchronization to < limit	

Table 7. Point Source emissions released during start-up (fires-in) for the month of December 2019 in mg/Nm^3

North Stack Emission Average from Fires-in to Synchronisation (Date and Time)							
Unit	Fires-In		Synchronisation		PM	SO_2	NO_x
Unit 1	2019/12/09	10:05 AM	2019/12/10	1:30 AM	72.1	931.2	460.3
Unit 3	2019/12/07	8:15 AM	2019/12/08	4:20 AM	131.6	1175.2	651.8
Unit 3	2019/12/14	1:40 AM	2019/12/14	2:20 PM	656.7	1172.1	637.9
Unit 3	2019/12/19	11:50 PM	2019/12/20	4:30 AM	33.8	960.6	516.9

Table 8. Point Source emissions released during Shut-down (SD) for the month of December 2019 in mg/Nm^3

North Stack Emission Average Breaker Open (BO) to Draft Group Shut Down (SD) (Date & Time)							
Unit	Breaker Open		DG SD		PM	SO_2	NO_x
Unit 2	2019/12/16	2:00 AM	2019/12/16	2:50 PM	108.8	852.4	450.7
Unit 3	2019/12/16	2:15 PM	2019/12/16	2:50 PM	103.4	768.1	420.7

Complaints Register

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 December 2019					

Table 9: Complaints for the month of December 2019

General
The particulate matter emissions on the North Stack exceeded the limit due to a sudden upset condition while South Stack was within the limit during the month of December 2019. The NEMA section 30 incident for north stack was reported to the licencing authority and the EMIs.

Online Gaseous Emissions Monitor (for NOx and SOx) were unavailable only on the South Stack.

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

North Stack NEMA Section 30 Summary:

On the 08th of December 2019, the North Common Stack had unit 1, 2 and 3 on load when high particulate emissions were reported. Hereunder is the sequence of events related to the incident:

- On Sunday, 8 December 2019 at around 08:04 am, the emissions on the North Stack exceeded the daily limit of 125mg/Nm3.
- Upon preliminary investigations, it was discovered that high emissions was caused by the failure of the flue gas conditioning plant (SO3) which injects sulphur trioxide into the north flue gas system (unit 1-3).
- Unit 01 and 02's sulphur conditioning plants (SO3) were immediately returned to service; however, the Unit 03 SO3 plant could not be restored as an upset condition was identified regarding the malfunction of the sulphur flow sensor. Consequently, the Electrostatic Precipitators in unit 3 operated with a reduced casing efficiency below 99% resulting into high emissions on the north stack from the 8th to the 16th of December 2019.
- On the 9th of December 2019, the maintenance team fabricated a by-pass line as a temporary measure for operation of the Unit 03 SO3 system; however, this measure was only effective for a few hours. The maintenance team attempted to replace the damaged flow sensor until 12 December 2019 without success. On the 12th of December 2019, the Original Equipment Manufacturer (OEM) was called to site to assist with replacing the equipment.The equipment was replaced and commissioned successfully on the 13th of December 2019 by the OEM.