



Medupi Power Station Monthly Emissions Report

Identifier	240-43921804	Rev	6
Document Identifier	240-88543153	Rev	1
Effective Date	January 2018		
Review Date	January 2021		

Phumudzo Thivhafuni

Date: 2018/10/20

Limpopo Dept. of Economic Development, Environment and Tourism

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Ref: 12/4/12L-W2/A3 – Sep 2018

Dear Phumudzo

MEDUPI POWER STATION MONTHLY EMISSIONS REPORT FOR THE MONTH OF SEPTEMBER 2018

This document serves as the monthly report required in terms of Section 7.7.1 of Medupi Power Station Provisional Atmospheric Emission License (AEL), 12/4/12L-W2/A3.

This report is a reflection of Unit 4, 5 and 6 gaseous and particulate emissions performance against the AEL limit for the month of September 2018 only. Calculated CO₂ emissions is presented in this report, this is due to challenges regarding CO₂ monitoring in power station. Unit is was on outage throughout the reporting period.

1. Raw Materials and Products

Table 1: Quantity of raw materials and products used/produced for Unit 4, 5 and 6 in September 2018

Raw Materials and Products used	Raw Material Type	Unit	Maximum Permitted Consumption/ Rate (Quantity)	Unit 4, 5 and 6 consumption September 2018
	Coal	Tons/month	1 875 000	356 868
	Fuel Oil	Tons/month	40 000	1365
Production Rates	Product/ By-Product Name	Unit	Maximum Production Capacity Permitted (Quantity)	Unit 4, 5 and 6 Production Rate in Month of September 2018
	Energy	MW	4800	1177
	Ash Emitted	Tons/month	not specified	77.8

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Table 2: Daily consumption and production rates

Date	Reportable hours of Operation			Fuel Consumption (tons)				Production rate (MW)		
	Unit 4	Unit 5	Unit 6	Oil			Coal	U4	U5	U6
				Aux Boiler	Unit 4, 5 & 6	Total	Unit 4, 5 & 6)			
01-Sep -18	24.0	24.0	0.0	0.0	50	50	9490	564	592	
02-Sep -18	24.0	24.0	0.0	0.0	19	19	13348	599	653	
03-Sep -18	24.0	24.0	0.0	0.0	6	6	13371	604	645	
04-Sep -18	24.0	24.0	0.0	0.0	11	11	13005	621	614	
05-Sep -18	24.0	24.0	0.0	8.6	3	12	12630	578	493	
06-Sep -18	24.0	24.0	0.0	0.6	5	6	12753	578	515	
07-Sep -18	24.0	24.0	0.0	0.0	2	2	12668	611	545	
08-Sep -18	24.0	24.0	0.0	0.0	0	0	12701	626	529	
09-Sep -18	3.8	24.0	0.0	0.0	14	14	9905	551	533	
10-Sep -18	10.4	24.0	0.0	0.0	60	60	13336	592	554	
11-Sep -18	24.0	24.0	0.0	0.0	7	7	11485	617	269	
12-Sep -18	24.0	24.0	0.0	0.0	179	179	11938	626	567	
13-Sep -18	24.0	24.0	0.0	0.0	16	16	13078	616	569	
14-Sep -18	24.0	24.0	0.0	0.0	0	0	13128	622	579	
15-Sep -18	11.9	24.0	0.0	2.3	0	2	10549	590	600	
16-Sep -18	2.9	24.0	0.0	0.7	92	93	13221	641	600	
17-Sep -18	24.0	24.0	0.0	0.0	0	0	12907	604	600	
18-Sep -18	2.0	24.0	0.0	0.0	11	11	7611	327	600	
19-Sep -18	0.0	24.0	0.0	1.5	223	224	10503	545	596	
20-Sep -18	0.0	24.0	0.0	0.0	54	54	9474	580	594	
21-Sep -18	11.6	24.0	0.0	2.6	185	188	9747	521	594	
22-Sep -18	24.0	24.0	0.0	0.0	180	180	13396	627	641	
23-Sep -18	24.0	24.0	0.0	0.0	17	17	12794	592	632	
24-Sep -18	24.0	24.0	0.0	0.0	31	31	12950	595	632	
25-Sep -18	24.0	24.0	0.0	0.0	21	21	13445	617	645	
26-Sep -18	24.0	24.0	0.0	0.0	0	0	13319	623	634	
27-Sep -18	16.1	24.0	0.0	0.0	0	0	11336	631	655	
28-Sep -18	0.5	24.0	0.0	0.0	100	100	13016	606	640	
29-Sep -18	24.0	24.0	0.0	0.1	36	36	13187	621	631	
30-Sep -18	23.9	23.9	0.0	0.0	27	27	13160	632	613	

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2. Abatement Technology

Table 3: Abatement Equipment Control Technology utilisation for month of September 2018

Associated Unit/Stack	Technology Type	Actual Utilisation (%) for the month of September 2018
Unit 4,5 and 6	Low NO _x Burners	100
	Pulse Jet Fabric Filter Plant	100

3. Energy Source Characteristics

Table 4: Energy Source Material Characteristics for the month of September 2018

Characteristic	Stipulated Range (% by weight on a dry basis)	Monthly Average Content (% by weight on a dry basis)
Coal		
Sulphur Content	1.3 - 2.2	1.54
Ash Content	35 - 39	34.61

Table 5: Energy Source Material Characteristics for the month of September 2018

Characteristic	Stipulated Range (%)	Monthly Average Content (%)
Oil		
Sulphur Content	0.5 - 3.5	2.2
Ash Content	0.02 - 0.1	0.01

4. Emissions Reporting-

Medupi Power Station uses Continuous Emission Monitoring System which uses the extractive method for analysis.

The daily emission limits are as follows:

SO₂= 3500 mg/Nm³

Dust= 50 mg/Nm³

NO₂= 750 mg/Nm³

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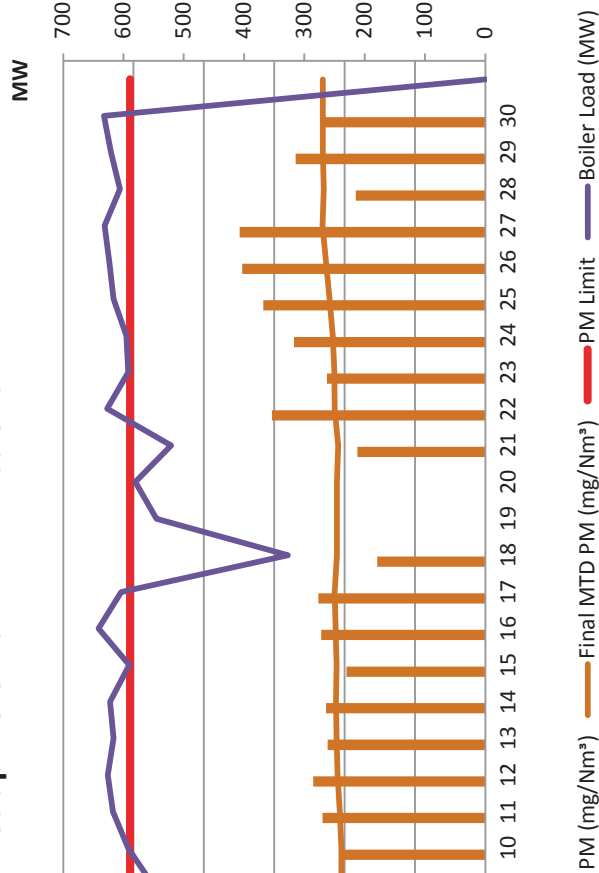
Averages emissions for the month of September 2018

	PM (mg/Nm ³)		SO ₂ (mg/Nm ³)			NO ₂ (mg/Nm ³)			CO (mg/Nm ³)			Temp (°C)			Press (kPa)			Velocity (m/s)			O ₂ (%)			(mg)
	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	
0	17.48		2966.2	2757.7		622.6	508.0		21.2	3.9		129.8	90.1	90.0		17.3					8.5	7.3		
1	31.26		3002.3	2750.3		625.9	519.3		9.5	7.1		133.7	89.6	89.5		18.2					8.2	6.9		
0	28.72		2745.7	2607.2		618.7	504.2		6.8	6.2		132.0	89.5	89.4		18.0					8.2	6.9		
3	30.54		2840.7	2473.8		623.0	514.6		7.2	4.0		131.4	89.7	89.6		17.8					8.1	7.3		
8	25.86		3149.5	2927.3		618.1	493.5		6.5	3.7		131.6	89.8	89.6		17.6					8.4	7.5		
5	23.06		3057.8	3014.8		657.5	525.3		6.6	3.3		134.7	89.5	89.4		17.2					8.4	7.3		
5	19.85		3039.6	2920.7		706.6	559.7		6.9	3.8		135.9	89.2	89.1		17.3					8.1	7.4		
9	16.94		3002.0	3102.0		707.1	543.0		7.0	4.2		133.1	89.4	89.3		17.6					7.9	7.3		
9	15.63		3037.5	3033.0		663.8	484.4		11.2	4.1		128.9	89.8	89.8		17.5					8.3	7.4		
7	22.16		2809.9	2644.2		635.9	443.4		7.2	3.8		129.6	90.1	90.0		18.1					8.3	7.0		
5	25.74		2729.5	2441.8		662.5	444.6		6.0	4.2		129.0	89.9	89.9		17.9					8.2	7.2		
7	14.45		2771.6	2301.6		659.8	452.1		5.9	5.7		123.6	89.7	89.7		15.3					8.1	8.5		
3	16.70		2750.0	2548.1		696.9	405.8		5.8	3.6		131.3	89.6	89.6		17.3					7.9	7.3		
2	16.54		2743.4	2671.2		684.6	416.4		6.9	4.5		131.6	89.7	89.7		17.3					7.9	7.5		
1	17.62		2755.3	2731.2		685.4	427.7		7.5	3.9		132.8	89.8	89.6		17.6					8.0	7.5		
2	17.51		2795.8	2747.9		702.4	429.0		6.2	4.3		132.9	89.6	89.5		17.6					7.6	7.4		
3	16.92		2835.8	2864.8		690.8	420.6		6.2	3.9		132.9	89.5	89.4		17.6					7.9	7.4		
5	16.53		2272.6	2688.7		597.4	391.8		9.5	3.7		133.4	89.6	89.4		17.7					9.5	7.4		
	19.43		2705.5	2717.0		581.0	403.7		6.9	3.7		134.9	89.6	89.5		17.7					9.0	7.5		
	16.78		2782.4	2827.9		508.5	413.6		6.5	3.9		131.4	89.9	89.7		17.5					8.1	7.5		
0	12.61		2662.0	2884.2		578.3	460.5		24.0	3.8		129.8	90.0	89.9		17.3					8.5	7.6		
3	12.49		2873.2	2954.3		678.1	544.1		6.3	3.8		136.6	89.9	89.8		18.0					7.8	7.1		
0	13.57		2838.4	2777.4		642.1	517.7		6.4	4.6		136.8	89.9	89.8		17.7					8.0	7.1		
7	16.89		3092.5	3076.1		603.3	411.7		6.7	4.1		135.7	89.8	89.7		17.7					7.9	7.0		
3	20.88		2749.3	2832.7		799.6	421.1		5.8	4.1		135.1	89.7	89.6		17.8					7.9	7.0		
4	18.93		3037.9	3008.3		837.9	434.7		6.2	4.5		138.1	89.6	89.5		17.9					7.8	7.0		
3	21.10		3018.6	2986.0		798.5	407.8		7.0	4.1		137.1	89.7	89.5		18.3					7.7	7.0		
1	20.03		2895.6	2856.9		704.4	395.6		6.7	4.1		133.6	89.7	89.6		17.9					7.9	7.1		
5	16.83		3310.9	3177.0		798.4	491.3		6.2	5.0		131.7	90.2	90.0		17.7					7.8	7.2		
9	13.30		3278.8	3182.7		717.3	409.0		7.0	4.9		127.1	90.5	90.5		17.3					7.8	7.4		

Temperature and velocity meters are faulty. A notification has been loaded for the maintenance team to fix the instrument. There is no reportable data on areas shaded black.

Graphical representation of the daily average emissions

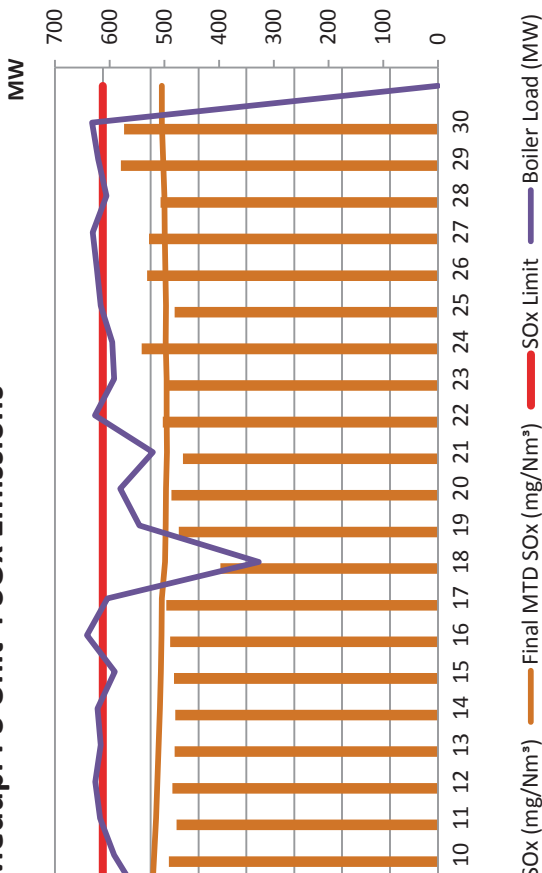
Medupi PS Unit 4 PM Emissions



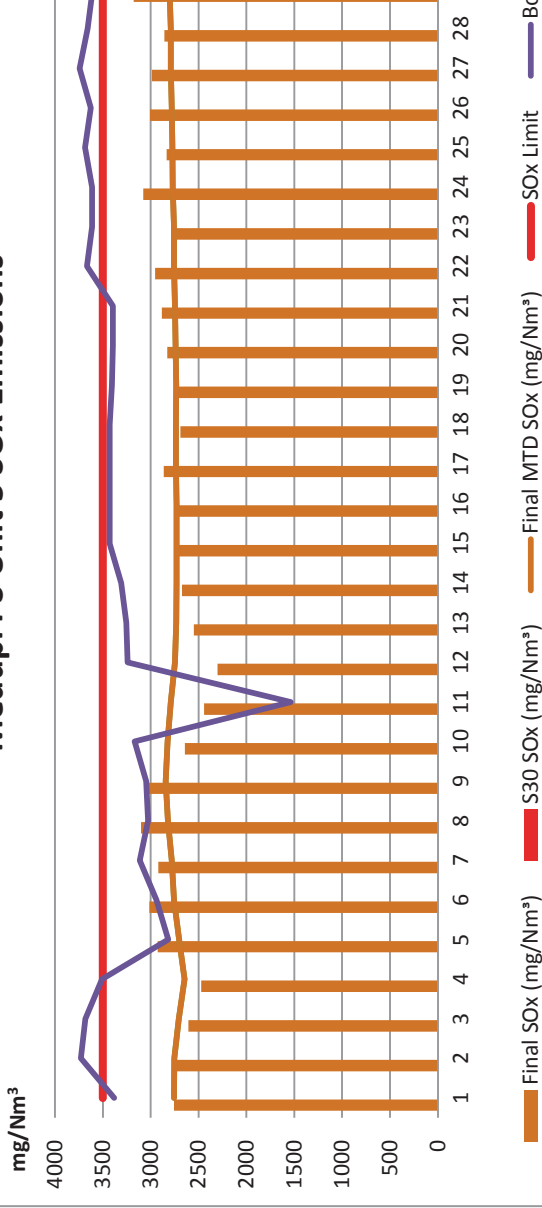
Medupi PS Unit 5 PM Emissions



Medupi PS Unit 4 SOx Emissions



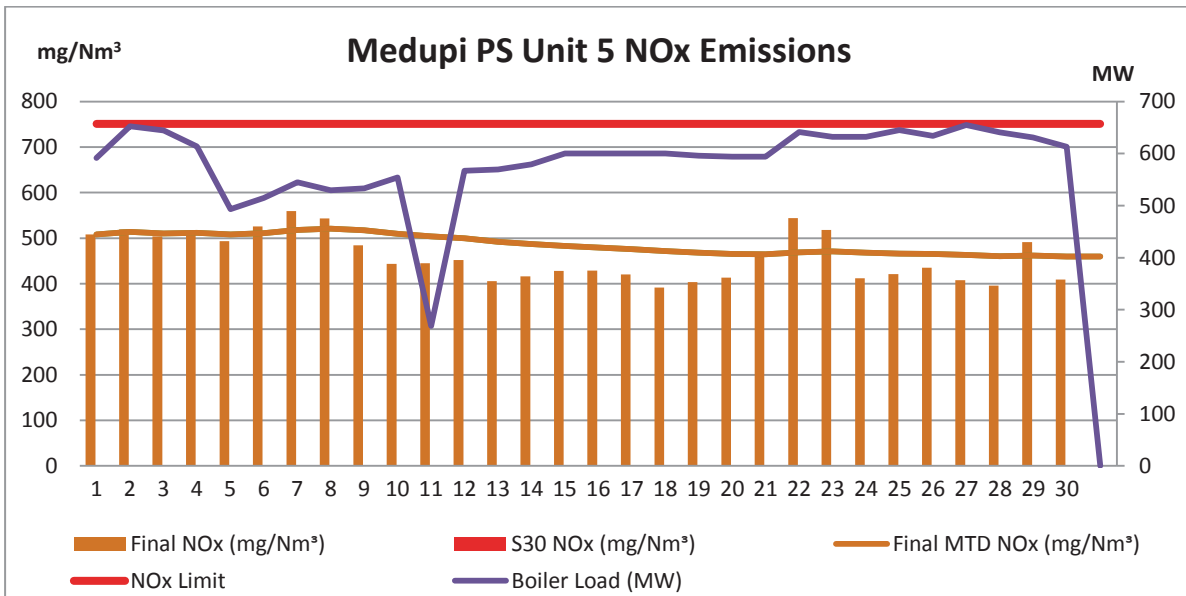
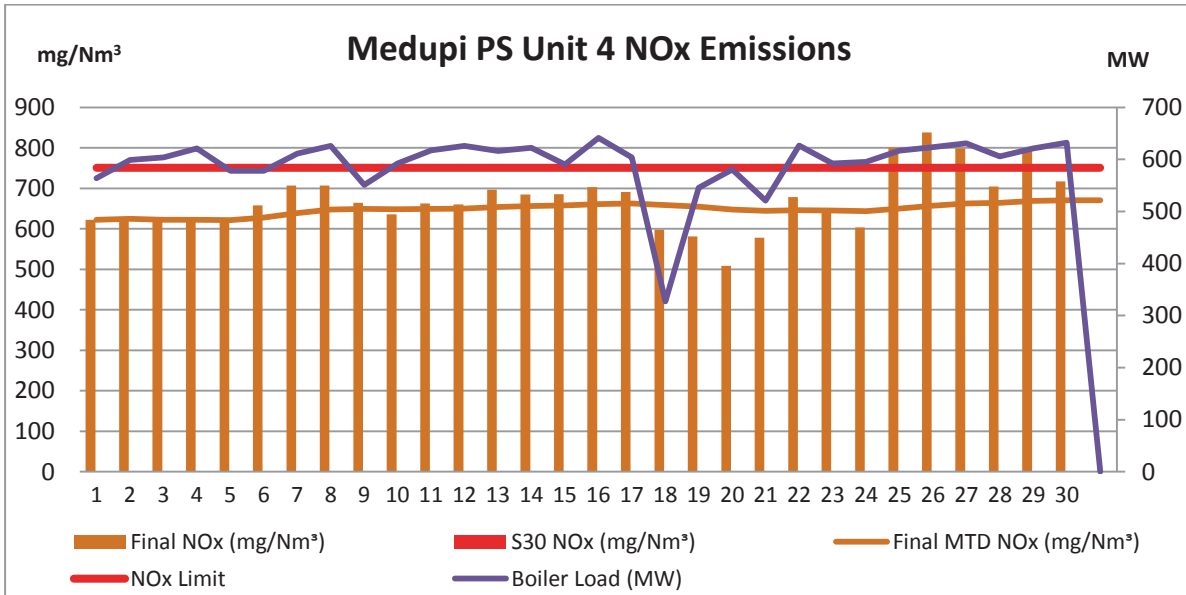
Medupi PS Unit 5 SOx Emissions





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Table 7: Monthly tonnages for the month of September 2018

Unit	PM (tons)	SO ₂ (tons)	NO ₂ (tons)	CO (tons)	CO ₂ (tons)
1					
2					
3					
4	36.3	3 995	932	11	
5	41.5	6 044	986	9	
6	0.0	0	0	0	
SUM	77.8	10 040	1 918	20	

Note: Unit 6 was on outage throughout the reporting period, unit 1 to 3 is not yet in commercial operation.

5. Shutdown/start-up information

Table 8: Days operating under normal operation, days in grace period and section 30 days respectively

Unit	Operating Days (DD:HH:MM)			
	Normal operation	In grace period	Under S 30	Unit off load
1	00:00:00	00:00:00	00:00:00	30:00:00
2	00:00:00	00:00:00	00:00:00	30:00:00
3	00:00:00	00:00:00	00:00:00	30:00:00
4	27:09:25	00:00:00	00:00:00	02:14:35
5	29:23:55	00:00:00	00:00:00	00:00:05
6	00:00:00	00:00:00	00:00:00	30:00:00

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Table 9: Days declared Emergency level one

Hours Declared EL1	
Date	EL1 Start
1 September 2018	(18:04) EL1 and MCR in force
3 September 2018	16h47: EL1 in force
4 September 2018	16:16 EL1 and MCR in force. 20h29: EL1 cancelled
5 September 2018	17:31 EL1 and MCR in force
6 September 2018	15:57 EL1 and MCR in force. 19:56 Cancelled
7 September 2018	17:29 EL1 and MCR in force. 19:21 Cancelled.
10 September 2018	16:46 EL1 and MCR in-force.
12 September 2018	05:01 EL1 and MCR in force. 07:49 EL1 and MCR cancelled. 17:15 EL1 and MCR in force.
13 September 2018	05:13 EL1 and MCR in force. 07:30 EL1 and MCR cancelled.
14 September 2018	06:04 EL1 and MCR in force. 07:19 EL1 and MCR cancelled.
15 September 2018	13:14 EL1 and MCR in force. 20:26 EL1 and MCR cancelled.
17 September 2018	15h23: EL1 in force
20 September 2018	21h36: EL1 & MCR cancelled 04h02: EL1 & MCR in force
21 September 2018	EL1 and MCR in force (04h02) and cancelled at 22h33
25 September 2018	15h50: EL1 and MCR in force
26 September 2018	14:13 EL1 and MCR in force
27 September 2018	12:18 EL1 and MCR in force.


6. Comments on the performance and availability of each unit

Medupi power station operating units performed well within the ambit of the Atmospheric emissions licence. Unit 4 NO_x exceeded the limit of 750 mg/Nm³ on four occasions, Medupi Power Station Engineering team is investigating the causes of these sporadic incidents to avoid recurrence.

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7. Light up information

Table 10: PM Start-up information for the month of September

Event No.	Event 1		Event 2		Event 3		Event 4	
Unit 4	4		4		4		4	
Fires in	2018/09/09	2018/09/09	11:55 AM	2018/09/15	01:10 AM	2018/09/20	04:05 PM	2018/09/27
Synchronisation with Grid	01:30 PM	2018/09/09	09:00 PM	2018/09/15	12:20 PM	2018/09/20	11:25 PM	2018/09/27
Emissions below limit from Sync (Date and Time)	did not go above limit	did not go above limit	did not go above limit	did not go above limit	did not go above limit	did not go above limit	did not go above limit	did not go above limit
Fires in to synchronization	00:04:05	Hrs (dd:hh:mm)	00:09:05	Hrs (dd:hh:mm)	00:11:10	Hrs (dd:hh:mm)	00:07:20	Hrs (dd:hh:mm)
Synchronization to < limit (Duration)	did not go above limit	Hrs (dd:hh:mm)	did not go above limit	Hrs (dd:hh:mm)	did not go above limit	Hrs (dd:hh:mm)	did not go above limit	Hrs (dd:hh:mm)

Table 11: Emission Average from Fires-in to Synchronisation

South Stack Emission Average from Fires-in to Synchronisation (Date and Time)							
Unit	Fires-In		Synchronisation		PM	SO ₂	NO _x
Unit 4	2018/09/09	09:25 AM	2018/09/09	01:30 PM	24.2	2524.8	740.7
Unit 4	2018/09/15	11:55 AM	2018/09/15	09:00 PM	17.5	415.5	49.0
Unit 4	2018/09/20	01:10 AM	2018/09/20	12:20 PM	24.6	2673.0	581.1
Unit 4	2018/09/27	04:05 PM	2018/09/27	11:25 PM	19.5	1284.0	302.0
Unit 6	2018/08/22	05:30 AM	2018/08/22	03:15 PM	8.3	4.9	5.2


Table 12: Point Source emissions released during Shut-down

South 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 4	2018/09/09	03:45 AM	2018/09/09	06:50 AM	11.7	1505.7	0.0
Unit 4	2018/09/18	02:00 AM	2018/09/18	10:05 AM	14.4	636.9	104.4

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8. Continuous Emission Monitoring Systems (CEMS)

Unit 4 and 5 Continuous Emission Monitoring Systems were in operation at all times when the unit was on load. CEMS CO₂ monitor verification test not yet conducted, the Licencing Authority will be notified prior to conducting the test.

Table 13: Periods during which CEMS was inoperative

Date	Time	Duration	Nature of Repair/Adjustment
N/A	N/A	N/A	N/A

Continuous emissions monitoring systems was operational through the month of September 2018.

Table 14: CEMS Monitor Reliability

Variable	Unit 4	Unit 5	Unit 6
Dust	100	100	0
SO ₂	100	100	0
NO _x	98.6	100	0
CO	100	100	0
O ₂	97.2	100	0
Temperature	0	100	0
Pressure	100	100	0
Velocity	0	100	0
CO ₂	0	0	0

9. CEMS Calibration certificates and equipment used for calibration

See attached Appendix A


10. Ambient Air Quality Monitoring Report

The Ambient Air Quality Monitoring and Dust fall-out report are emailed to the Licencing authority on a monthly basis.

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11. Visual inspection of the exterior walls of the fuel oil tanks, fuel oil inventory data and TVOC Estimation

Visual inspection was conducted and there were no leaks observed on the exterior walls of the fuel oil tanks.

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Table 15: Total Volatile Organic Compound (TVOC) for September 2018

		
CALCULATION OF EMISSIONS OF TOTAL VOLATILE COMPOUNDS FROM FUEL OIL STORAGE TANKS*		
Date:	30 September 2018	
Station:	Medupi Power Station	
Province:	Limpopo Province	
Tank no.	1-2	
Description:	Outdoor fuel oil storage tank	
Tank Type:	Vertical fixed roof (vented to atmosphere)	
Material stored:	Fuel Oil 150	
MONTHLY INPUT DATA FOR THE STATION Please only insert relevant monthly data inputs into the <i>blue cells</i> below Choose from a dropdown menu in the <i>green cells</i> The total VOC emissions for the month are in the <i>red cells</i> IMPORTANT: Do not change <i>any</i> other cells without consulting the AQ CoE		
MONTH:	September	
GENERAL INFORMATION:	Data	Unit
Total number of fuel oil tanks:	2	NA
Height of tank:*	14.2	m
Diameter of tank:	12	m
Net fuel oil throughput for the month:	4562.593	tons/month
Molecular weight of the fuel oil:	166.00	Lb/lb-mole
METEROLOGICAL DATA FOR THE MONTH	Data	Unit
Daily average ambient temperature	20.46	°C
Daily maximum ambient temperature	28.86	°C
Daily minimum ambient temperature	12.76	°C
Daily ambient temperature range	16.09	°C
Daily total insolation factor	4.23	kWh/m ² /day
Tank paint colour	Aluminum/Specular	NA
Tank paint solar absorbance	0.39	NA
FINAL OUTPUT:	Result	Unit
Breathing losses:	0.72 kg/month	
Working losses:	0.13 kg/month	
TOTAL LOSSES (Total TVOC Emissions for the month):	0.85 kg/month	
<small>*Calculations performed on this spreadsheet are taken from the USEPA AP-42- Section 7.1 Organic Liquid Storage Tanks - January 1996. This spreadsheet is derived from materials provided by Jimmy Peress, PE, Tritech Consulting Engineers, 85-93 Chevy Chase Street, Jamaica, NY 11432 USA, Tel - 718-454-3920, Fax - 718-454-6330, e-mail - PeressJ@nyc.rr.com.</small>		

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		Review Date	January 2021			

12. Air quality improvements initiatives and public education and awareness campaigns

There were no activities relating to community awareness campaign during the month of September 2018.

13. Complaints Register


Table 16: Complaints for the month of September 2018

Source Code/ Name	Air pollution complaints received	Calculation of Impacts/ emissions associated with the incident	Date of complaint and date of response by the license holder	Results of investigation	Action taken to resolve the complaint
N/A	No complaints received	N/A	N/A	N/A	N/A

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		Review Date	January 2021		

Compiled by:

Senior Environmental Advisor

Reviewed by:

Boiler System Engineer

Supported by:

Environmental Manager

Supported by:

Boiler Engineering Manager

Supported by:

Engineering Group Manager (Acting)

I Rudi van der Wal, declares that the information provided in this report is accurate and correct.

Yours sincerely

GENERAL MANAGER: MEDUPI POWER STATION

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APPENDIX 1

CEMS Calibration certificates



12 Angellier Street, Bardene,
Boksburg, SA, 1459
PO Box 328, Isando, SA, 1600
VAT REG #: 421 021 2249
www.e-analytics.co.za

Tel: 0861 000 032
Intl. Tel: +27 11 918 6994
Fax: +27 11 894 1037
CO REG #: 2004/007607/07
info@e-analytics.co.za

ISO 9001 Level 4 Company

CALIBRATION CERTIFICATE

CUSTOMER:		Medupi Power Station	CERTIFICATE NO: 2706	
CONTACT NAME:		Christo Vorster	JOB NO:	SC943
MODEL:		Foedisch MGA 23	PHONE:	014 762 2255
AUXILIARY EQUIPMENT:		Unit 4	SERIAL NO:	

CHAN		PRIOR	FINAL	TEST GAS	TEST GAS VALUE	GAS CERTIFICATE NUMBER
1	ZERO	0.1 ppm	0 ppm	Air	21 %	Air
	SPAN	822 ppm	804 ppm	CO	803.9 ppm	80A
2	ZERO	2.6 ppm	0 ppm	Air	21 %	Air
	SPAN	832 ppm	834 ppm	NO	833.9 ppm	3207
3	ZERO	1.9 ppm	0 ppm	Air	21 %	Air
	SPAN	2267 ppm	2090 ppm	SO2	2090.4 ppm	12633
4	ZERO	0.12 %	0.0 %	N2	99.99 %	3207
	SPAN	21.34 %	20.95	O2	20.95 %	Air

REPORT: Inspect sample lines and sample system, check diagnostics. Calibrate analysers with zero and span gas, calibration was done according to cylinder standards, analysers were responding to all test gas.

Date: 24 July 2018

Calibration Due Date: Oct 2018

Technician:



Document Number: TH-PFC-002-F1 Rev 1

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CO REG #: 2004/007607/07
info@e-analytics.co.za

CALIBRATION CERTIFICATE

CERTIFICATE NO: 2797

CUSTOMER:	Medupi Power Station	JOB NO.:	SC043
CONTACT NAME:	Christo Vorster	PHONE:	014 762 2255
MODEL:	Foedisch MGA 23	SERIAL NO.:	
AUXILIARY EQUIPMENT:	Unit 5		

CHAN		PRIOR	FINAL	TEST GAS	TEST GAS VALUE	GAS CERTIFICATE NUMBER
1	ZERO	0.3 ppm	0 ppm	Air	21 %	Air
	SPAN	835 ppm	804 ppm	CO	803.9 ppm	804
2	ZERO	1.8 ppm	0 ppm	Air	21 %	Air
	SPAN	833 ppm	834 ppm	NO	833.9 ppm	3207
3	ZERO	3.1 ppm	0 ppm	Air	21 %	Air
	SPAN	2248 ppm	2090 ppm	O2	2090.4 ppm	12633
4	ZERO	0.03 %	0.0 %	N2	99.99 %	3207
	SPAN	21.01 %	20.95 %	O2	20.95 %	Air

REPORT: Inspect sample lines and sample system, check diagnostics. The peristaltic pump on cooler 1 for unit 5 must be replaced. Calibrate analysers with zero and span gas, calibration was done according to cylinder standards, analysers were responding to all test gas.

Date: 24 July 2018

Calibration Due Date: Oct 2018

Technician:



Document Number: TR-PFC-002-F1 Rev 1

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CALIBRATION CERTIFICATE

		CERTIFICATE NO: 2708	
CUSTOMER:	Medupi Power Station	JOB NO:	SC943
CONTACT NAME:	Christo Vorster	PHONE:	014 762 2255
MODEL:	Foedisch MGA 23	SERIAL NO:	
AUXILIARY EQUIPMENT:	Unit 6		

CHAN		PRIOR	FINAL	TEST GAS	TEST GAS VALUE	GAS CERTIFICATE NUMBER
1	ZERO	-3.0 ppm	0 ppm	Air	21 %	Air
	SPAN	829 ppm	804 ppm	CO	803.9 ppm	80A
2	ZERO	-5.1 ppm	0 ppm	Air	21 %	Air
	SPAN	837 ppm	834 ppm	NO	833.9 ppm	3207
3	ZERO	-1.7 ppm	0 ppm	Air	21 %	Air
	SPAN	2173 ppm	2090 ppm	SO2	2090.4 ppm	12633
4	ZERO	0.09 %	0.0 %	N2	99.99 %	3207
	SPAN	21.17 %	20.95	O2	20.95 %	Air

REPORT: Inspect sample lines and sample system, check diagnostics. Calibrate analysers with zero and span gas, calibration was done according to cylinder standards, analysers were responding to all test gas.

Date: 24 July 2018

Calibration Due Date: Oct 2018

Technician:

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