APPENDIX 4: THE MONITORING RESULTS

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SCHOOL OF ENVIRONMENTAL SCIENCE AND TECHNOLOGY
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VILAS 406; VIMCERTS 055

No: 01/20/TTQT-2022-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Ambient air
Number of Samples : 05 samples

No.	Parameters		Time	Unit	Measurement methods	Results					QCVN 05: 2013/BTNMT
						K1	K2	K3	K4	K5	
1.	Temperature		8h-16h	°C	QCVN 46:2012/BTNMT	15.7	15.9	15.9	15.3	15.0	-
2.	Humidity		8h-16h	%		94.6	95.0	95.2	94.6	93.6	-
3.	Wind velocity		8h-16h	m/s		2.3	2.6	2.1	1.8	1.1	-
4.	Wind direction		8h-16h	-		NE	NE	NE	NE	NE	-
5.	Noise	Leq	6h-21h	dB_A	TCVN 7878-2:2010	63	64	62	56	58	70(*)
		Leq	21h-6h	dB_A		50	52	45	46	46	55(*)
6.	SO_2		1 hour	$\mu g/m^3$	TCVN 5971:1995	57	54	48	44	52	350
			24 hours	$\mu g/m^3$	MASA method 704A	43	37	39	37	40	125
7.	NO_2		1 hour	$\mu g/m^3$	TCVN 6137:2009	56	52	50	47	52	200
			24 hours	$\mu g/m^3$	MASA method 406A	43	41	37	34	41	100
8.	CO		1 hour	$\mu g/m^3$	SOP-CO	4,500	5,200	4,700	4,300	5,000	30,000
			24 hours	$\mu g/m^3$		3,600	4,500	4,400	3,500	4,300	-
9.	TSP		24 hours	$\mu g/m^3$	TCVN 5067:1995	145.7	162.3	160.4	146.3	140.7	200

No.	Parameters	Time	Unit	Measurement methods	Results					QCVN 05: 2013/BTNMT
					K1	K2	K3	K4	K5	
10.	PM10	24 hours	$\mu g/m^3$	AS/NZS 3580.9.6:2003	76.3	93.4	90.4	67.6	64.2	150
11.	PM2,5	24 hours	$\mu g/m^3$	SOP-PM2,5	37.4	44.3	43.8	33.6	32.1	50

Notes:

- *The result is valid only for samples at the monitoring time, The monitoring results were calculated at 25°C, 760 mmHg, Symbol (-): unstipulated; NE: "North East",*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer,*
- ***QCVN 05:2013/BTNMT** – National Technical Regulation on ambient air quality*
- *(*)**QCVN 26:2010/BTNMT** – National Technical Regulation on noise,*
- *Sampling positions:*

	Coordinates	
K1: Plant area near coal store	*21°04'13.4" N*	*107°20'56.2"E*
K2: Nguyen Trai primary school, Mong Duong ward	*21°03'57.5" N*	*107°19'20.1"E*
K3:Mong Duong junior high school, zone 1, Mong Duong ward	*21°03'56.2"N*	*107°20'20.8"E*
K4:Household of Mr, Ha Van Tien, village 2, Cam Hai commune	*21°05'47.6"N*	*107°21'44.7"E*
K5:Residental area of Trang Huong village, Dong Xa commune, Van Don district	*21°03'21.2"N*	*107°23'26.7"E*

Ha Noi, March 08th 2022

Centre for industrial environmental monitoring and pollution control

Director

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No: 02/20/TTQT-2022-EN

VILAS 406; VIMCERTS 055

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Noise
Number of Samples : 20 samples x 2 times per day (day time and night time)

No	Sampling positions	Measurement methods	QCVN 26:2010/BTNMT			
			From 6h to 21h		From 21h to 6h	
			Leq (dB_A)	Lmax (dB_A)	Leq (dB_A)	Lmax (dB_A)
			70	-	**55**	-
1.	N1	TCVN 7878-2:2010	58	68	48	57
2.	N2		57	65	46	55
3.	N3		66	76	52	61
4.	N4		59	68	49	58
5.	N5		64	76	50	60
6.	N6		62	75	49	57
7.	N7		60	69	47	54
8.	N8		67	76	53	64
9.	N9		68	78	46	56
10.	N10		64	72	42	54
11.	N18		60	68	51	61
12.	N19		56	64	46	58
13.	N20		69	81	54	65
14.	N21		68	80	53	62
15.	N22		63	72	49	58
16.	N23		64	74	51	60
17.	N24		57	66	49	57
18.	N25		59	67	48	58
19.	N26		58	67	46	55
20.	N27		56	77	45	54

Note:

- *The result is valid only at the monitoring time,*
- ***QCVN 26:2010/BTNMT:*** *National Technical Regulation on Noise - Permissible Exposure Levels of Noise in the usual areas*
- ***Sampling positions:***

	Coordinates	
N1: Parking area	*21°04'40.2"N*	*107°21'07.5"E*
N2: Outside plant near with lay-down area	*21°04'38.5"N*	*107°21'14.7"E*
N3: Main access road	*21°04'30.8"N*	*107°21'18.9"E*
N4: Outside plant near with fuel oil tank	*21°04'23.0"N*	*107°21'11.0"E*
N5: Near the east side of the coal warehouse	*21°04'08.3"N*	*107°20'56.4"E*
N6: Near the south side of the coal warehouse	*21°04'06.6"N*	*107°20'46.9"E*

- ***Sampling positions:***	***Coordinates***	
N7: Near the west side of the coal warehouse	*21°04'09.8"N*	*107°20'38.8"E*
N8: Outside plant near with mill plant #2	*21°04'23.8"N*	*107°20'54.1"E*
N9:Outside plant near with cooling water discharging position	*21°04'3..7"N*	*107°20'58.2"E*
N10: Near with outlet #1	*21°04'40.0" N*	*107°21'02.8"E*
N18 – Near residential area. about 1000 m in the North West of plant (near EVN operation office)	*21°04'44.8''N*	*107°20'39.2''E*
N19 – Near residential area. about 500m in the East of plant (near Mong Duong temple)	*21°04'28.2''N*	*107°21'26.6''E*
N20: Area between boiler and emission treatment area of set of machinery #1 and #2	*21°04'23.5" N*	*107°21'00.3"E*
N21: Base of stack	*21°04'18.6" N*	*107°20'59.5"E*
N22: Side entrance into coal store (about 200m from base of stack)	*21°04'13.4" N*	*107°20'59.5"E*
N23: Fencing wall between Mong Duong 1 thermal power plant and coal conveyor area of MongDuowng 2 thermal power plant (about 200m from the West of base of stack)	*21°04'15.4" N*	*107°20'54.6"E*
N24: Outside of FGD water treatment house (about 200m from the East of base of stack)	*21°04'22.7" N*	*107°21'07.7"E*
N25: Road between FGD water treatment house and Chemical store (about 400m from the East of base of stack)	*21°04'26.3" N*	*107°21'09.0"E*
N26: Front of door of operator house	*21°04'37.9" N*	*107°21'06.8"E*
N27: Road which leads to plant – outside discharge channel near EVN building	*21°04'40.6" N*	*107°20'40.5"E*

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No: 03/20/TTQT-2022-EN

VILAS 406; VIMCERTS 055

ENVIRONMENTAL MONITORING RESULTS

Sampling area : Mong Duong 2 Thermal Power Plant
Address : Mong Duong Ward, Cam Pha City, Quang Ninh Province
Sampling date : 16-17/02/2022
Type of samples : Ambient air
Number of samples : 01 samples

No	Parameters	Time	Units	Results
				K1
1.	CO_2	14h-16h	mg/m^3	584.3
2.	CH_4	14h-16h	mg/m^3	1.4
3.	N_2O	14h-16h	$\mu g/m^3$	43.7

Notes:

- *The result is valid only for samples at the monitoring time. The monitoring results were calculated at 25°C. 760 mmHg.*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer*
- *Sampling positions:* *Coordinates*
  K1: Plant area near coal store *21°04'13.4" N 107°20'56.2"E*

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VILAS 406; VIMCERTS 055

No: 04/20/TTQT-2022-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Cooling water
Number of Samples : 03 samples

No.	Parameters	Unit	Analytical methods	Results			MDPCL-EHS-SP-02-006	QCVN 40: 2011/BTNMT	
				CW1	CW2	CW3		$C_{(Column\ B)}$	C_{max}
1.	Temperature	°C	SMEWW 2550B:2017	20.5	26.7	26.1	40	40	40
2.	Temperature difference (out-in)	°C	SMEWW 2550B:2017	-	6.2	5.6	8	-	-
3.	pH	-	TCVN 6492:2011	7.6	7.3	7.4	6.0-9.0	5.5 – 9.0	5.5 – 9.0
4.	Color (pH=7)	Pt/Co	TCVN 6185:2015	<5	<5	<5	70	150	150
5.	COD	mg/L	SMEWW 5220C:2017	58	55	54	81	150	135
6.	BOD_5	mg/L	TCVN 6001-1:2008	21	20	20	40.5	50	45
7.	TSS	mg/L	TCVN 6625:2000	11	8	7	50	100	90
8.	Arsenic (As)	mg/L	US EPA method 200.8	0.0063	0.0059	0.0057	0.081	0.1	0.09
9.	Mercury(Hg)	mg/L	US EPA method 200.8	<0.001	<0.001	<0.001	0.005	0.01	0.009
10.	Lead (Pb)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	0.405	0.5	0.45
11.	Cadmium (Cd)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	0.0081	0.1	0.09
12.	Chromium III	mg/L	EPA Method 200.8 & TCVN 6658:2000	<0.006	<0.006	<0.006	0.5	1	0.9
13.	Chromium VI	mg/L	TCVN 6658:2000	<0.006	<0.006	<0.006	0.081	0.1	0.09
14.	Copper(Cu)	mg/L	US EPA method 200.8	0.002	0.003	0.002	0.5	2	1.8
15.	Zinc (Zn)	mg/L	US EPA method 200.8	0.012	0.015	0.014	1.0	3	2.7
16.	Nickel (Ni)	mg/L	US EPA method 200.8	0.007	0.008	0.007	0.405	0.5	0.45
17.	Manganese (Mn)	mg/L	US EPA method 200.8	0.002	0.001	0.002	0.81	1	0.9
18.	Iron (Fe)	mg/L	US EPA method 200.8	0.340	0.273	0.268	1	5	4.5

19.	Mineral Oil & Grease	mg/L	SMEWW5520F:2017	<0.3	<0.3	<0.3	4.05	10	9
20.	Flouride (F^-)	mg/L	SMEWW 4500D.F-2017	1.15	1.24	1.20	8.1	10	9
21.	Sulfide (as H_2S)	mg/L	TCVN 6637:2000	<0.03	<0.03	<0.03	0.405	0.5	0.45
22.	Total N	mg/L	TCVN 6638:2000	4	4	3	24.3	40	36
23.	Total P	mg/L	TCVN 6202:2008	<0.01	<0.01	<0.01	4.86	6	5.4
24.	Residue Chlorine	mg/L	TCVN 6225-3:2011	<0.1	<0.1	<0.1	0.2	2	1.8
25.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2017	0.17	0.15	0.14	8.1	10	9
26.	Coliform	MPN/100mL	TCVN 6187-2:1996	440	410	430	5,000	5,000	5,000

Note:

- *The result is valid only for samples at the monitoring time.*
- *Symbol (-): unstipulated;*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***MDPCL-EHS-SP-02-006**: The standard of Mong Duong 2 BOT thermal power plant on permited limit of cooling water*
- ***QCVN 40:2011/BTNMT**- National technical regulation on industrial wastewater; Column B indicates the values of parameters of industrial wastewater (C) when it is discharged into the water sources not serving tap water supply;*
- *C_{max} is the maximum permissible value of a pollution parameter of industrial wastewater being discharged into receiving waters (mg/L). $C_{max}$is calculated as follows:*

$$C_{max} = C \times K_q \times K_f = C \times 1 \times 0.9 = 0.9 \times C$$

In which:

+ C: is the value of a pollution parameter of industrial wastewater specified in QCVN 40:2011/BTNMT;

+ K_q: Flow rate coefficient/ volume of wastewater receiving resource K_q = 1

+ K_f: is the coefficient of discharged flow rate (F >5,000 m^3/24h) therefore; K_f=0.9;

- *Sampling positions:*

	Coordinates	
CW1: Intake point of cooling water	*21°04'32.6"N*	*107°21'18.5"E*
CW2:Discharge point into the cooling water canal	*21°04'28.3"N*	*107°20'57.1"E*
CW3:Discharge point to common Mong Duong Power complex canal	*21°04'42.4"N*	*107°21'03.1"E*

Ha Noi, March 08th 2022

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No: 05/20/TTQT-2022-EN

VILAS 406; VIMCERTS 055

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Sanitary wastewater
Number of Samples : 03 samples

No.	Parameters	Unit	Analytical methods	Results			QCVN 14: 2008/BTNMT	
				SH1	SH2	SH3	$C_{(Column\ B)}$	C_{max}
1.	Temperature	°C	SMEWW 2550B:2017	19.4	19.8	18.8	-	-
2.	pH	-	TCVN 6492:2011	7.5	7.0	8.1	5.0÷9.0	5.0÷9.0
3.	BOD_5	mg/L	TCVN 6001-1:2008	18	4	15	50	60
4.	TSS	mg/L	TCVN 6625:2000	16	<2	9	100	120
5.	TDS	mg/L	SOP-TDS	216	117	183	1.000	1.200
6.	Sulfide (as H_2S)	mg/L	TCVN 6637:2000	<0.03	<0.03	<0.03	4.0	4.8
7.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2017	1.30	0.17	2.13	10	12
8.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500-NO^{3-} E:2017	31.08	48.82	38.82	50	60
9.	Oil and grease	mg/L	SMEWW 5520B:2017	<0.3	<0.3	<0.3	20	24
10.	Phosphate (PO_4^{3-}-P)	mg/L	TCVN 6202:2008	4.15	5.63	2.62	10	12
11.	Total surface active agents	mg/L	SMEWW 5540 B&C:2017	<0.02	<0.02	<0.02	10	12
12.	Coliform	MPN/ 100mL	TCVN 6187-2:1996	390	110	200	5.000	5.000

Note:

- *The result is valid only for samples at the monitoring time.*
- *Symbol (-): unstipulated;*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***QCVN 14:2008/BTNMT** - National technical regulation on domestic wastewater. Column B specifies C value of pollution parameters as a basis for calculating the permissible maximum value in domestic wastewater as being discharged into water resources not used for the purpose of domestic water supply. C_{max} value is calculated as follows*
  $C_{max} = C \times K = 1.2 \times C$
  + K coefficient =1.2 (agencies. offices. school. research institutions under10.000 m^2)
- *Sampling positions:*

	Coordinates	
SH1: Sanitary waste water in Operation house	*21°04'39.6"N*	*107°21'07.8"E*
SH2: Sanitary waste water in Chemical dosing building	*21°04'28.7"N*	*107°21'09.6"E*
SH3: Sanitary waste water in coal warehouse area	*21°04'11.5"N*	*107°20'56.5"E*

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No: 06/20/TTQT-2022-EN

VILAS 406; VIMCERTS 055

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Surface water
Number of Samples : 03 samples

No.	Parameters	Unit	Analytical methods	Results			QCVN 10-MT:2015/ BTNMT
				SW1	SW17	SW5a	
1.	Temperature	°C	SMEWW 2550B:2017	19.7	20.6	20.5	-
2.	pH	-	TCVN 6492:2011	7.5	7.9	7.6	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2501:2017	29.4	30.6	28.5	-
4.	DO	mg/L	TCVN 7325:2016	7.4	8.0	6.8	-
5.	COD	mg/L	SMEWW 5220C:2017	43	54	46	-
6.	BOD_5	mg/L	TCVN 6001-1:2008	15	17	17	-
7.	TSS	mg/L	TCVN 6625:2000	13	12	15	-
8.	Total N	mg/L	TCVN 6638:2000	<3.0	<3.0	<3.0	-
9.	Total P	mg/L	TCVN 6202:2008	0.06	0.09	0.10	-
10.	Ammonium	mg/L	SMEWW 4500 NH_3.B&F:2017	0.16	0.20	0.23	0.5
11.	Flouride (F^-)	mg/L	SMEWW4500D.F-2017	1.15	1.35	1.29	1.5
12.	Sulfide (as H_2S)	mg/L	TCVN 6637:2000	<0.03	<0.03	<0.03	-
13.	Cyanide (CN^-)	mg/L	SMEWW 4500 CN^- A,B,C,E:2017	<0.002	<0.002	<0.002	0.01
14.	Arsenic (As)	mg/L	US EPA method 200.8	0.0048	0.0061	0.0053	0.05
15.	Mercury (Hg)	mg/L	US EPA method 200.8	<0.0005	0.0007	0.0005	0.005
16.	Lead (Pb)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	0.1
17.	Cadmium (Cd)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	0.01
18.	Chromium (Cr)	mg/L	US EPA method 200.8	0.026	0.036	0.033	0.5
19.	Copper (Cu)	mg/L	US EPA method 200.8	0.001	0.001	0.002	1
20.	Zinc (Zn)	mg/L	US EPA method 200.8	0.005	0.010	0.007	2.0
21.	Manganese (Mn)	mg/L	US EPA method 200.8	<0.003	<0.003	<0.003	0.5
22.	Iron (Fe)	mg/L	US EPA method 200.8	0.215	0.249	0.238	0.5
23.	Chromium (Cr^{6+})	mg/L	TCVN 6658:2000	<0.006	<0.006	<0.006	0.05
24.	Phenol	mg/L	SMEWW 5530 B&C:2017	<0.001	<0.001	0.001	0.03
25.	Residue Chlorine	mg/L	TCVN 6225-3:2011	<0.1	<0.1	<0.1	-
26.	Total oil and grease	mg/L	SMEWW 5520B:2017	<0.3	<0.3	<0.3	0.5

No.	Parameters	Unit	Analytical methods	Results			QCVN 10-MT:2015/ BTNMT
				SW1	SW17	SW5a	
27.	Coliform	MPN/ 100ml	TCVN 6187-2:1996	180	210	269	1,000

Note:

- *The result is valid only for samples at the monitoring time.Symbol (-): unstipulated;*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***QCVN 10-MT:2015/BTNMT** - National technical regulation on coastal water quality. With coastal water - Luong Gac. we apply limit value of polluted parameters in coastal which is not belong to aquaculture areas or seaside resort. water sport*
- *Sampling positions:*

	Coordinates	
SW1: Position before wasterwater receiving position from Luong Gac canal	*21°05'43.1"N*	*107°22'50.4"E*
SW17: Position which receives wastewater from Luong Gac canal	*21°05'21.4"N*	*107°22'22.8"E*
SW5a: Position behind wasterwater receiving position from Luong Gac canal	*21°05'12.8"N*	*107°22'42.7"E*

Ha Noi, March 08th 2022

Centre for industrial environmental monitoring and pollution control

Director

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No: 07/20/TTQT-2022-EN

VILAS 406; VIMCERTS 055

ENVIRONMENTAL MONITORING RESULTS

Sampling area : Mong Duong 2 Thermal Power Plant
Address : Mong Duong Ward, Cam Pha City, QuangNinh province
Sampling date : 16-17/02/2022
Type of samples : Air emission
Number of samples : 03 samples

No	Parameters	Unit	Analytical methods	Results			MDPCL-EHS-SP-02-006	QCVN 22:2009/BTNMT	
				S1.1	S1.2	S1.3		C(Column B)	C_{max}
1.	Temperature	°C	SOP-KT.01	66	66	67	-	-	-
2.	PM	mg/Nm^3	EPA Method 5	17.4	14.8	15.3	50	200	112
3.	SO_2	mg/Nm^3	EPA Method 6	159.8	144.8	154.5	280	500	280
4.	CO	mg/Nm^3	TCVN 7242:2003	20.7	21.4	23.6	900	1,000(*)	900(*)
5.	NO_x *(Calculated by NO_2)*	mg/Nm^3	EPA Method 7	539.7	525.5	529.4	560	1,000	560

Notes:

- *The result is valid only for samples at the monitoring time. The concentration of pollutants in stack emissions provided at the conditions (temperature 25°C, pressure 760 mm Hg).*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***MDPCL-EHS-SP-02-006**: The standard of Mong Duong 2 BOT thermal power plant about permitted limit of industrial air emission.*
- ***QCVN 22:2009/BTNMT**- National Technical Regulation on emissions of thermal power industry. Column B C concentrations specified by the parameters of pollution in emissions of thermal as a basic for calculating the maximum concentration (Cmax) allowed for all units of Thermal Power Plants with the applicable period from January 1st 2015.In which, calculating Cmax as follow:*

$$Cmax = C \times Kp \times Kv = 0.56 \times C$$

+ Kp is power coefficient, Kp=0.7; Kv is regional coefficient, Kv=0.8 (Urban city type II – Cam Pha City);

- *Symbol (*) apply for **QCVN 19:2009/BTNMT** - National Technical Regulation on industrial emissions of inorganic substances and dusts. Column B C concentration specified by dusts and inorganic substances (here is only for CO) as a basic for calculating the maximum concentration (Cmax) allowed for all production facilities, processing, trading and industrial services operations from January 1st 2015. In which, calculating Cmax as follow:*

$$Cmax(*) = C \times Kp \times Kv = 0.9 \times C$$

+ Kp is coefficient of flow sources, Kp=1; Kv is regional coefficient, Kv=0.9

- *Sampling positions:* *S1.1: Stack of line 1, sample 1*
  S1.2: Stack of line 1, sample 2
  S1.3: Stack of line 1, sample 3

Operation status: Stack of line 1 works with 617MW of capacity *21°04'18.3''E* *107°20'59.7''N*

Ha Noi, March 08th 2022

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No: 08/20/TTQT-2022-EN

VILAS 406; VIMCERTS 055

ENVIRONMENTAL MONITORING RESULTS

Sampling area : Mong Duong 2 Thermal Power Plant
Address : Mong Duong Ward, Cam PhaCity, QuangNinh province
Sampling date : 16-17/02/2022
Type of samples : Air emission
Number of samples : 03 samples

No	Parameters	Unit	Analytical methods	Results			MDPCL-EHS-SP-02-006	QCVN 22:2009/BTNMT	
				S2.1	S2.2	S2.3		C(ColumnB)	C_{max}
1.	Temperature	°C	SOP-KT.01	70	71	70	-	-	-
2.	PM	mg/Nm^3	EPA Method 5	16.4	15.3	17.1	50	200	112
3.	SO_2	mg/Nm^3	EPA Method 6	130.5	128.6	133.7	280	500	280
4.	CO	mg/Nm^3	TCVN 7242:2003	19.5	18.0	17.5	900	1,000(*)	900(*)
5.	NO_x *(Calculated by NO_2)*	mg/Nm^3	EPA Method 7	522.7	520.5	525.6	560	1,000	560

Notes:

- *The result is valid only for samples at the monitoring time. The concentration of pollutants in stack emissions provided at the conditions (temperature 25°C, pressure 760 mm Hg).*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***MDPCL-EHS-SP-02-006**: The standard of Mong Duong 2 BOT thermal power plant about permitted limit of industrial air emission.*
- ***QCVN 22:2009/BTNMT**- National Technical Regulation on emissions of thermal power industry. Column B C concentrations specified by the parameters of pollution in emissions of thermal as a basic for calculating the maximum concentration (Cmax) allowed for all units of Thermal Power Plants with the applicable period from January 1st 2015.In which, calculating Cmax as follow:*

$$Cmax = C \times Kp \times Kv = 0.56 \times C$$

+ Kp is power coefficient, Kp=0.7; Kv is regional coefficient, Kv=0.8 (Urban city type II – Cam Pha City);

- *Symbol (*) apply for **QCVN 19:2009/BTNMT** - National Technical Regulation on industrial emissions of inorganic substances and dusts. Column B C concentration specified by dusts and inorganic substances (here is only for CO) as a basic for calculating the maximum concentration (Cmax) allowed for all production facilities, processing, trading and industrial services operations from January 1st 2015. In which, calculating Cmax as follow:* $Cmax(*) = C \times Kp \times Kv = 0.9 \times C$

+ Kp is coefficient of flow sources, Kp=1; Kv is regional coefficient, Kv=0.9 (Urban city type II – Cam Pha City);

- *Sampling positions: Coordinates: 21°04'18.3" N 107°20'59.7"E*

S2.1: Stack of line 2. Sample 1
S2.2: Stack of line 2. Sample 2
S2.3: Stack of line 2. Sample 3

- *Operation status: Stack of line 2 works with 618 MW of capacity.*

Ha Noi, March 08th 2022

Centre for industrial environmental monitoring and pollution control
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No: 09/20/TTQT-2022-EN

VILAS 406; VIMCERTS 055

ENVIRONMENTAL MONITORING RESULTS

Sampling area : Mong Duong 2 Thermal Power Plant
Address : Mong Duong Ward, Cam PhaCity, QuangNinh province
Sampling date : 16-17/02/2022
Type of samples : Air emission
Number of samples : 06 samples

No	Parameters	Unit	Analytical methods	Results			
1.	***Stack of line 1***			**S1.1**	**S1.2**	**S1.3**	**Average**
	Hg and compound calculated in Hg	mg/Nm^3	EPA Method 29	<0.001	<0.001	<0.001	<0.001
2.	***Stack of line 2***			**S2.1**	**S2.2**	**S2.3**	**Average**
	Hg and compound calculated in Hg	mg/Nm^3	EPA Method 29	<0.001	<0.001	<0.001	<0.001

Notes:

- *The result is valid only for samples at the monitoring time. The concentration of pollutants in stack emission was calculated at the standard condition with the temperature is 25°C and the pressure is 760 mm Hg.*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- *Sampling positions:* *Coordinates: 21°04'18.3" N 107°20'59.7"E*

S1.1: Stack of line 1. sample 1 *S2.1: Stack of line 2. sample 1*
S1.2: Stack of line 1. sample 2 *S2.2: Stack of line 2. sample 2*
S1.3: Stack of line 1. sample 3 *S2.3: Stack of line 2. sample 3*

Operation status: Stack of line 1 works with 617 MW of capacity.
: Stack of line 2 works with 618 MW of capacity.

Ha Noi, March 08th, 2022

Centre for industrial environmental monitoring and pollution control
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VILAS 406; VIMCERTS 055

No: 10/20/TTQT-2022-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Surface water
Number of Samples: 04 samples

No.	Parameters	Unit	Analytical methods	Results				QCVN 10-MT: 2015/BTNMT
				MD1	MD2	MD3	MD4	
1.	Temperature	°C	SMEWW 2550B:2017	20.1	19.7	19.3	19.4	-
2.	pH	-	TCVN 6492:2011	7.5	7.9	8.6	7.7	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2501:2017	13.5	14.6	15.5	25.5	-
4.	DO	mg/L	TCVN 7325:2016	4.4	6.1	7.9	7.2	-
5.	BOD_5	mg/L	TCVN 6001-1:2008	38	14	23	13	-
6.	TSS	mg/L	TCVN 6625:2000	85	8	6	5	-
7.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-.E:2017	1.24	0.36	0.91	0.14	-
8.	Total N	mg/L	TCVN 6638:2000	<3.0	<3.0	<3.0	<3.0	-
9.	Total P	mg/L	TCVN 6202:2008	0.21	0.09	0.15	<0.01	-
10.	Ammonium	mg/L	SMEWW 4500 NH_3.B&F:2017	2.79	1.43	1.68	0.25	0.5
11.	Arsenic (As)	mg/L	US EPA method 200.8	0.0062	0.0031	0.0022	0.0038	0.05
12.	Mercury (Hg)	mg/L	US EPA method 200.8	<0.0005	<0.0005	0.0010	<0.0005	0.005
13.	Lead (Pb)	mg/L	US EPA method 200.8	0.0012	0.0023	<0.0005	<0.0005	0.1
14.	Cadmium (Cd)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	0.01
15.	Chromium (Cr)	mg/L	US EPA method 200.8	0.037	0.025	0.005	0.021	0.5

No.	Parameters	Unit	Analytical methods	Results				QCVN 10-MT: 2015/BTNMT
				MD1	MD2	MD3	MD4	
16.	Copper (Cu)	mg/L	US EPA method 200.8	0.012	0.017	0.002	0.008	1
17.	Zinc (Zn)	mg/L	US EPA method 200.8	0.019	0.015	0.014	0.010	2
18.	Nickel (Ni)	mg/L	US EPA method 200.8	0.012	0.009	0.009	0.007	-
19.	Manganese (Mn)	mg/L	US EPA method 200.8	0.026	0.033	0.013	0.015	0.5
20.	Iron (Fe)	mg/L	US EPA method 200.8	0.317	0.263	0.236	0.169	0.5
21.	Selenium (Se)	mg/L	US EPA method 200.8	0.025	0.023	0.016	0.017	-
22.	Total oil and grease	mg/L	SMEWW 5520B:2017	<0.3	<0.3	<0.3	<0.3	0.5
23.	Coliform	MPN/ 100mL	TCVN 6187-2:1996	5,400	2.700	440	280	1,000

Note:

- *The result is valid only for samples at the monitoring time. Symbol (-): unstipulated;*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***QCVN 10-MT:2015/BTNMT** - National technical regulation on coastal water quality. With coastal water – Luong Gac, we apply limit value of polluted parameters in coastal which is not belong to aquaculture areas or seaside resort, water sport.*
- *Sampling sites:Mong Duong river where water run from Tran bridge (Zone 4, Mong Duong ward) to Luong Gac*
- *Sampling positions:*

	Coordinates	
MD1: Tran bridge (Zone 4, Mong Duong ward)	*21°03'48.0"N*	*107°19'26.7"E*
MD2: Mong Duong bridge	*21°03'51.5"N*	*107°20'50.6"E*
MD3: Area where conveyor transfers coal to factory	*21°04'07.8"N*	*107°21'00.8"E*
MD4: Estuary where river runs into Luong Gac canal	*21°04'25.3"N*	*107°21'41.0"E*

Ha Noi, March 08th,2022

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VILAS 406; VIMCERTS 055

No: 11/20/TTQT-2022-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Surface water
Number of Samples : 05 samples

No.	Parameters	Unit	Analytical methods	Results					QCVN 10-MT: 2015/BTNMT
				SW12	SW13	SW14	SW15	SW16	
1.	Temperature	°C	SMEWW 2550B:2017	21.1	23.5	25.6	24.2	22.4	-
2.	pH	-	TCVN 6492:2011	7.9	7.6	7.4	7.6	7.8	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2501:2017	10.3	11.6	12.5	10.3	10.8	-
4.	DO	mg/L	TCVN 7325:2016	7.5	7.2	6.8	7.0	6.9	-
5.	BOD_5	mg/L	TCVN 6001-1:2008	23	25	23	27	30	-
6.	TSS	mg/L	TCVN 6625:2000	9	12	10	14	17	-
7.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-.E:2017	0.53	0.37	030	0.33	0.25	-
8.	Total N	mg/L	TCVN 6638:2000	<3.0	<3.0	<3.0	<3.0	<3.0	-
9.	Total P	mg/L	TCVN 6202:2008	0.06	<0.01	<0.01	<0.01	<0.01	-
10.	Ammonium	mg/L	SMEWW 4500 NH_3.B&F:2017	1.98	1.56	0.83	0.96	1.49	0.5
11.	Arsenic (As)	mg/L	US EPA method 200.8	0.0033	0.0029	0.0025	0.0031	0.0023	0.05
12.	Mercury(Hg)	mg/L	US EPA method 200.8	0.007	<0.0005	<0.0005	<0.0005	<0.0005	0.005
13.	Lead (Pb)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.1
14.	Cadmium (Cd)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.01
15.	Chromium (Cr)	mg/L	US EPA method 200.8	0.006	0.005	0.005	0.005	0.006	0.5
16.	Copper(Cu)	mg/L	US EPA method 200.8	<0.003	<0.003	<0.003	<0.003	<0.003	1
17.	Zinc (Zn)	mg/L	US EPA method 200.8	0.011	0.006	0.010	0.009	0.005	2
18.	Nickel (Ni)	mg/L	US EPA method 200.8	0.015	0.011	0.014	0.011	0.009	-

No.	Parameters	Unit	Analytical methods	Results					QCVN 10-MT: 2015/BTNMT
				SW12	SW13	SW14	SW15	SW16	
19.	Manganese (Mn)	mg/L	US EPA method 200.8	0.0047	<0.0015	<0.0015	<0.0015	<0.0015	0.5
20.	Iron (Fe)	mg/L	US EPA method 200.8	0.186	0.167	0.173	0.149	0.154	0.5
21.	Selenium (Se)	mg/L	US EPA method 200.8	0.017	0.013	0.015	0.011	0.014	-
22.	Total oil and grease	mg/L	SMEWW 5520B:2017	<0.3	<0.3	<0.3	<0.3	<0.3	0.5
23.	Coliform	MPN/100mL	TCVN 6187-2:1996	460	250	220	310	300	1,000

Notes:

- *The result is valid only for samples at the monitoring time. Symbol (-): unstipulated;*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***QCVN 10-MT:2015/BTNMT** - National technical regulation on coastal water quality. With coastal water – Luong Gac, we apply limit value of polluted parameters in coastal which is not belong to aquaculture areas or seaside resort, water sport.*
- *Sampling sites:Channel which leads cooling water of Mong Duong 1&2 Thermal Power Plants into Luong Gac*
- *Sampling positions:*

	Coordinates	
SW12: Cooling water canal head	*21°04'39.5"N*	*107°20'40.6"E*
SW13: Behind cooling water outlet of Mong Duong 1 Thermal Power Plant	*21°04'43.4"N*	*107°20'50.9"E*
SW14: Behind cooling water outlet of Mong Duong 2 Thermal Power Plant	*21°04'48.3"N*	*107°21'04.4"E*
SW15: Cooling water channel	*21°05'05.0"N*	*107°21'41.0"E*
SW16: Cooling water channel	*21°05'05.0"N*	*107°21'57.3"E*

Ha Noi, March 08th, 2022

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VILAS 406; VIMCERTS 055

No:12/20/TTQT-2022-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Coastal water
Number of Samples: 05 samples

No.	Parameters	Unit	Analytical methods	Results					QCVN 10-MT: 2015/BTNMT
				SW2	SW3	SW4	SW5b	SW6	
1.	Temperature	°C	SMEWW 2550B:2017	19.7	19.3	19.9	19.2	19.3	-
2.	pH	-	TCVN 6492:2011	7.7	7.5	7.4	8.1	7.5	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2501:2017	28.9	28.4	27.6	29.4	27.5	-
4.	DO	mg/L	TCVN 7325:2016	7.4	7.2	7.5	8.2	8.0	-
5.	BOD_5	mg/L	TCVN 6001-1:2008	17	14	13	16	13	-
6.	TSS	mg/L	TCVN 6625:2000	12	13	10	12	10	-
7.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-.E:2017	0.144	0.139	0.138	0.140	0.135	-
8.	Total N	mg/L	TCVN 6638:2000	<3.0	<3.0	<3.0	4.0	<3.0	-
9.	Total P	mg/L	TCVN 6202:2008	<0.01	<0.01	<0.01	0.01	<0.01	-
10.	Ammonium	mg/L	SMEWW 4500 NH_3.B&F:2017	0.26	0.29	0.25	0.23	0.25	0.5
11.	Arsenic (As)	mg/L	US EPA method 200.8	0.008	0.007	0.007	0.005	0.006	0.05
12.	Mercury(Hg)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.005
13.	Lead (Pb)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.1
14.	Cadmium (Cd)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.005
15.	Chromium (Cr)	mg/L	US EPA method 200.8	0.009	0.010	0.007	0.005	0.008	0.5
16.	Copper(Cu)	mg/L	US EPA method 200.8	0.003	0.005	<0.003	<0.003	<0.003	1

No.	Parameters	Unit	Analytical methods	Results					QCVN 10-MT: 2015/BTNMT
				SW2	SW3	SW4	SW5b	SW6	
17.	Zinc (Zn)	mg/L	US EPA method 200.8	0.0015	0.0014	0.0011	0.017	0.014	2
18.	Nickel (Ni)	mg/L	US EPA method 200.8	0.007	0.016	0.010	0.008	0.015	-
19.	Manganese (Mn)	mg/L	US EPA method 200.8	0.003	0.002	0.001	0.002	0.002	0.5
20.	Iron (Fe)	mg/L	US EPA method 200.8	0.227	0.274	0.236	0.242	0.256	0.5
21.	Selenium (Se)	mg/L	US EPA method 200.8	0.044	0.036	0.034	0.041	0.037	-
22.	Total Oil and grease	mg/L	SMEWW 5520B:2017	<0.3	<0.3	<0.3	<0.3	<0.3	0.5
23.	Coliform	MPN/100mL	TCVN 6187-2:1996	170	250	180	240	210	1,000

Note:

- *The result is valid only for samples at the monitoring time.Symbol (-): unstipulated;*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***QCVN 10-MT:2015/BTNMT**–National technical regulation on coastal water quality. With coastal water – Luong Gac, we apply limit value of polluted parameters in coastal which is not belong to aquaculture areas or seaside resort, water sport*
- *Sampling positions:*

		Coordinates
SW2	*21°05'17.4"N*	*107°23'07.2"E*
SW3	*21°03'41.8"N*	*107°22'35.2"E*
SW4	*21°04'08.9"N*	*107°22'02.9"E*
SW5b	*21°04'45.6"N*	*107°22'11.5"E*
SW6	*21°03'05.7"N*	*107°22'14.6"E*

Ha Noi, March 08th, 2022

Centre for industrial environmental monitoring and pollution control
Director

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TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI

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VILAS 406; VIMCERTS 055

No: 13/20/TTQT-2022-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 Thermal Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 16-17/02/2022
Type of Samples : Coastal water
Number of Samples: 07 samples

No.	Parameters	Unit	Analytical methods	Results							QCVN 10-MT: 2015/BTNMT
				SW7	SW8	SW9	SW10	SW11	SW18	SW19	
1.	Temperature	°C	SMEWW 2550B:2017	19.6	20.4	20.0	19.5	19.6	18.9	19.3	-
2.	pH	-	TCVN 6492:2011	7.6	7.9	7.9	8.2	7.5	8.0	7.3	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2501:2017	29.6	28.3	31.4	27.5	29.9	27.3	27.9	-
4.	DO	mg/L	TCVN 7325:2016	8.1	8.4	7.7	7.9	7.3	8.1	7.8	-
5.	BOD_5	mg/L	TCVN 6001-1:2008	17	18	24	19	14	18	16	-
6.	TSS	mg/L	TCVN 6625:2000	9	8	13	11	7	10	9	-
7.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-.E:2017	0.285	0.184	0.237	0.383	0.159	0.195	0.205	-
8.	Total N	mg/L	TCVN 6638:2000	3.0	3.2	3.5	3.2	3.7	<3.0	<3.0	-
9.	Total P	mg/L	TCVN 6202:2008	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
10.	Ammonium	mg/L	SMEWW 4500 NH_3.B&F:2017	0.17	0.19	0.21	0.16	0.17	0.15	0.17	0.5
11.	Arsenic (As)	mg/L	US EPA method 200.8	0.0067	0.0078	0.0059	0.0052	0.0059	0.0063	0.0055	0.05
12.	Mercury (Hg)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.005
13.	Lead (Pb)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	0.0010	<0.0005	<0.0005	0.1
14.	Cadmium (Cd)	mg/L	US EPA method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.005
15.	Chromium (Cr)	mg/L	US EPA method 200.8	0.008	0.007	0.009	0.008	0.006	0.012	0.013	0.5

No.	Parameters	Unit	Analytical methods	Results							QCVN 10-MT: 2015/BTNMT
				SW7	SW8	SW9	SW10	SW11	SW18	SW19	
16.	Copper (Cu)	mg/L	US EPA method 200.8	<0.003	<0.003	<0.003	<0.003	0.003	<0.003	<0.003	1
17.	Zinc (Zn)	mg/L	US EPA method 200.8	0.0105	0.0117	0.0107	0.0115	0.0113	0.0126	0.0128	2
18.	Nickel (Ni)	mg/L	US EPA method 200.8	0.004	0.007	0.006	0.006	0.007	0.007	0.005	-
19.	Manganese (Mn)	mg/L	US EPA method 200.8	0.003	0.002	0.002	0.002	0.002	0.003	0.003	0.5
20.	Iron (Fe)	mg/L	US EPA method 200.8	0.223	0.275	0.247	0.241	0.225	0.264	0.316	0.5
21.	Selenium (Se)	mg/L	US EPA method 200.8	0.025	0.029	0.023	0.021	0.024	0.028	0.026	-
22.	Total Oil and grease	mg/L	SMEWW 5520B:2017	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.5
23.	Coliform	MPN/100ml	TCVN 6187-2:1996	250	240	190	240	320	260	210	1,000

Note:

- *The result is valid only for samples at the monitoring time.Symbol (-): unstipulated;*
- *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
- ***QCVN 10-MT:2015/BTNMT**–National technical regulation on coastal water quality. With coastal water – Luong Gac, we apply limit value of polluted parameters in coastal which is not belong to aquaculture areas or seaside resort, water sport*
- *Sampling positions:*

	Coordinates	
SW7	*21°03'12.3"N*	*107°22'49.0"E*
SW8	*21°05'42.5"N*	*107°22'16.0"E*
SW9	*21°05'31.0"N*	*107°22'36.2"E*
SW10	*21°04'59.0"N*	*107°22'36.3"E*
SW11	*21°03'49.2"N*	*107°22'09.2"E*
SW18	*21°04'33.7"N*	*107°21'21.3"E*
SW19	*21°04'33.5"N*	*107°21'42.5"E*

Ha Noi, March 08th, 2022

Centre for industrial environmental monitoring and pollution control

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