AES MONG DUONG POWER CO. LTD.

MONG DUONG 2 BOT COAL FIRED POWER PLANT

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ENVIRONMENTAL MONITORING REPORT FOR MONG DUONG 2 BOT COAL FIRED POWER PLANT

AUGUST- 2024

HA NOI, SEPTEMBER – 2024

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AUGUST - 2024

Invested by:

AES MONG DUONG POWER CO.LTD.

Implemented by:

BACH KHOA ENVIRONMENTAL AMICABLE TECHNOLOGY, JSC. (BKEST)

M.S.D.N: 0103772... C.T.
CÔNG TY CỔ PHẦN CÔNG NGHỆ THÂN THIỆN MÔI TRƯỜNG BÁCH KHOA
Q. HAI BÀ TRƯNG - TP...

GIÁM ĐỐC

Nguyễn Ngọc Việt

HA NOI, SEPTEMBER - 2024

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1. MONG DUONG 2 BOT COAL FIRED POWER PLANT

Mong Duong 2 BOT Coal Fired Power Plant is one of two thermal power plant projects. It locates in Mong Duong Electricity Power Centre and has construction site that locates near No. 18A national route. The distance from Mong Duong thermal power plant to Ha Long city is about 50 km and to Cam Pha commune about 18 km in the North East. Mong Duong Electricity Power Centre locates in zone 3, Mong Duong ward, Cam Pha commune, Quang Ninh province. This position lies near Mong Duong estuary and along Luong Gac (Gac Channel). This is an advantage for not only transporting materials by waterway to construction site but also installing cooling water system for two factories. Along South East coast of Electricity Power Centre is range of low mountain. In Luong Gac, there is coal port and chemical store belong Bai Tu Long Coal Company. The plant has total capacity about 1240MW (including two sets of machinery with average capacity is 620MW) with total investment about 2 billion USD. Construction stage was started since September 15th, 2011 and is scheduled supplying commercial electricity for each set of machinery.

- No. 1 set of machinery was operated on March 4th, 2015 with capacity 600MW.
- No. 2 set of machinery was operated on April 22nd, 2015 with capacity 600MW. Total capacity is 1200MW.

Area of plant is 81,822 ha. Plant is built in zone 3, Mong Duong ward, Cam Pha commune, Quang Ninh province. Boundary of plant: by the East: beside Binh Minh port; by the South: beside rivulet; by the West: beside Mong Duong 1 thermal power plant; by the North: beside the road which leads to plant and Mon Duong river. The location to build project has many advantages in transferring material by waterway, constructing, investigating, exploiting, and operating plant.

The location of Mong Duong Electricity Power Centre including Mong Duong 2 BOT Coal Fired Power Plant project and general plan of Centre is shown in **Figure 1.1**

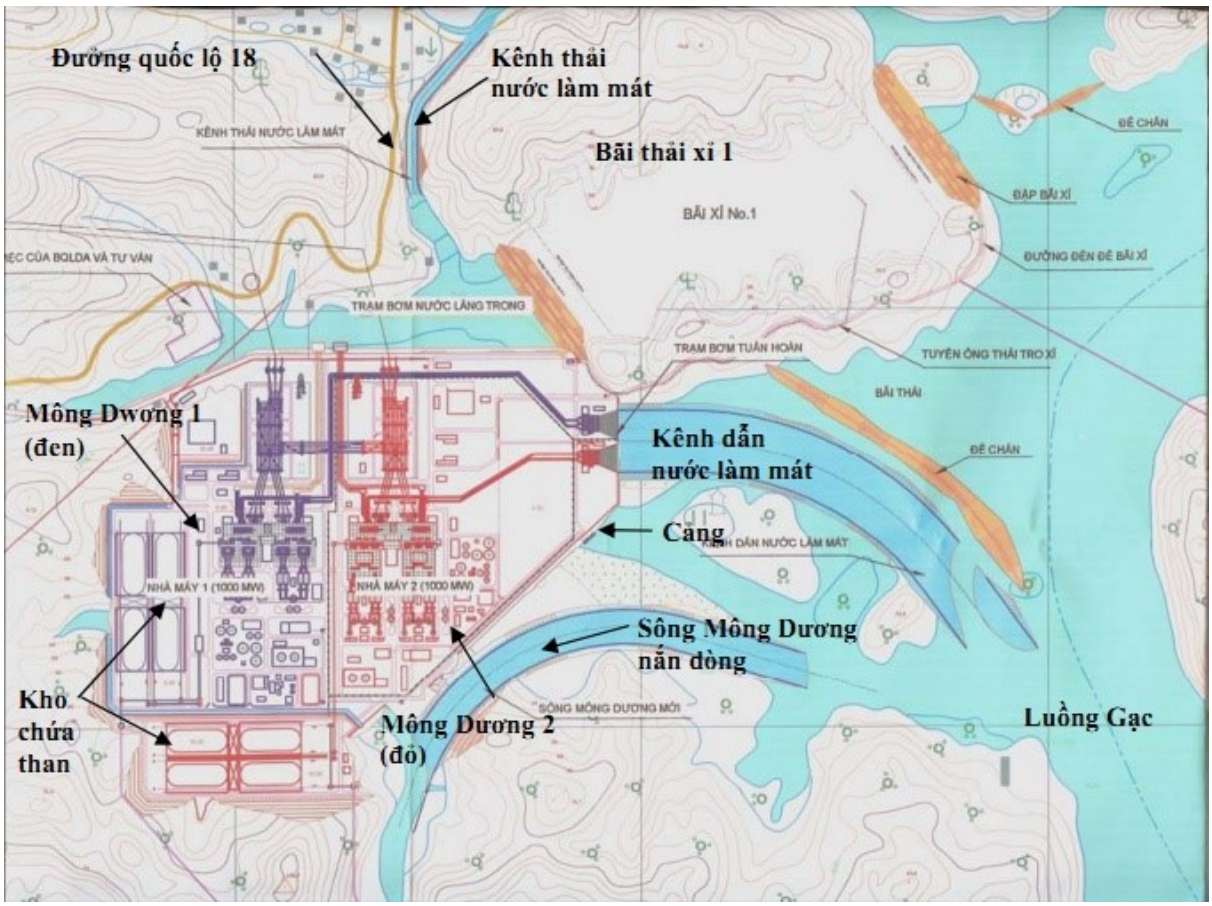


Figure 1.1. Mong Duong 2 BOT Coal Fired Power Plant location

Mong Duong 2 BOT Coal Fired Power Plant project is built after Mong Duong Electricity Power Centre completing infrastructures (leveling platform, converting flow of Mong Duong river, completing water collection system, water discharge system to cool, ash dumps…). The works within project include:

+ Infrastructure of thermal power plant: including generator, primary transformer and ancillary works;

+ The operator, warehouse, workshop;

+ Piping, cooling pump system of general channel from Luong Gac river to Electricity Power Centre.

+ Sewage piping system from plant to Luong Gac canal

+ Channel discharges cooling water into general discharge system of Electricity Power Centre

+ Piping system leads oil from oil receiving point;

+ Slag treating system includes pump station and pump system, which leads slag to general slag, discharged pool of Electricity Power Centre

+ Coal warehouse (about 15 days);

+ Construction treats wastewater;

+ Private road;
+ Fire preventing and fighting system;
+ Temperatureorary and fixed accommodation;
+ The drainage system within plant.
+ Port that receive oil and limestone
+ Slag landfill

The categories used together with Mong Duong 1 Thermal Power Plant are shown in the following table:

Table 1.1. The categories of Mong Duong 2 BOT Coal Fired Power Plant are used together with Mong Duong 1 Thermal Power Plant in Mong Duong Electricity Power Centre

No.	Categories	Description
1	All area of centre	Mong Duong 2 plant account for 50%
2	Coal receiving region	Using conveyer to transport coal in centre
3	Cooling water supplying channel	This construction is built by EVN. Connection point is pump station in the East of project
4	Cooling water discharging channel	This construction is built by EVN. It locates in the North of project
5	Fresh water supplying system	This construction is built in the North - West by EVN.
6	500 KV connection line	This construction is built by EVN. Mong Duong 2 connection structure inside the distribution station
7	110 KV power supply line for testing in factory	This construction is built by EVN. Mong Duong 2 connected at self-substation to the point inside the
8	Road	At primary road of Mong Duong 2.
9	FO oil and limestone receiving port	Only used by Mong Duong 2. Area is 0.57 ha
Source: AES-VCM Mong Duong Power Co. Ltd., October, 2014		

All general categories of construction are completed and put in use

2. ASH POND 2 - MONG DUONG 2 BOT COAL FIRED POWER PLANT

The area of ash pond 2 of Mong Duong 2 BOT Coal Fired Power Plant is 187 ha and it is located at the Cong Hoa commune, Cam Pha town. It was about 4.3 km in the

North of Mong Duong plant and about 50 km far from Ha Long city and 18 km from Cam Pha town. The ash pond 2 was designed to contain the amount of ash during 30 years of Mong Duong plant's operations.

The ash pond 2 included the system of ash boxes, dam around ash pond and dam around ash boxes, collecting rainwater drainage system, sewage pipeline of the dimissing slag from the Mong Duong 2 BOT project to the ash pond 2 and circulation rainwater pipeline from the ash pond 2 to the plant (10ha).

The total area of other auxiliary construction is 0.204 ha. These include pump stations, operator house, electric lines supplying for recirculation wastewater pump station in ash pond 2, the roads leading to ash pond.

The auxiliary components of ash pond 2 detail as in the following table:

Table 1.2. The auxiliary components of ash pond 2

No.	Components	Technical parameters
1.	Road to ash pond	- Length: 300m - Width: 6m
2.	Road to ash pond B	Surface top of dikes, dams with a width of 10m
3.	Drainage channel of basin	- Rectangular channel system, steel-rod concrete - Slope: 1:2 - Length: About 2500m.
4.	Recirculation pump station	- In the West of ash pond, steel-rod concrete - Dimensions: 13.5 x 6.0 x 6.2 - Pump system configuration is 3x50%.
5.	Operation house	- Office area: Area is 60m^2, steel frame structure - Storage area: Area is 100m^2.

Conterminous areas around ash pond 2 include:

- The West area and the South area of ash pond 2 abuts with Thac Thay river.

- The North area of ash pond 2 abuts with residental area of Ha Chanh village, Cong Hoa commune and is far about 250 m from residential area.

- The East area of ash pond 2 abuts with Thai Viet Long construction material producting company and is far 250 m from Ha Chanh inter-village road.
- About 750m from the North of Cam Pha brick factory
- About 300m from the South East of Ha Chanh clay mine.
- About 500m from the South of Thanh Dinh wood manufacturing company.

The feature of ash pond has good character of topography and geology, sparse population, mainly hills, mountains, river and stream. The main traffic is road. Rivers, canal around ash pond has small capacity of water and is not suitable for transportation. Therefore, ash transportation is mainly on the road.

The location and total area of ash pond 2 are shown in **Figure 1.2; 1.3.**

Figure 1.2. Geographical location of ash pond 2

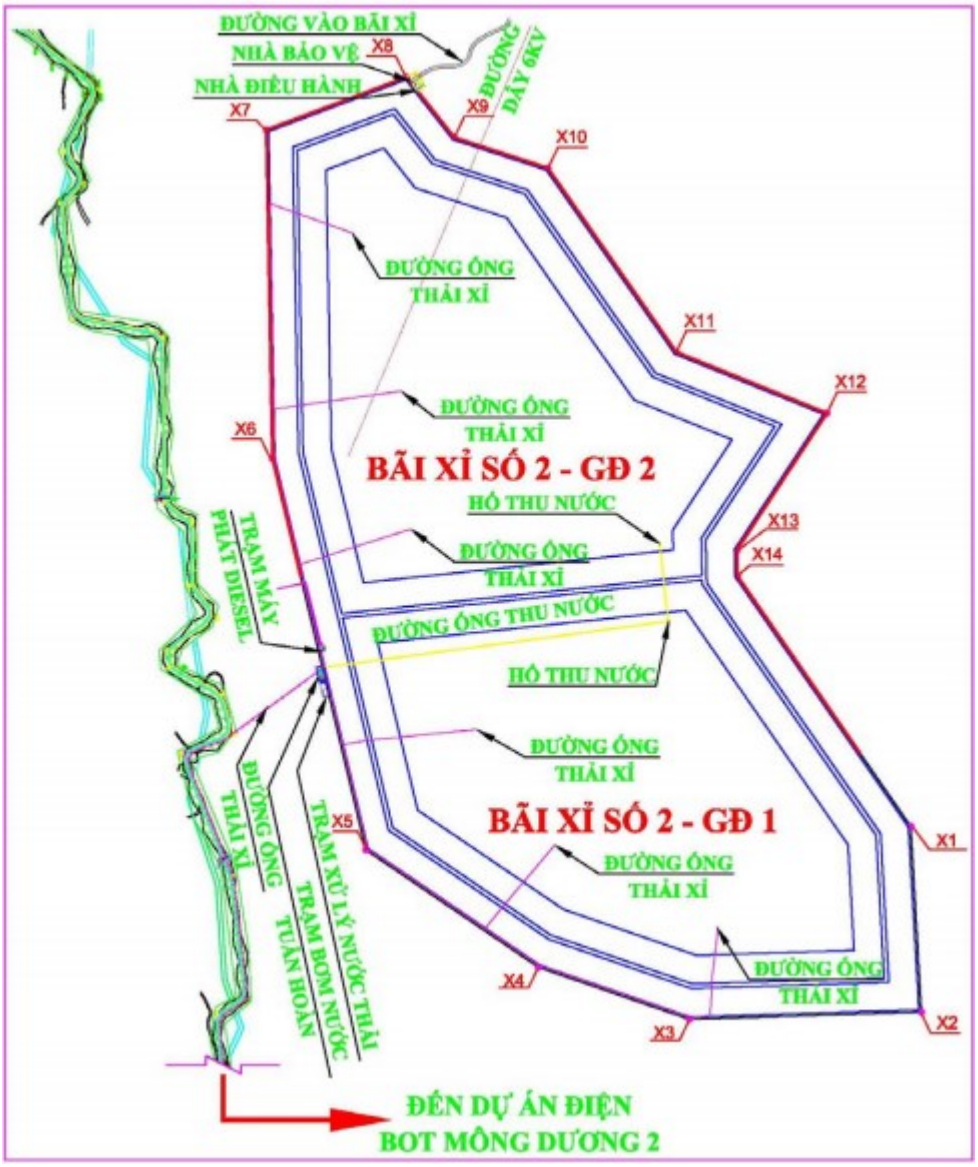


Figure 1.3. The general area of ash pond 2

3. HOUSING COLONY

The Housing area is 4 ha. In addition, it is located in Section 8, Mong Duong ward, Cam Pha city, Quang Ninh province. This area is based in Mong Duong ward residential area surrounded by the new and old National Highway No.18, where the transportation is very convenient. The Housing was in operation in April 2014. The scale of the Housing colony for staffs of AES-VCM Mong Duong Power Limited Company includes:

- 02 dormitories with construction area of 235 m^2, three floors; size: 26.72 x 19.22 x 13.9 meters;
- 02 apartment blocks with construction area of 386 m^2, three floors; size: 33.82 x 11.72 x 13.9 meters;

- 01 apartment blocks with construction area of 370 m^2, three floors; size: 32.29 x 11.69 x 13.9
- 01 multifunctional building with construction area of 1,381 m^2; two floors, size: 54.125 x 37 x 14.1 meters;
- 01 staff – driver accommodation with construction area of 235 m^2; two floors, size: 31.47 x 7.72 x 12.7 meters;
- 01 technical houses with construction area of 140 m^2; one floor, size: 42.25 x 7.5 x 5 meters;
- 01 substation of 1,200 KVA
- 01 multi-court with construction area of 400m^2

The entire building was used for officers and specialist staffs joining the operation of Mong Duong 2 BOT Coal Fired Power Plant. The largest number of people can be up to 200 people.

CHAPTER I. PLAN OF ENVIRONMENTAL MONITORING PROGRAM IN MONG DUONG 2 BOT COAL FIRED POWER PLANT, ASH POND 2 AND HOUSING COLONY IN 2024

The environmental monitoring program in August 2024 is the 109th monitoring time in operation stage of plant and the 37th monitoring time in operation stage of ash pond 2. The main purpose is to show the judge about environment status of plant and ash pond 2 during operation stage. Environmental monitoring program are performed to make report on periodic environment quality of Mong Duong 2 BOT Coal Fired Power Plant and Ash pond 2. This program ensures environmental management object of Mong Duong 2 BOT Coal Fired Power Plant project to meet the requirements of national environmental protection laws and AES company during operation stage. The detailed objects are shown as following parts:

I.1. The purpose of monirtoring program

The purpose of monitoring program is to evaluate the environmental quality, to examine the pollution level of each environmental component and to collect continuous data to serve environmental management works for Mong Duong 2 BOT Coal Fired Power Plant and Mong Duong Electricity Power Centre.
In detail:

- ✓ Components, polluted sources, concentration/contents/intensity of pollutants
- ✓ The impact of environmental agents/pollutants
- ✓ Forecasting changes in the levels and effects of these agents
- ✓ Information to managers, namely management board of Mong Duong thermal power plant to take measures in order to mitigate or prevent the harmful effects of environmental pollution caused by the operation of the plant

Besides, this environmental monitoring program is also followed the requirements of approved EIA report of Mong Duong 2 BOT Coal Fired Power Plant (2007).

Since the fourth quarter of 2023, environmental component permits are no longer valid for the plant area, ash pond 2 and housing colony area. All three areas comply with the Environmental License issued by the Ministry of Natural Resources and Environment No. 418/GPMT-BTNMT dated October 25th, 2023.

I.2. Environmental monitoring parameters and frequency in 2024

All the environmental monitoring parameters are selected typically for each environmental component.

For Mong Duong 2 BOT Coal Fired Power Plant, ash pond 2 and housing Colony, monitoring parameters selected in 3rd quarter (August 2024) monitoring time are strictly complied with EIA report; Environment License No. 418/GPMT-BTNMT dated October 25th, 2023 and based on the fact operating stage of the factory.

Main monitoring parameters and frequency are seen in table below:

Table 1.3. Environmental parameters and frequency

No	Item	Term of work	Location	Frequency requirement			Monitoring parameters	Reference Standard	Final frequency	Sampling Quantity
				ADB EIA	MONRE EIA	Permit				
A. Mong Duong 2 BOT Coal Fired Power Plant										
1.	Ambient air		Baseline air quality monitoring stations (total: 5 locations)	Monthly for 1st year Quarterly thereafter	Quarterly	-	SO_2; TSP; PM2.5; PM10; NO_x; CO	QCVN 05:2023/BTNMT	Quarterly	05
2.	Microclimate		Baseline air quality monitoring stations (total: 5 locations)	Monthly for 1st year	Quarterly	-	Temperature, humidity, wind speed, wind velocity	QCVN 46:2012/BTNMT	Quarterly	05
3.	Nosie (day time and night time)		Baseline air quality monitoring stations	-	Quarterly	-	Noise (Leq)	QCVN 26:2010/BTNMT	Quarterly	05x2

No	Item	Term of work	Location	Frequency requirement			Monitoring parameters	Reference Standard	Final frequency	Sampling Quantity
				ADB EIA	MONRE EIA	Permit				
			(total: 5 locations)							
4.	Industrial air emission		Stack of line 1 & 2	-	Quarterly	Quarterly	SO_2, NO_x, CO, Dust, Hg	QCVN 22:2009/BTNMT	Quarterly	02
5.	Green house gases		K1: Plant area, near coal store	-	Quarterly	-	CO_2, CH_4, N_2O	-	Quarterly	01
6.	Noise (day time and night time)		- 5m from noise resource	Weekly Monthly (for first year)	Quarterly	Quartely	Noise (LAeq)	QCVN 26:2010/BTNMT	Quartely	29 x2
7.	Vibration (day time and night time)		- 5m from noise resource	Quarterly	Quarterly	Quarterly	Vibration (LAeq)	QCVN 27:2010/BTNMT	Quarterly	29 x2

No	Item	Term of work	Location	Frequency requirement			Monitoring parameters	Reference Standard	Final frequency	Sampling Quantity
				ADB EIA	MONRE EIA	Permit				
8.	Water environment	Surface water including coastal water	21 positions (12 positions of coastal water)	Yearly	Quarterly	-	Temperature, pH; TSS; EC; NH_4^+; NO_3^-; DO; BOD_5; Total N&P; Heavy metals (As, Cr, Cd, Cu, Pb, Zn, Ni, Hg, Fe, Mn, Se..), Total oil and grease, Coliform	QCVN 10:2023/BTNMT	Quarterly	21
9.		Cooling water	CW1, CW2, CW3	Yearly	Quarterly	Quarterly	Temperature, pH; Color; TSS; TDS; COD; NH_4^+; BOD_5; Total N&P; Heavy metals (As, Cr, Cd, Cu, Pb, Zn, Ni, Hg, Fe, Mn, Se...), Mineral Oil & grease, F^-; H_2S; Residue Chlorine; Coliform	QCVN 40:2011/ BTNMT QCĐP 3:2020/QN	Monthly	03

No	Item	Term of work	Location	Frequency requirement			Monitoring parameters	Reference Standard	Final frequency	Sampling Quantity
				ADB EIA	MONRE EIA	Permit				
10.		Sanitary wastewater	SH1, SH2, SH3	Quarterly	-	Quarterly	pH; BOD_5; TSS; TDS; sunfur (H_2S); Ammonium (NH_4); Nitrat (NO_3^-); Oil and Grease; Phophatse (PO_4^{3-}); coliform	QCVN 14:2008/BTNMT	Quartely	03
11.		Industrial waste water (WW1)	From the discharge point into the coolant channels	Quarterly	-	Quarterly	Temperature; pH; Colour; COD; BOD_5; TSS; As, Hg; Pb, Cd, Cr^{3+}, Cr^{6+} , Cu, Zn, Ni, Mn, Fe, Oil & grease, F^- , S^{2-}; Nutrients (N&P), ; Residual chlorine, Ammonium and Coliform	QCVN40:2011/ BTNMT	Quarterly	01
B. ASH POND 2										
1.	Wastewater		AP-W1: Wastewater from AP2	Quarterly	-	Quarterly	Temperature, pH, Color, TSS, COD, BOD_5, As, Hg, Pb, Cd, Cr(III),	QCĐP 3:2020/QN	Quarterly	02

No	Item	Term of work	Location	Frequency requirement			Monitoring parameters	Reference Standard	Final frequency	Sampling Quantity
				ADB EIA	MONRE EIA	Permit				
			Reservoir; AP-W2: Output of wastewater treatment system – Ash pond 2				Cr(VI), Cu, Zn, Ni, Mn, Fe, Total mineral Oil and Grease, residual chlorine, Sunfua, total N, total P, Ammonium, Flouride, Cyanide, Phenol, Coliform			
2.	Noise (day time and night time)		AP2-N: Wastewater treatment plant	Quarterly	-	Semi-annually	Noise (LAeq)	QCVN 26:2010/BTNMT	Quarterly	01x2
C. HOUSING COLONY										
1.	Sanitary wastewater		HS-NT1: Wastewater before the wastewater	Quarterly	-	Quarterly	Temperature, pH, TDS, TSS, BOD_5, $S^{2-;}$ NO_3^-, NH_4^+, PO_4^{3-}, total surfactants, Total oil and grease, coliform	QCVN 14:2008/BTNMT	Quarterly	02

No	Item	Term of work	Location	Frequency requirement			Monitoring parameters	Reference Standard	Final frequency	Sampling Quantity
				ADB EIA	MONRE EIA	Permit				
			treatment system; HS-NT2: Wastewater after the wastewater treatment system							

I.3. Monitoring positions

All the environmental monitoring positions are selected by the fact situation of the plant and are followed by the proposed program from EIA report that is approved in permit No 803/QĐ-BTNMT (22nd May 2007), demand of monitoring in operating period is built in Social and Environment Management System - SEMS, Environment License No. 418/GPMT-BTNMT dated October 25th, 2023.

The survey was conducted before sampling to examine the monitoring points by GPS-Silva-21802-901, Sweden. The coordinates are listed as in **Table 1.4** follows:

Table 1.4. The coordinates of monitoring points 109th time in Mong Duong 2 BOT Coal Fired Power Plant

Environmental Aspect	No	Location	X	Y
A. MONG DUONG 2 BOT COAL FIRED POWER PLANT				
I. AIR ENVIRONMENT				
Ambient air (5 positions)	K1	Plant area near coal store	21°04'13.4" N	107°20'56.2"E
	K2	Nguyen Trai the primary school, Mong Duong ward	21°03'57.5" N	107°19'20.1"E
	K3	Mong Duong the secondary 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	Trang Huong Village, Dong Xa Commune, Van Don District (brigade area No.242)	21°03'21.2"N	107°23'26.7"E
Industrial air emission	S1	Stack of line 1	21°04'18.3"N	107°20'59.7"E
			2330961	458239
	S2	Stack of line 2	21°04'18.3"N	107°20'59.7"E
			2330961	458233
II. WATER ENVIRONMENT				

Cooling water (3 positions)	CW1	Intake point of cooling water	21°04'32.6"N	107°21'18.5"E
	CW2	Discharge point into the cooling water channel	21°04'28.3"N	107°20'57.1"E
	CW3	Discharge point to common Mong Duong Power complex channel	21°04'42.4"N	107°21'03.1"E
			2331698	458326
Sanitary wastewater	SH1	Admin area	21°04'39.6"N	107°21'07.8"E
			2331603	458369
	SH2	Chemical dosing building	21°04'28.7"N	107°21'09.6"E
			2331391	458375
	SH3	Coal warehouse area	21°04'11.5"N	107°20'56.5"E
			2331262	458175
Industrial waste water	WW1	Discharge point into the Cooling water channel	21°04'31.1"N	107°21'04.4"E
			2331338	458360
Surface water	MD1	Tran bridge (Zone 4, Mong Duong ward)	21°05'43.1"N	107°22'50.4"E
	MD2	Mong Duong bridge	21°04'48.3"N	107°21'04.4"E
	MD3	Area where conveyor transfers coal to factory	21°05'12.8"N	107°22'42.7"E
	MD4	Estuary where riverruns into Luong Gac canal	21°03'48.0"N	107°19'26.7"E
	SW12	Cooling water canal head	21°03'51.5"N	107°20'50.6"E
	SW13	Behind cooling water outlet of Mong Duong 1 Thermal Power Plant	21°04'07.8"N	107°21'00.8"E
	SW14	Behind cooling water outlet of Mong Duong 2 BOT Coal Fired Power Plant	21°04'25.3"N	107°21'41.0"E
	SW15	Cooling water channel	21°04'39.5"N	107°20'40.6"E
	SW16	Cooling water channel	21°04'43.4"N	107°20'50.9"E
Coastal water	SW2	SW2	21°05'17.4"N	107°23'07.2"E
	SW3	SW3	21°03'41.8"N	107°22'35.2"E

	SW4	SW4	21°04'08.9"N	107°22'02.9"E
	SW5b	SW5b	21°04'45.6"N	107°22'11.5"E
	SW6	SW6	21°03'05.7"N	107°22'14.6"E
	SW7	SW7	21°03'12.3"N	107°22'49.0"E
	SW8	SW8	21°05'42.5"N	107°22'16.0"E
	SW9	SW9	21°05'31.0"N	107°22'36.2"E
	SW10	SW10	21°04'59.0"N	107°22'36.3"E
	SW11	SW11	21°03'49.2"N	107°22'09.2"E
	SW18	SW18	21°04'33.7"N	107°21'21.3"E
	SW19	SW19	21°04'33.5"N	107°21'42.5"E
III. NOISE AND VIBRATION				
Noise level (N) and Vibration (V)	N1, V1	Unit 1 area – pump for boiler – 1st floor – turbine building	2331206	458244
	N2, V2	Unit 1 area – compressor – 1st floor – turbine building	2331206	458244
	N3, V3	Unit 2 area – pump for boiler – 1st floor – turbine building	2331005	458247
	N4, V4	Unit 2 area – compressor – 1st floor – turbine building	2331207	458244
	N5, V5	Unit 1 – 2nd floor area – turbine building	2331215	455112
	N6, V6	Unit 2 – 2nd floor area – turbine building	2331132	458152
	N7, V7	Unit 1 – 3rd floor area – turbine building	2331198	458299
	N8, V8	Unit 2 – 3rd floor area – turbine building	2331174	458153
	N9, V9	Ball mill area – Unit 1 – 1st floor – coal crusher area	2331141	458294

	N10, V10	Ball mill area – Unit 2 – 1st floor – coal crusher area	2331164	458177
	N11, V11	Hopper pouring, heater ash hopper of Unit 1 – 1st floor – Boiler building	2331075	458294
	N12, V12	Hopper pouring, heater ash hopper of Unit 2 – 1st floor – Boiler building	2331073	458169
	N13, V13	Hopper pouring area of Unit 1 – 2nd floor – electrostatic precipitator area	2331031	458360
	N14, V14	Hopper pouring area of Unit 2 – 2nd floor – electrostatic precipitator area	2331053	458164
	N15, V15	Compressor – 1st floor – electrostatic precipitator area	2331053	458253
	N16, V16	Circulating pump and oxygen pump – FGD absorption tower of Unit 1	2330949	458241
	N17, V17	Circulating pump and oxygen pump – FGD absorption tower of Unit 2	2330949	458210
	N18, V18	Exhaust gases dryer including under shaft bearing and upper shaft bearing of Unit 1 – FGD and absorption tower area	2330976	458241
	N19, V19	Exhaust gases dryer including under shaft bearing and upper shaft bearing of Unit 2 – FGD and absorption tower area	2330978	458137

	N20, V20	Smoke fan area of ground floor of Unit 1 – FGD and absorption tower area	2330964	458281
	N21, V21	Smoke fan area of ground floor of Unit 2 – FGD and absorption tower area	2331116	458114
	N22, V22	Pump – Plaster building	2330956	458241
	N23, V23	Vacuum conveyor filter – 3rd floor – plaster building	2330974	458241
	N24, V24	Silo 1 – Area of slag silo at the bottom of furnace	2331115	458333
	N25, N25	Silo 2 - Area of slag silo at the bottom of furnace	2330915	458092
	N26, V26	Excavator – coal warehouse	2330727	458032
	N27, V27	Coal dividing machine of Unit 1 – Coal warehouse	2331166	458241
	N28, V28	Coal dividing machine of Unit 2 – Coal warehouse	2331165	458137
	N29, V29	Coal scraper – Coal warehouse	2330738	457721
B. ASH POND 2				
Wastewater	AP-W1	Wastewwater from neutralization tank	21°06'40.9"N	107°21'19.8"E
	AP-W2	Output of wastewater treatment system – Ash pond 2	21°06'42.5"N	107°21'12.9"E
			2335395	458628
Noise	AP2-N	Wastewater treatment plant	21°6'43.23"N	107°21'15.47"E
			2335415	458700
C. HOUSING COLONY				
Domestic wastewater	HS-NT1	Wastewater before the wastewater treatment system	21°04’16.2’’ N	107°20’01.1’’ E

	HS-NT2	Wastewater after the wastewater treatment system	21°04'16.2'' N	107°20'01.2'' E
			2330894	456546

1.4. Environmental monitoring method and equipment/instruments

Main environmental monitoring methods are:

- ✓ Surveying, collecting data, sampling, on-field measurement;
- ✓ Sampling, preservation and measurement on-field and laboratory in compliance with current Vietnamese standards, circulars and regulations;
- ✓ Data processing and evaluation, statistical method in comparison to QCVN/TCVN and the world.

Methods for measurements, sampling and preservation; equipment/instruments are as in **Table 1.5 and Table 1.6**

Table 1.5. Method for measurement, sampling and preservation

No	Environmental components	Name/ number of sampling and measurement methods	Equipment / LOD
AMBIENT AIR			
1.	Temperature	QCVN 46:2022/BTNMT	From 0°C – 70°C
2.	Humidity	QCVN 46:2022/BTNMT	From 0 – 100% RH
3.	Wind speed	QCVN 46:2022/BTNMT	From 0 – 40m/s
4.	Wind direction	QCVN 46:2022/BTNMT	From 0 – 360°
5.	TSP (24 hrs)	TCVN 5067:1995	Dust sampling equipment with high volume Staplex Model TFIA-2 FCDT

No	Environmental components	Name/ number of sampling and measurement methods	Equipment / LOD
6.	PM10 (24 hrs)	AS/NZS 3580.9.6:2003	Sampling volume: 0.5-2 litres/min The equipment includes two air sampling tube impingers with absorption method, the timer is to set the sampling time from 1-999 minutes Dust PM10 Samplers, Airmetric-TAS PM10-USA
7.	PM2.5	SOP-CO	10µg/m^3
8.	CO	TCVN 5971:1995	Equipment for gas sampling multifunction, Kimoto HS-7 Flow Sampling: 0,5-2 liter/min The equipment includes two air sampling tube impingers with absorption method, the timer is to set the sampling time from 1-999 minutes
9.	SO_2	TCVN 6137:1995	
10.	NO_2	QCVN 46:2022/BTNMT	
NOISE			
1.	Noise (LAeq)	TCVN 7878-2:2018	30 - 130 dB
VIBRATION			
1.	Vibration (LAeq)	TCVN 6963:2001	30-130dB
SURFACE WATER		TCVN 6663-1:2011, TCVN 6663-3:2016, TCVN 6663-4:2018, TCVN 6663-6:2018, TCVN 6663-4:2020	
1.	Temperature	SMEWW 2550B:2023	Từ 4 - 50ºC
2.	pH	TCVN 6492:2011	Từ 2 - 12
3.	Conductivity (EC)	SMEWW 2510:2023	Từ 0 - 100 mS/cm
4.	DO	TCVN 7325: 2016	0.1 - 16 mg/L
WASTEWATER		TCVN 6663-1:2011; TCVN 6663-3:2016;	

No	Environmental components	Name/ number of sampling and measurement methods	Equipment / LOD
		TCVN 6663-4:2018; TCVN 6663-6:2018; TCVN 5994:1995	
1.	Temperature	SMEWW 2550B:2023	4-50^{o}C
2.	pH	TCVN 6492:2011	2-12
COASTAL WATER		ISO 5667-9:2015; TCVN 6663-1:2011; TCVN 5998:1995; TCVN 6663-3:2016	
1.	pH	TCVN 6492:2011	2-12
2.	Temperature	SMEWW 2550B:2023	4-50^{o}C
3.	Conductivity (EC)	SMEWW 2510B:2023	0-100 mS/cm
4.	Dissolved Oxygen (DO)	TCVN 7325:2016	0.1-16 mg/L

Table 1.6. Analytical methods in the Laboratory

No	Environmental components	Name/ number of analytical methods	MDL/LOD
AMBIENT AIR			
1.	Total suspended particulate (TSP)	TCVN 5067:1995	10 µg/m^3
2.	PM10	AS/NZS 3580.9.6:2003	10 µg/m^3
3.	CO	SOP-PT-01	3,000 µg/m^3
4.	SO_2	TCVN 5971:1995	10 µg/m^3
5.	NO_2	TCVN 6137:1995	5 µg/m^3
AIR EMISSION			
1.	Dust	EPA method 5 TCVN 5977:2009	5 mg/Nm^3 5 mg/Nm^3
2.	SO_2	EPA method 6	3.4 mg/Nm^3
3.	NOx	EPA method 7	5.0 mg/Nm^3
4.	Hg	EPA Method 29	0.001 mg/Nm^3
WASTEWATER			
1.	Colour (pH=7)	TCVN 6185: 2015	5.0 Pt -Co
2.	BOD_5 (20^{O}C)	SMEWW 5210B:2023	1.0 mg/L
3.	COD	SMEWW 5220 C:2023	3.0 mg/L
4.	Total suspended solid (TSS)	TCVN 6625 : 2000	3.0 mg/L
5.	Arsenic (As)	EPA Method 200.8	0.0015 mg/L
6.	Mercury (Hg)	EPA Method 200.8	0.0005 mg/L
7.	Lead (Pb)	EPA Method 200.8	0.002 mg/L

No	Environmental components	Name/ number of analytical methods	MDL/LOD
8.	Cadmium (Cd)	EPA Method 200.8	0.0005 g/L
9.	Chrome VI	SMEWW 3500-Cr.B 2023	0.003 mg/L
10.	Chrome III	EPA Method 200.8 + SMEWW 3500-Cr.B 2023	0.003 mg/L
11.	Copper (Cu)	EPA Method 200.8	0.001 mg/L
12.	Zinc (Zn)	EPA Method 200.8	0.005 mg/L
13.	Nickel (Ni)	EPA Method 200.8	0.001 mg/L
14.	Manganese (Mn)	EPA Method 200.8	0.002 mg/L
15.	Iron (Fe)	EPA Method 200.8	0.02 mg/L
16.	Mineral Oil	SMEWW 5520B&F:2023	1.0 mg/L
17.	Fluoride (F-)	SMEWW 4500-F^-.B&D:2023	0.03 mg/L
18.	Sulfide (calculated by H_2S)	SMEWW 4500-S^{2-}.B&D:2023	0.03 mg/L
19.	Total Nitrogen	TCVN 6638:2000	1.0 mg/L
20.	Total phosphorus	TCVN 6202: 2008	0.01 mg/L
21.	Residual Chlorine	TCVN 6225 – 3:2011	0.2 mg/L
22.	Ammonium (calculated by N)	SMEWW 4500-NH_3 .B&F:2023	0.03 mg/L
23.	Coliform	SMEWW 9221B:2023	1.8 MPN/100mL
SURFACE WATER			
1.	Colour (pH=7)	SMEWW 5210B:2023	5.0 Pt -Co
2.	Total Suspended solids (TSS)	SMEWW 4500-NH_3.B&F:2023	1.5 mg/L
3.	BOD_5 (20^OC)	US EPA Method 200.8	1.0 mg/L
4.	Ammonium NH_4^+	US EPA Method 200.8	0.02 mg/L
5.	Arsenic (As)	US EPA Method 200.8	0.0015 mg/L
6.	Mercury (Hg)	US EPA Method 200.8	0.0003 mg/L
7.	Lead (Pb)	US EPA Method 200.8	0.002 mg/L
8.	Cadmium (Cd)	US EPA Method 200.8	0.0003 mg/L
9.	Chrome	US EPA Method 200.8	0.006 mg/L
10.	Copper (Cu)	US EPA Method 200.8	0.002 mg/L
11.	Zinc (Zn)	US EPA Method 200.8	0.03 mg/L
12.	Nickel (Ni)	US EPA Method 6020B	0.002 mg/L
13.	Manganese (Mn)	US EPA Method 200.8	0.005 mg/L
14.	Iron (Fe)	SMEWW 5520B:2023	0.05 mg/L
15.	Selene (Se)	SMEWW 9221B:2023	0.001 mg/L
16.	Total Oil and grease	SMEWW 5210B:2023	1.0 mg/L
17.	Coliform	SMEWW 4500-NH_3.B&F:2023	1.8 MPN/100mL
COASTAL WATER			
1.	BOD_5	SMEWW 5210B:2023	1 mg/L
2.	TSS	TCVN 6625:2000	3 mg/L
3.	Nitrate (NO_3^--N)	SMEWW 4500 NO_3^-E:2023	0.02 mg/L
4.	Total N	SMEWW 4550 NO_3^-.E:2023	0.02 mg/L
5.	Total P	TCVN 6202: 2008	0.05 mg/L
6.	Ammonium	SMEWW 4500 NH_3.B&F:2023	0.01 mg/l

No	Environmental components	Name/ number of analytical methods	MDL/LOD
7.	Arsenic (As)	US EPA Method 200.8	0.001 mg/L
8.	Mercury (Hg)	US EPA Method 200.8	0.0003 mg/L
9.	Lead (Pb)	US EPA Method 200.8	0.0005 mg/L
10.	Cadmium (Cd)	US EPA Method 200.8	0.0005 mg/L
11.	Chrome (Cr)	US EPA Method 200.8	0.0015 mg/L
12.	Copper (Cu)	US EPA Method 200.8	0.003 mg/L
13.	Zinc (Zn)	US EPA Method 200.8	0.003 mg/L
14.	Nickel (Ni)	US EPA Method 200.8	0.002 mg/L
15.	Manganese (Mn)	US EPA Method 200.8	0.0015 mg/L
16.	Iron (Fe)	US EPA Method 6020B	0.005 mg/L
17.	Selene (Se)	US EPA Method 200.8	0.001 mg/L
18.	Total oil and grease	SMEWW 5520B:2023	1.0 mg/L
19.	Coliform	SMEWW 9221B:2023	1.8 MPN/100mL

Notes:

- *TCVN: Viet Nam standards*
- *SOP-CO: Standard Operating Procedure for on-field sampling of CO*
- *MASA: Methods of Air Sampling and Analysis*
- *AS/NZS: Australian/New Zealands Standards*
- *EPA: Environment Protection Agency*
- *SMEWW: Standard Method for The Examination of Water and Waste Water*

CHAPTER II. RESULTS AND ASSESSMENT

The 109th environmental monitoring time in operation time of Mong Duong 2 plant and and the 37th monitoring time in operation stage of ash pond 2 was implemented in the period from 14-15/08/2024 at 05 locations with the ambient air environment, 02 industrial air emission positions, 29 positions for noise monitoring, 29 positions for vibration monitoring, 03 cooling water samples, 03 sanitary wastewater samples, 01 industrial wastewater samples, 21 surface water samples and coastal water samples; the environmental monitoring in the Ash pond 2 are included the 02 wastewater samples, 01 noise sample; the environmental monitoring in the Housing area included 02 points for domestic wastewater . The monitoring results are shown in the following sections.

II.1. MONG DUONG 2 BOT COAL FIRED POWER PLANT

II.1.1. Ambient air

The ambient air was monitored on 14th- 15th, August 2024 at 05 points:

Table 2.1. Location and coordinate details of surrounding air samples

No	Positions	X	Y
K1	Project area near coal store	21°04’13.4” N	107°20’56.2”E
K2	Hien’s house, group 9 zone 2, Mong Duong ward	21°03’57.5” N	107°19’20.1”E
K3	Residential area near TKV Group, Mong Duong ward	21°03’56.2”N	107°20’20.8”E
K4	Residental area of 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 distric	21°03’21.2”N	107°23’26.7”E

The results of ambient air monitoring are presented in Appendix - Results of environmental monitoring of ambient air. With climate condition, microclmate in Mong Duong 2 BOT Coal Fired Power Plant in the 109nd monirtoring time of operation stage is showed in **Table 2.2**

Table 2.2. Microclimate conditions in August - 2024

No.	Symbol	Position	Temperature (ºC)	Humidity (%)	Wind speed (m/s)	Wind direction
1	K1	Plant area near the coal store	29.4	94.1	2.5	SE
2	K2	Nguyen Trai the primary school, Mong Duong ward	29.1	94.7	2.4	SE
3	K3	Mong Duong the seconadry school, zone 1 Mong Duong ward	29.7	93.8	1.9	SE
4	K4	Household of Mr. Ha Van Tien, village 2, Cam Hai commune	30.7	89.4	2.6	SE
5	K5	Trang Huong Village, Dong Xa Commune, Van Don District (brigade area No.242)	30.2	90.7	2.5	E

The ambient air quality in positions of project is showed through monitoring results with basic parameters as follows:

*** TSP**

TSP contents at the different points and different times during the day were shown in **Figure 2.1.**

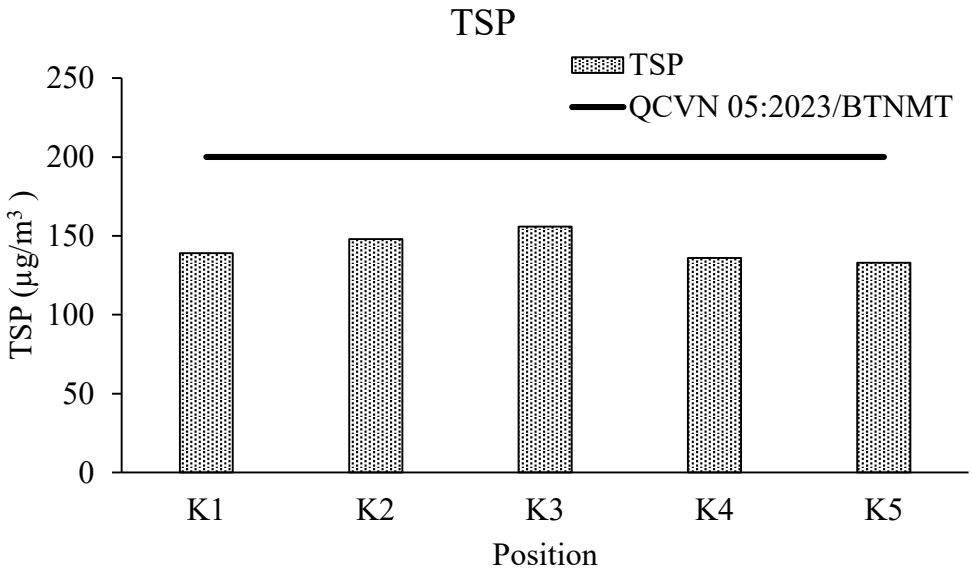


Figure 2.1. The TSP concentration in monitoring positions

The chart of TSP concentration at the monitoring points shows that there is a small difference of TSP at positions and monitoring results are smaller than allowed standard. The highest TSP value is at K3 (156 µg/m^3) following by K2. The smallest of TSP values are at K5 (133 µg/m^3).

Comparing with result that measured in last year, these values measuring in this month increase insignificantly, however, they still are smaller than allowed standard.

*** SO_2**

The monitoring results of SO_2 concentration in ambient air are indicated in **Figure 2.2** below:

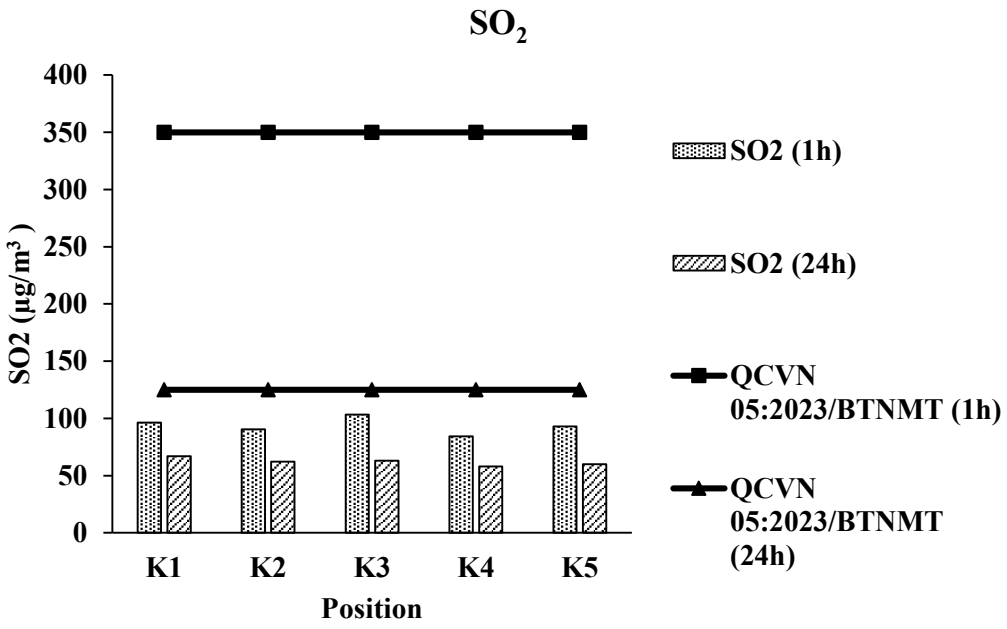


Figure 2.2. The chart of SO_2 concentration

The chart above shows that SO_2 concentrations at all monitoring points are smaller than the allowed standard. There is not much difference of SO_2 concentrations at different points. The highest SO_2 concentration is at K3 (103.2 µg/m^3), following by K1, K5 and K2. The lowest SO_2 concentration is at K4 (84.3 µg/m^3).

Comparing with the last year results, there is no significant difference.

***NO_2**

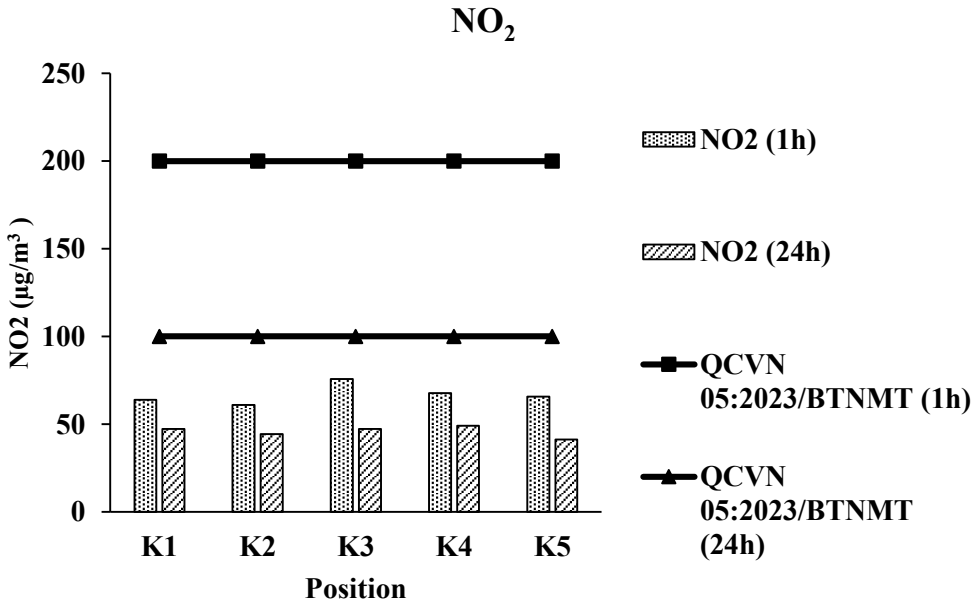


Figure 2.3. The chart of NO_2 concentration at monitoring points

The chart shows that the NO_2 concentrations at all monitoring positions are smaller than allowed standard. K3 has the highest NO_2 concentration with value is 75.7 µg/m^3.

Thus, ambient air environment in the area of Mong Duong 2 BOT Coal Fired Power Plant is not polluted by parameters TSP, SO_2, NO_2, CO, PM10, PM2.5.

Besides basis parameter in ambient air, in August 2024, the plant also monitors parameters of greenhouse gases in K1: Plant area near coal store. Measured results were shown in Table 2.3:

Table 2.3. Measured parameters of greenhouse gases

No	Parameters	Time	Units	Results
				K1
1.	CO_2	14h-16h	mg/m^3	1333.1
2.	CH_4	14h-16h	mg/m^3	1.675
3.	N_2O	14h-16h	µg/m^3	0.637

These greenhouse gases monitoring parameters will be monitored periodically to monitor the evolution of greenhouse gases in the area, which is also an attempt by the plant to monitor the environmental quality due to the long-term impact of plant operations to the surroundings.

II.1.2. Air emission

Air emission samples in the monitoring time in August 2024 were taken at 02 points in the stack after exhaust treatment systems line 1 and line 2. At the time of monitoring, stack of line 1 operated normally with a capacity of 365 MW, stack of line 2 operated normally with a capacity of 357 MW. Emission monitoring results are compared with QCVN 22:2009/BTNMT column B. Results is in **Table 2.4 and Table 2.5** as follows:

Table 2.4. Results of air emission monitoring of stack of line 1, August 2024

TT	Thông số	Đơn vị	Phương pháp quan trắc và phân tích	Kết quả			MDPCL-EHS-SP-02-006	QCVN22:2009 /BTNMT	
				S1.1	S1.2	S1.3		$C_{(Cột B)}$	C_{max}
1.	Nhiệt độ	ºC	SOP-KT.01	72	72	72	-	-	-
2.	Bụi tổng	mg/Nm^3	EPA Method 5	16,0	18,3	17,7	50	200	112
3.	SO_2	mg/Nm^3	EPA Method 6	44,5	47,1	44,5	280	500	280

4.	CO	mg/Nm^3	TCVN 7242:2003	<10	<10	<10	900	1.000(*)	640*)
5.	NO_x *(tính theo NO_2)*	mg/Nm^3	EPA Method 7	438,3	496,7	430,8	560	1.000	560

Table 2.5. Results of air emission monitoring of stack of line 2, August 2024

TT	Thông số	Đơn vị	Phương pháp quan trắc và phân tích	Kết quả			MDPCL-EHS-SP-02-006	QCVN22:2009/BTNMT	
				S2.1	S2.2	S2.3		$C_{(Cột B)}$	C_{max}
1.	Nhiệt độ	°C	SOP-KT.01	71	71	71	-	-	-
2.	Bụi tổng	mg/Nm^3	EPA Method 5	21,7	22,8	21,6	50	200	112
3.	SO_2	mg/Nm^3	EPA Method 6	65,4	94,2	65,4	280	500	280
4.	CO	mg/Nm^3	TCVN 7242:2003	<10	<10	<10	900	1.000(*)	640*)
5.	NO_x *(tính theo NO_2)*	mg/Nm^3	EPA Method 7	442,1	436,5	492,9	560	1.000	560

Air emission monitoring results shown that all the parameters' values are lower than the permitted Vietnamese standards **QCVN 22:2009/BTNMT** and plant standard **MDPCL-EHS-SP-02-006**. Like the previous monitoring times, environmental treatment systems for dust emissions included air handling systems and NO_2 treatment by selective catalytic reduction (SCR) and electrostatic precipitators (ESP) and SO_2 treatment device by desulphurization system (FGD) are working well and high efficiently.

Besides basis parameters are measured quarterly, in August 2024, the plant carried out to monitor Hg and its compounds parameter in air emission program. Measured result is shown in **Table 2.6**.

Table 2.6. Hg and compound (calculated by Hg)

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

At present, there is no national technical regulation on the permissible limits of mercury in the exhaust gases, especially for the thermal power plant, but periodic monitoring of the release of mercury into the environment is necessary and is an effort of plant in environmental monitoring program. In turn, the Hg concentation data in the exhaust gas will be updated periodically to monitor the occurrence of pollution of this parameter over time.

II.1.3. Noise and Vibration

Noise and vibration were measured at the different points in the plant see table below:

Table 2.7. The monitoring points of noise (N) and vibration (V)

TT	Vị trí	X	Y
N1, V1	Unit 1 area – pump for boiler – 1st floor – turbine building	2331206	458244
N2, V2	Unit 1 area – compressor – 1st floor – turbine building	2331206	458244
N3, V3	Unit 2 area – pump for boiler – 1st floor – turbine building	2331005	458247
N4, V4	Unit 2 area – compressor – 1st floor – turbine building	2331207	458244
N5, V5	Unit 1 – 2nd floor area – turbine building	2331215	455112
N6, V6	Unit 2 – 2nd floor area – turbine building	2331132	458152
N7, V7	Unit 1 – 3rd floor area – turbine building	2331198	458299
N8, V8	Unit 2 – 3rd floor area – turbine building	2331174	458153
N9, V9	Ball mill area – Unit 1 – 1st floor – coal crusher area	2331141	458294
N10, V10	Ball mill area – Unit 2 – 1st floor – coal crusher area	2331164	458177
N11, V11	Hopper pouring, heater ash hopper of Unit 1 – 1st floor – Boiler building	2331075	458294
N12, V12	Hopper pouring, heater ash hopper of Unit 2 – 1st floor – Boiler building	2331073	458169
N13, V13	Hopper pouring area of Unit 1 – 2nd floor – electrostatic precipitator area	2331031	458360

N14, V14	Hopper pouring area of Unit 2 – 2nd floor – electrostatic precipitator area	2331053	458164
N15, V15	Compressor – 1st floor – electrostatic precipitator area	2331053	458253
N16, V16	Circulating pump and oxygen pump – FGD absorption tower of Unit 1	2330949	458241
N17, V17	Circulating pump and oxygen pump – FGD absorption tower of Unit 2	2330949	458210
N18, V18	Exhaust gases dryer including under shaft bearing and upper shaft bearing of Unit 1 – FGD and absorption tower area	2330976	458241
N19, V19	Exhaust gases dryer including under shaft bearing and upper shaft bearing of Unit 2 – FGD and absorption tower area	2330978	458137
N20, V20	Smoke fan area of ground floor of Unit 1 – FGD and absorption tower area	2330964	458281
N21, V21	Smoke fan area of ground floor of Unit 2 – FGD and absorption tower area	2331116	458114
N22, V22	Pump – Plaster building	2330956	458241
N23, V23	Vacuum conveyor filter – 3rd floor – plaster building	2330974	458241
N24, V24	Silo 1 – Area of slag silo at the bottom of furnace	2331115	458333
N25, V25	Silo 2 - Area of slag silo at the bottom of furnace	2330915	458092
N26, V26	Excavator – coal warehouse	2330727	458032
N27, V27	Coal dividing machine of Unit 1 – Coal warehouse	2331166	458241
N28, V28	Coal dividing machine of Unit 2 – Coal warehouse	2331165	458137
N29, V29	Coal scraper – Coal warehouse	2330738	457721

The noise measurement results are shown in the following chart:

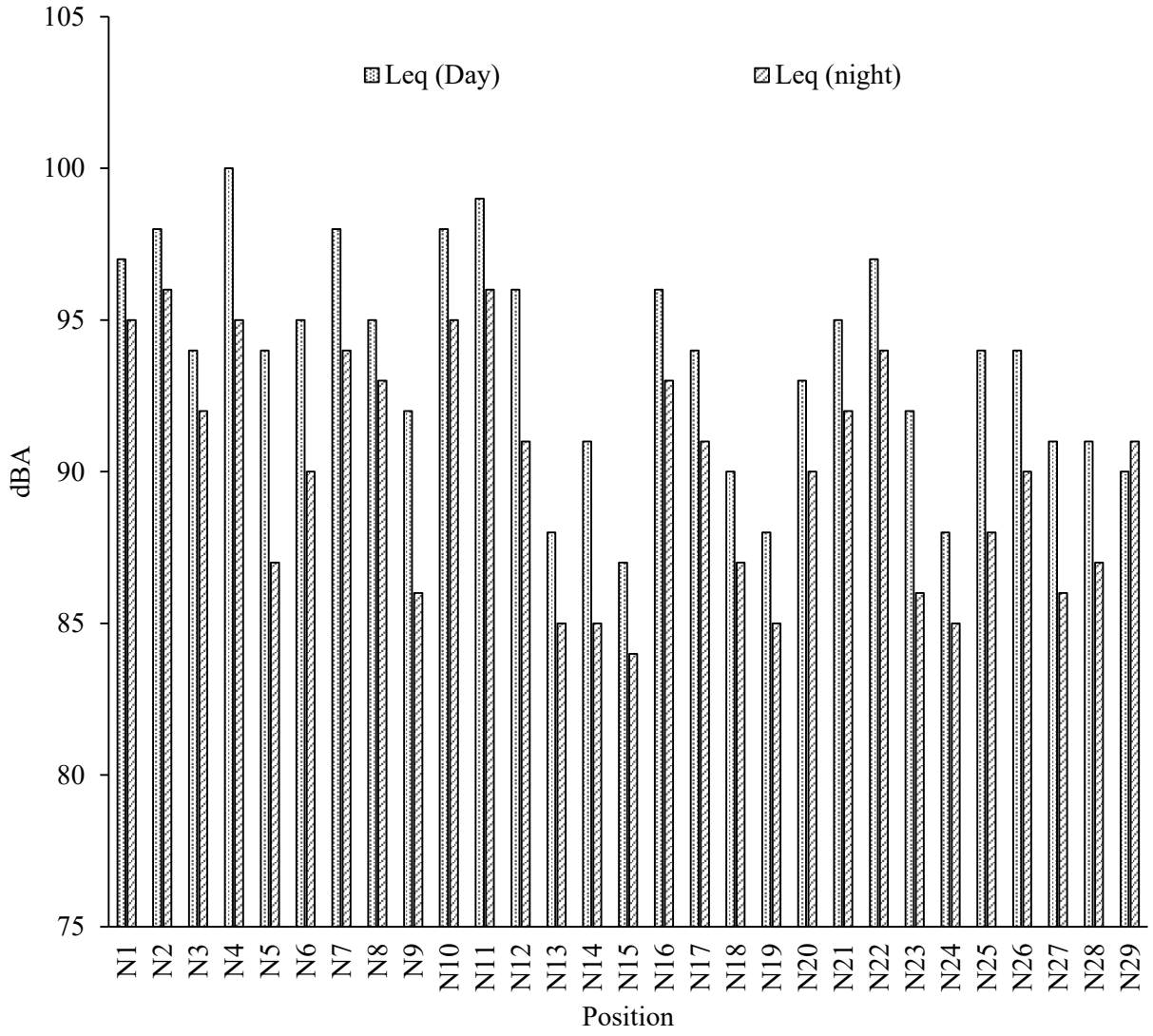


Figure 2.4. The chart of noise at the monnitoring points in or out of the plant

Based on above graphs, almost noise positions (N1 - N29) have rather high noise level because these positions are the noise sources. The plant has issued the technical procedure for noise minimization in order to protect labours. All the positions with high noise level (>85 dBA) are warning with protective equipment for labour avoiding the hearing hurt.

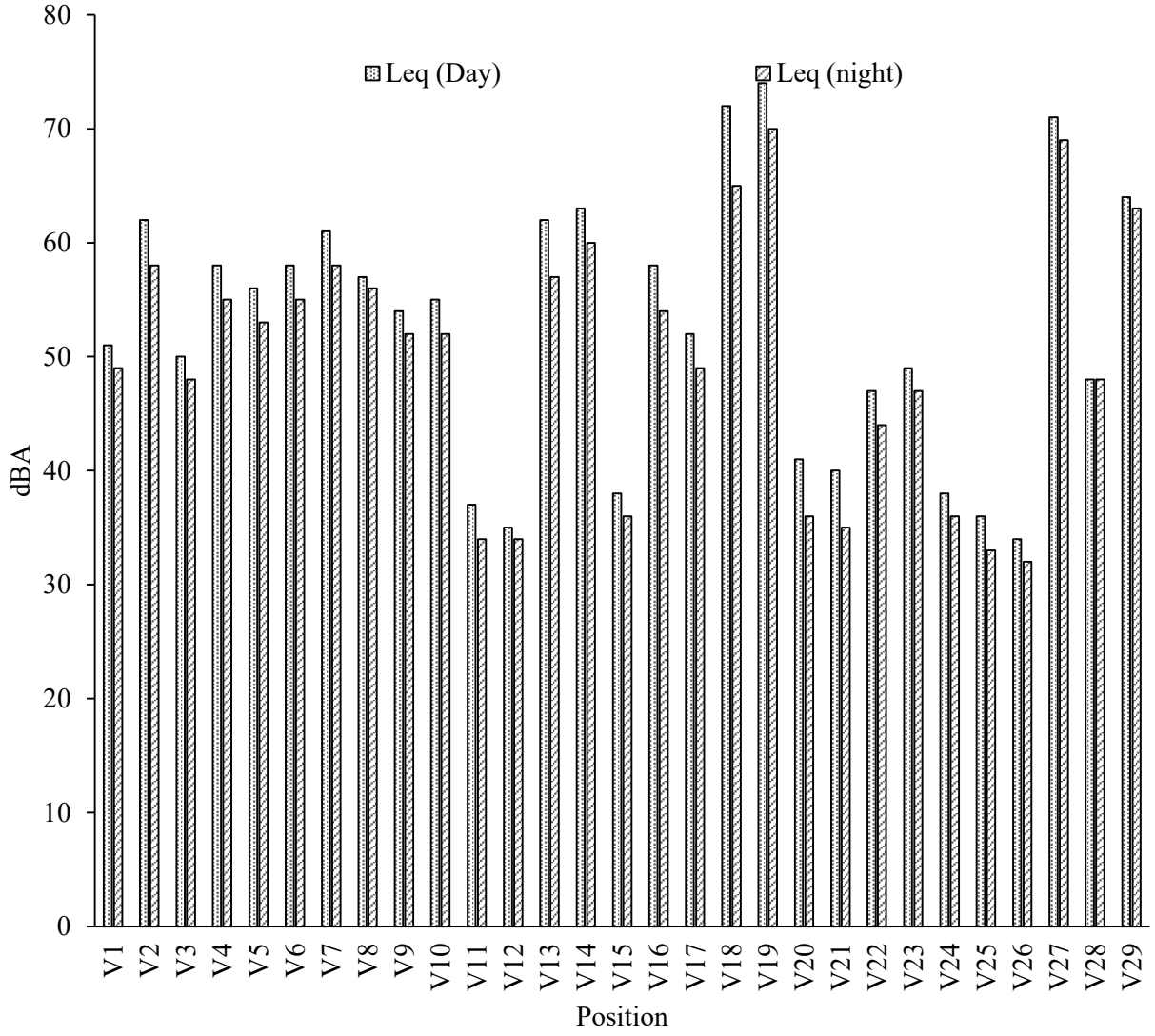


Figure 2.5. The chart of vibration at the monnitoring points in or out of the plant

Based on the above graph, at some point as V18, V19, V27, V29 with high level of vibration due to these positions are vibration sources. The plant has issued the technical procedure for vibration minimization to protect labour out of exposure to vibration for long time. The plant also has a plan for periodical maintenance the equipment in order to reduce the sources of noise and vibration.

II.1.4. Water environment

Water samples are monitored including wastewater, surface water, coastal water, and detailed water sampling locations as **Table 2.8** below:

Table 2.8. The points of water sampling 109th environmental monitoring

Environmental Aspect	No	Location	X	Y
WATER ENVIRONMENT				
Cooling water (3 positions)	CW1	Intake point of cooling water	21°04'32.6"N	107°21'18.5"E
	CW2	Discharge point into the cooling water channel	21°04'28.3"N	107°20'57.1"E
	CW3	Discharge point to common Mong Duong Power complex channel	21°04'42.4"N	107°21'03.1"E
			2331698	458326
Industrial waste water	WW1	Discharge point into the Cooling water channel	21°04'31.1"N	107°21'04.4"E
			2331338	458360
Sanitary wastewater	SH1	Admin area	21°04'39.6"N	107°21'07.8"E
			2331603	458369
	SH2	Chemical dosing building	21°04'28.7"N	107°21'09.6"E
			2331391	458375
	SH3	Coal warehouse area	21°04'11.5"N	107°20'56.5"E
			2331262	458175
Surface water	MD1	Tran bridge (Zone 4, Mong Duong ward)	21°05'43.1"N	107°22'50.4"E
	MD2	Mong Duong bridge	21°04'48.3"N	107°21'04.4"E
	MD3	Area where conveyor transfers coal to factory	21°05'12.8"N	107°22'42.7"E
	MD4	Estuary where riverruns into Luong Gac canal	21°03'48.0"N	107°19'26.7"E
	SW12	Cooling water canal head	21°03'51.5"N	107°20'50.6"E
	SW13	Behind cooling water outlet of Mong Duong 1	21°04'07.8"N	107°21'00.8"E

		Thermal Power Plant		
	SW14	Behind cooling water outlet of Mong Duong 2 BOT Coal Fired Power Plant	21°04'25.3"N	107°21'41.0"E
	SW15	Cooling water channel	21°04'39.5"N	107°20'40.6"E
	SW16	Cooling water channel	21°04'43.4"N	107°20'50.9"E
Coastal water	SW2	SW2	21°05'17.4"N	107°23'07.2"E
	SW3	SW3	21°03'41.8"N	107°22'35.2"E
	SW4	SW4	21°04'08.9"N	107°22'02.9"E
	SW5b	SW5b	21°04'45.6"N	107°22'11.5"E
	SW6	SW6	21°03'05.7"N	107°22'14.6"E
	SW7	SW7	21°03'12.3"N	107°22'49.0"E
	SW8	SW8	21°05'42.5"N	107°22'16.0"E
	SW9	SW9	21°05'31.0"N	107°22'36.2"E
	SW10	SW10	21°04'59.0"N	107°22'36.3"E
	SW11	SW11	21°03'49.2"N	107°22'09.2"E
	SW18	SW18	21°04'33.7"N	107°21'21.3"E
	SW19	SW19	21°04'33.5"N	107°21'42.5"E

Evaluating the results of environmental monitoring of water as the following sections:

II.1.4.1. Wastewater

Wastewater of the plant in the 109th monitoring program includes 03 samples of cooling water, 03 samples of sanitary wastewater and 01 of industrial wastewater.

a. Industrial wastewater

The influent industrial wastewater includes irregular wastewater, regular wastewater, and oil contaminated wastewater. The capacity of industrial wastewater treatment system is

110 m^3/h. The sample WW was taken at the discharge point into the cooling water channel. At the monitoring time, the industrial wastewater treatment system operates normally. The detailed monitoring points are below:

WW: From discharge point to cooling water chanel

The result shows that all the parameters of industrial wastewater are lower than QCĐP 3:2020/QN column B and QCVN 40:2011/BTNMT column B. Comparing with the GVC-AES-TKV - Standards of BOT Mong Duong 2 BOT Coal Fired Power Plant about permitted limit of industrial wastewater, all parameter meet allowed standard. This demonstrates that the industrial wastewater treatment system works extremely well.

b. Cooling water

In order to estimate the quality of cooling water supply for plant and also discharging cooling wastewater, cooling water was taken at 03 positions at 03 intake points of cooling water, discharge point into the cooling water channel and discharge point to common Mong Duong power complex channel. The detailed positions:

- CW1: Intake point of cooling water
- CW2: Discharge point into the cooling water channel
- CW3: Discharge point to common Mong Duong Power complex channel

According to the design of cooling water system as well as the characteristics of the cooling water, two parameters that need to be tightly controlled are temperature and residual chlorine. In addition, the quality of the cooling wastewater is compared with QCĐP 3:2020/QN - Local technical regulation on industrial wastewater in Quang Ninh province and QCVN 40:2011/BTNMT - National technical regulation on industrial wastewater. Due to the characteristics of the cooling water does not contain many polluted factors so the monitoring results therefore also reflect the fact that the monitoring parameters are achieved strictly allowed standard of the plant -GVC-AES-TKV- Standards of BOT Mong Duong 2 BOT Coal Fired Power Plant of the permitted limit value of cooling water. Monitoring the temperature of the cooling water after discharging into the environment is also quite important to ensure that the cooling water does not affect the aquatic environment.

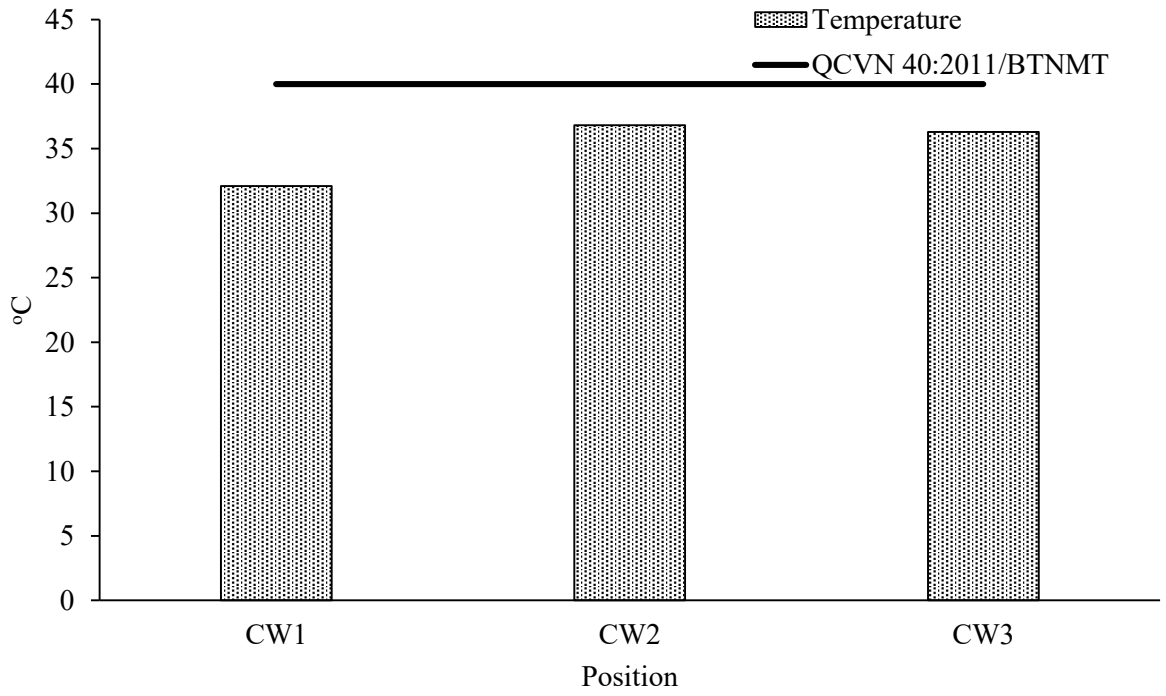


Figure 2.6. The chart of Temperature in cooling water samples

c. Sanitary wastewater

Sanitary wastewater included 3 samples points.

SH1: Sanitary wastewater in admin area.

SH2: Sanitary wastewater in Chemical dosing building.

SH3: Sanitary wastewater in coal warehouse area.

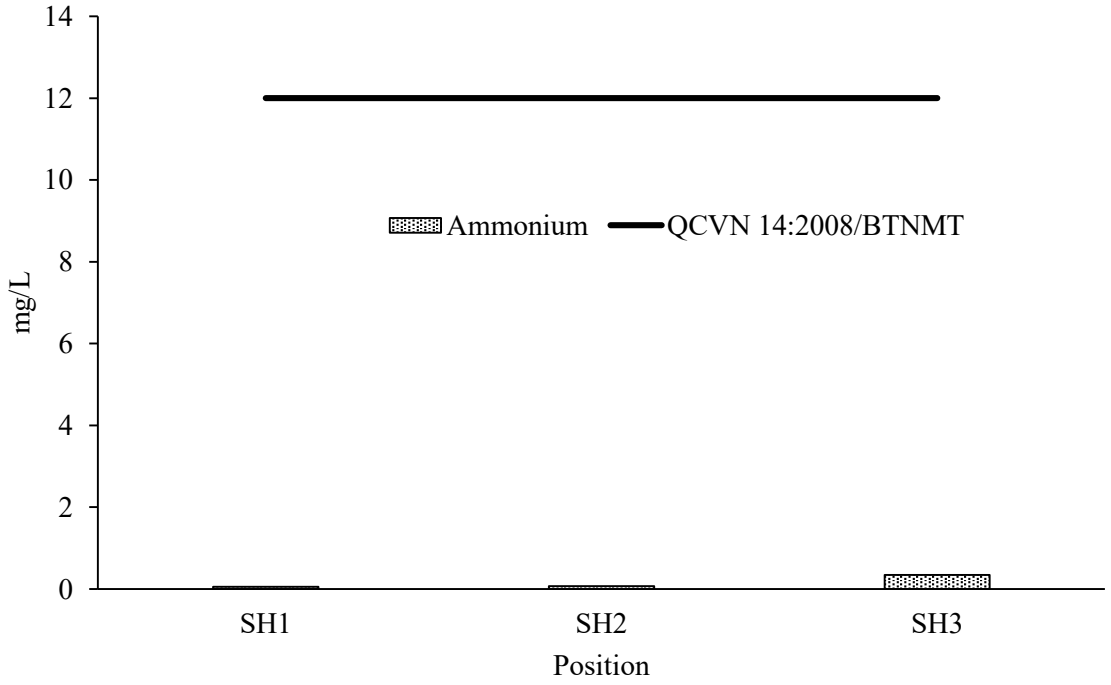


Figure 2.7. The chart of Amonium in sanitary wastewater

Based on the graph, the ammonium concentration in all positions are much lower than standard of the plant TCSAES-TKV Standards of BOT Mong Duong 2 BOT Coal Fired Power Plant and QCVN 14:2008/BTNMT.

II.1.4.2. Surface water

Surface water samples arounding the plant area of Mong Duong 2 BOT Coal Fired Power Plant includes 09 samples that were taken at detailed positions as in **Table 2.8.**

Surface water samples were taken mainly on the cooling channels; thus, the Temperature factor is quite important, the Temperature of the surface water samples are illustrated in **Figure 2.8** below:

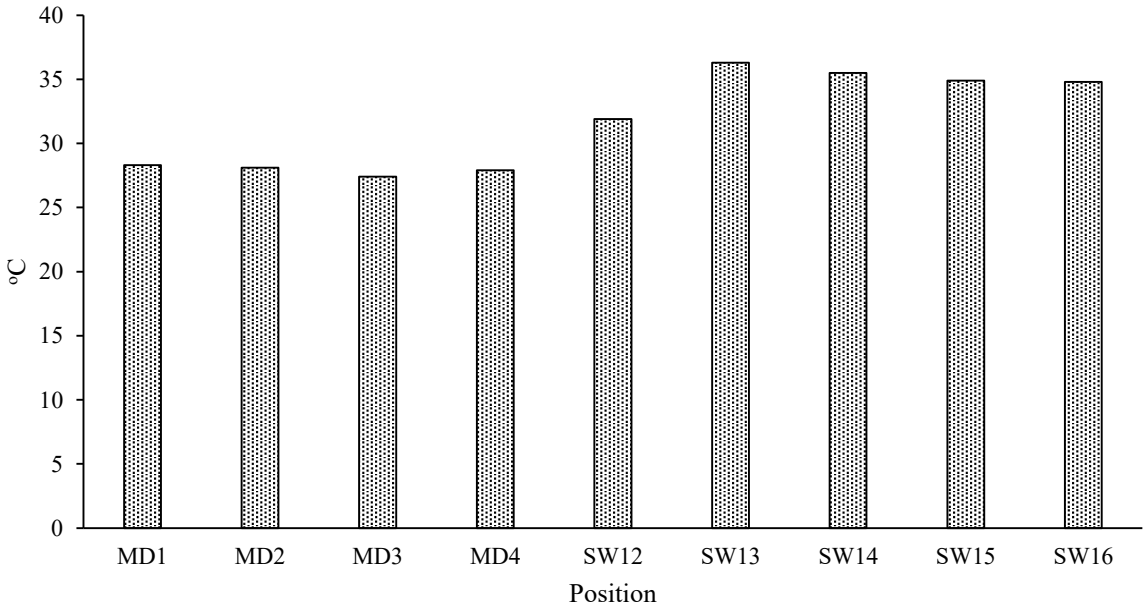


Figure 2.8. The chart of Temperature in surface water samples

The highest temperature of the surface water samples is at 36.3°C and the lowest temperature of the surface water samples is 27.4°C.

Besides the monitoring results of surface water samples also showed that most of the parameters values are smaller than allowed standards many times, however some positions have the higher concentration Ammonium than allowed standard (see chart **Figure 2.9, Figure 2.10** below).

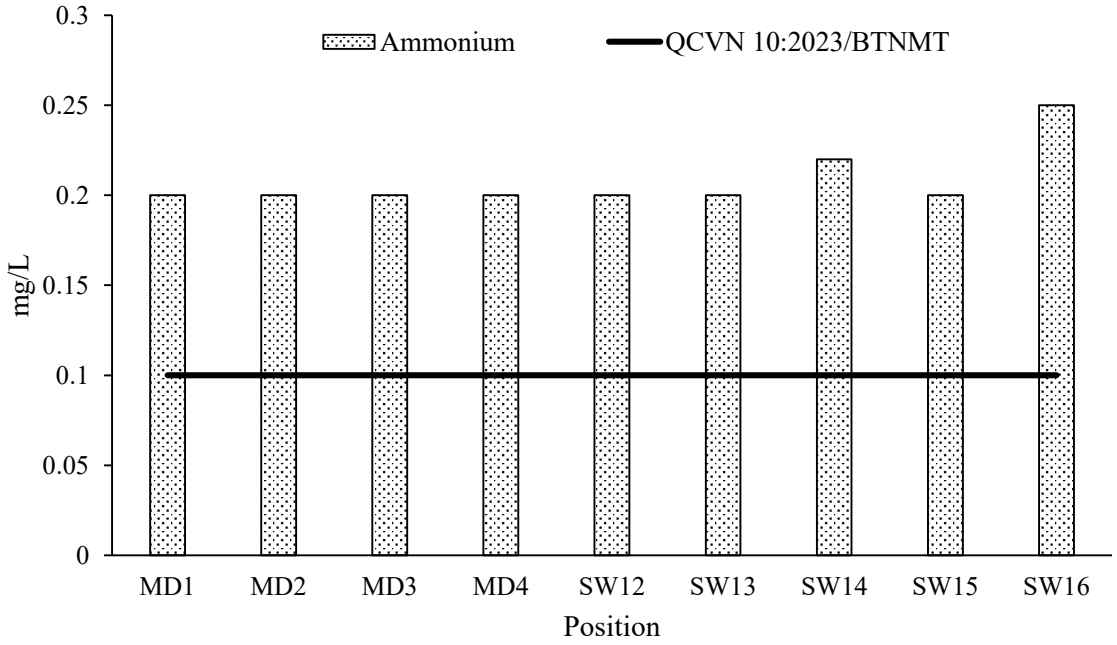


Figure 2.9. Ammonium concentration in surface water samples

The chart shows that all positions having higher Ammonium concentration than the allowed standard. In particular, the Ammonium concentration at SW14, SW15 and SW16 are higher 2.2 times, 2.0 time and 2.5 times than allowed standard.

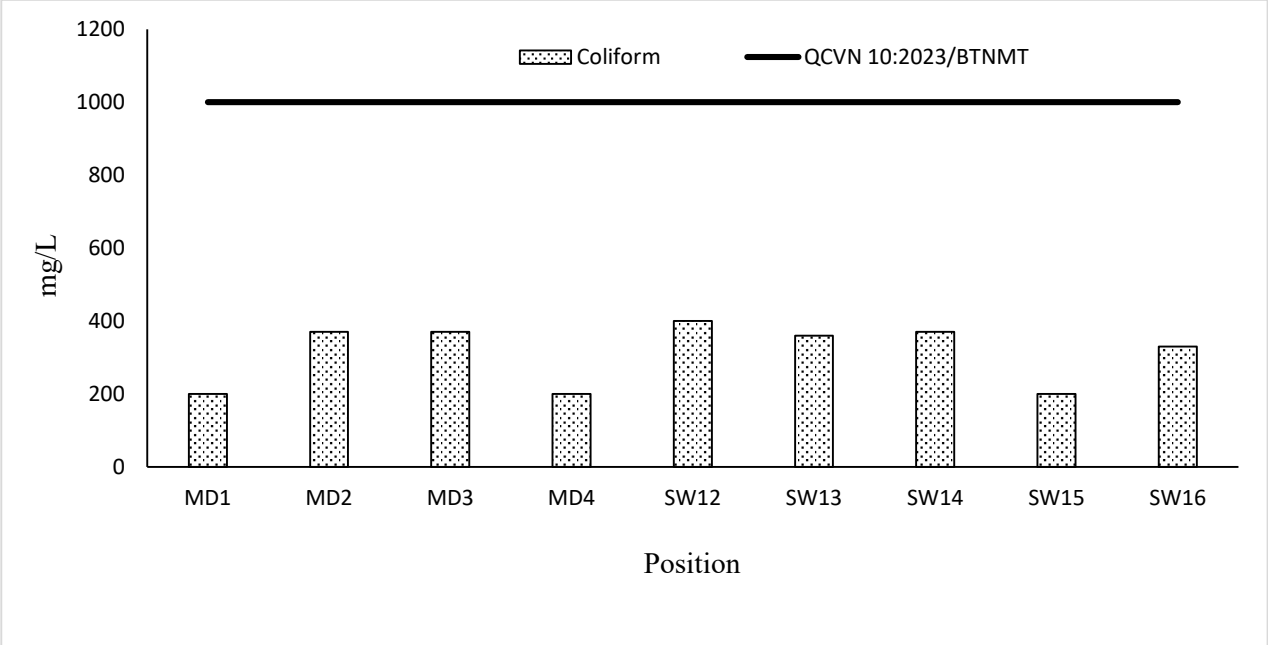


Figure 2.10. Coliform concentration in surface water samples

Above figure shown all the surface water position with lower concentration in coliform in comparison to the standard. However, it's necessary to to continuely monitor the fluctuation of coliform concentrations in next quarters.

II.1.4.3. Coastal water

There are 12 coastal water samples in 109th monitoring time (August 2024) and these samples showed detaily in **Table 2.8**

The results of monitoring showed that most of the parameters in coastal water are smaller than the allowed standards except ammonium.

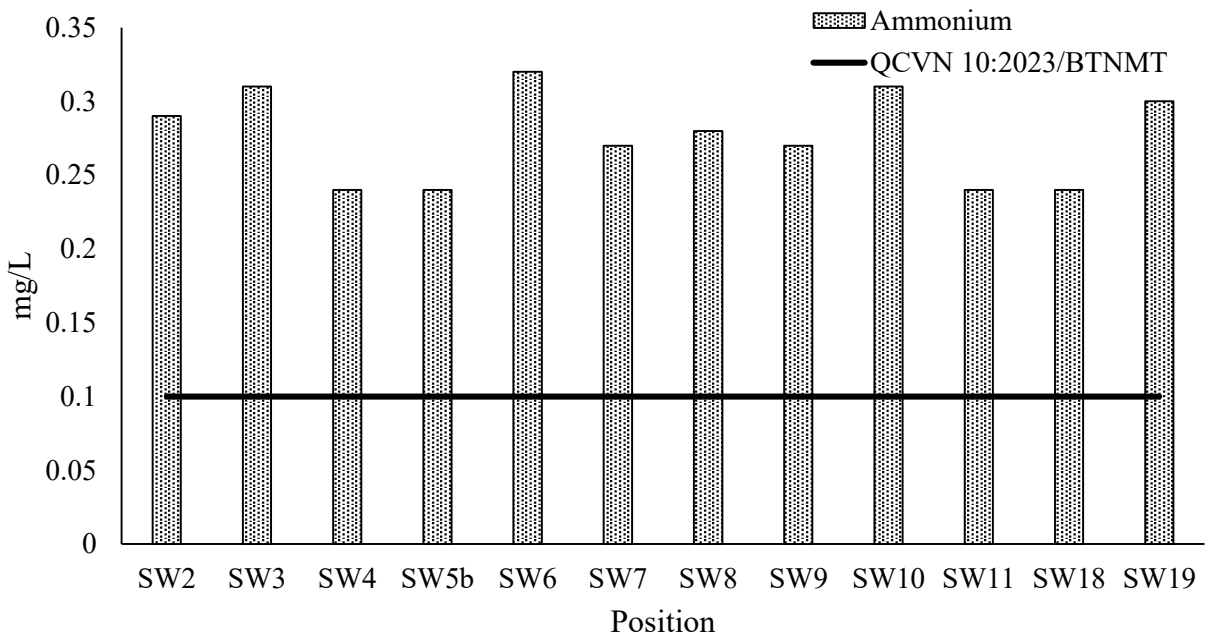


Figure 2.11. The chart of Ammonium concentration in coastal water

The above figure shows all positions with higher than standards of QCVN 10:2023/BTNMT in ammonium concentration. In which, SW2, SW3, SW6, SW10, SW19 as 0.29 mg/L, 0.31 mg/L, 0.32 mg/L, 0.31 mg/L and 0.30 mg/L, respectively, higher than the standard of 2.9 times, 3.1, 3.2,3.1 and 3.0 times.

II.2. ASH POND 2

II.2.1. Wastewater

A part of wastewater from ash pond is collected and recycle to plant with max volume is about 200 m^3/h. It is re-used for collecting ash from bottom, processing concentrated sludge and ash discharging system. It isn't discharged directly to water resource. The

construction which collects wastewater from ash pond cyclically includes water collecting hole and cyclic pump.

Another part comes through wastewater treatment system that includes sedimentation tank using flocculation compound. After treating, wastewater is discharged to Thac Thay river. In this monitoring time, 02 wastewater samples were sampled one sample in treatment tank and one sample after treated

Wastewater positions is as follow:

- AP-W1: Wastewater from AP2 Reservoir
- AP-W2: Output of wastewater treatment system – Ash pond 2

The monitoring results are showed in **Table 2.9**

Table 2.9. Wastewater results in ash pond 2

No.	Parameters	Unit	Analytical methods	Results		QCĐP 3:2020/QN	
				AP-W1	AP-W2	$C_{(Column\ B)}$	C_{max}
1.	Temperature	^oC	SMEWW 2550B:2023	32.4	32.1	40	40
2.	pH	-	TCVN 6492:2011	7.5	7.4	5.5 – 9.0	5.5 - 9.0
3.	Color (pH=7)	Pt/Co	TCVN 6185:2015	<5	<5	150	150
4.	TSS	mg/L	TCVN 6625:2000	13	11	100	90
5.	COD	mg/L	SMEWW 5220C:2023	19	9	150	135
6.	BOD_5	mg/L	SMEWW 5220C:2023	9	5	50	45
7.	Arsenic (As)	mg/L	EPA method 200.8	0.0030	<0.0015	0.1	0.09
8.	Mercury(Hg)	mg/L	EPA method 200.8	<0.0005	<0.0005	0.01	0.009
9.	Lead (Pb)	mg/L	EPA method 200.8	<0.002	<0.002	0.5	0.45
10.	Cadmium (Cd)	mg/L	EPA method 200.8	<0.0005	0.0006	0.1	0.09
11.	Chromium III	mg/L	EPA Method 200.8 & SMEWW 3500-Cr.B.2023	0.014	0.014	1	0.9
12.	Chromium VI	mg/L	SMEWW 3500-Cr.B.2023	<0.003	<0.003	0.1	0.09
13.	Copper (Cu)	mg/L	EPA method 200.8	0.002	0.003	2	1.8
14.	Zinc (Zn)	mg/L	EPA method 200.8	<0.005	<0.005	3	2.7
15.	Nikel (Ni)	mg/L	EPA method 200.8	0.017	0.018	0.5	0.45
16.	Manganese (Mn)	mg/L	EPA method 200.8	0.076	0.026	1	0.9
17.	Iron (Fe)	mg/L	EPA method 200.8	1.2	1.2	5	4.5
18.	Total mineral oil & grease	mg/L	SMEWW5520B&F:2023	<1.0	<1.0	10	9
19.	Residue Chlorine	mg/L	TCVN 6225-3:2011	1.7	1.7	2	1.8
20.	Sulfide (as H_2S)	mg/L	SMEWWS^{2-}B&D:2023	<0.03	<0.03	0.5	0.45

No.	Parameters	Unit	Analytical methods	Results		QCĐP 3:2020/QN	
				AP-W1	AP-W2	$C_{(Column\ B)}$	C_{max}
21.	Total N	mg/L	TCVN 6638:2000	3.5	3.5	40	36
22.	Total P	mg/L	TCVN 6202:2008	0.10	0.09	6	5.4
23.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2023	0.10	0.09	10	9
24.	Fluoride (F^-)	mg/L	SMEWW 4500-F^- .B&D:2023	6.16	6.69	10	9
25.	Total Cyanide (CN^-) *(*)*	mg/L	SMEWW 4500 CN^- C&E:2017	<0.004	<0.004	0.1	0.09
26.	Total Phenol	mg/L	SMEWW 5530 B&C:2023	<0.001	<0.001	0.5	0.45
27.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	330	220	5,000	5,000

The monitoring results show that all of monitoring parameters in wastewater meet allowed standard QCĐP 3:2020/QN. However, Fluoride parameter for recently monitoring times with increasing concentration nearly level of QCĐP 3:2020/QN. I's recommended to continue monitor the fluoride concentration in Ash pond 2 wastewater.

II.2.2. Noise

The noise was measured at the wastewater treatment system of ash pond 2 - Mong Duong 2 BOT Coal Fired Power Plant.

The monitoring results are showed in **Table 2.10:**

Table 2.10. Noise results in ash pond 2

No.	Sampling positions	Measurement methods	Results			
			6h-21h		21h-6h	
			Leq (dB_A)	Lmax (dB_A)	Leq (dB_A)	Lmax (dB_A)
1.	AP2-N	TCVN 7878-2:2010	58	63	52	55
QCVN 26:2010/BTNMT			**70**	**-**	**55**	-

The measurement results of noise at the wastewater treatment system location shown that all values met the permissible standard of QCVN 26:2010/BTNMT.

Within the the wastewater treatment system area of ash pond 2, the noise is detected from personnel movement and operation of the treatment system in the treatment station area. Although the values did not exceed the standard, noise control must be continuously

maintained. The measured values were only instantaneous, and noise measurement should be conducted more frequently to have timely preventive and mitigation measures.

II.3. HOUSING COLONY

Monitoring results of domestic wastewater

Samples of domestic wastewater are taken before and after the treatment system. The monitoring results in August 2024 show that all parameters met QCVN 14: 2008 / BTNMT

Table 2.11. The monitoring results of domestic wasewwater in Housing colony

No.	Parameters	Unit	Analytical methods	Result		QCVN 14: 2008/BTNMT	
				HS-NT1	HS-NT2	C (Column B)	C_{max}
1.	Temperature	^oC	SMEWW 2550B:2023	30.5	31.6	-	-
2.	pH	-	TCVN 6492:2011	7.8	7.3	5.0– 9.0	5.0– 9.0
3.	TDS	mg/L	SOP-TDS	358	315	1,000	1,000
4.	TSS	mg/L	TCVN 6625:2000	17	10	100	100
5.	BOD_5	mg/L	SMEWW 5210B:2023	48	7	50	50
6.	Sulfide (as H_2S)	mg/L	SMEWW 4500S2-.B&D:2023	<0.03	<0.03	4.0	4.0
7.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2023	5.65	0.7	10	10
8.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^- E:2023	<0.06	6.85	50	50
9.	Phosphate (PO_4^{3-}-P)	mg/L	TCVN 6202:2008	7.2	1.66	10	10
10.	Surfactant (*)	mg/L	SMEWW 5540B&C:2017	<0.015	<0.015	10	10
11.	Animal Oil & Grease	mg/L	SMEWW 5520B&F:2023	<1.0	<1.0	20	20
12.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	630	270	5,000	5,000

The results indicate that all parameters are smaller than allowed limit of QCVN 14:2008/BTNMT.

CHAPTER III. CONCLUSION AND RECOMMENDATION

III.1. Conclusion

The 109th Environmental monitoring program in operation stage of Mong Duong 2 BOT Coal Fired Power Plant was conducted in August 2024, the sampling locations were approved according to plan, the environmental monitoring factors includes: environment ambient air, noise, vibration, air emission, industrial wastewater, surface water, coastal water, cooling water. Based on the results of environmental monitoring, the assessment of environmental quality in the area of the plant in operation stage as follows:

Noise

Noise level at 29 noise sources in the plant were rather high. The plant has issued the solution to protect labour working at 2-unit area.

The noise values at 05 locations in the plant's area and in the surrounding residential areas were satisfied with the specified standards: QCVN 26:2010/BTNMT.

Ambient air

Ambient air quality surrounding the plant area is relatively good. The parameters such as TSP, PM10, PM2.5 gases such as CO, SO_2, and NO_2 were meet QCVN 05:2023/BTNMT. Especially, dust levels at the locations near transportation road are needed to monitor more often because of the transportation affecting. It should be noted more about dust levels at the locations near roads or the construction areas of the plant. Also note the location near transportation of fuel to take monitoring to control these indicators by transport activity and freight.

Vibration

Some positions of V18, V19, V27, V29 within 29 vibration have high value in vibration due to these points are the source of vibration. The plant has the solution to protect labour working at the 2-unit operation area.

Air emission

Monitoring results shown that all the parameter values in air emission are lower than the standard, QCVN 22:2009/BTNMT, this proves that exhaust treatment system is still operating stability and efficiency.

Wastewater

Wastewater of the plant in the 109th monitoring time includes 01 industrial wastewater sample. In which, parameters of industrial wastewater are smaller than allowed standard (QCĐP 3:2020/QN and QCVN 40:2011/BTNMT), and GVC-AES-TKV: The

standard of Mong Duong 2 BOT Coal Fired Power Plant about permitted limit of industrial wastewater.

Cooling water

Monitoring results of the cooling water samples showed that all the monitoring parameters are allowed to the standards of QCĐP 3:2020/QN and QCVN 40:2011/BTNMT and GVC-standard AES-TKV- Standards of BOT Mongduong Thermal power plants of the permitted limit value of cooling water.

Sanitary wastewater

Monitoring results of the sanitary wastewater samples showed that all the monitoring parameters are allowed to the standards of the plant TCSAES-TKV Standards of BOT Mong Duong 2 BOT Coal Fired Power Plant and QCVN 14:2008/BTNMT.

Surface water

During the construction stage, the surface water sampling locations previously were filled (De Dach River and a branch flowing to Mong Duong estuary). Therefore, in this operation stage, the survey team has selected some new positions for surface water monitoring; see the tables in the report. The surface water sampling locations in Mong Duong estuary and Luong Gac canal are remain the same quantity.

The quality of surface water around plant is polluted by some parameters. According to the 109th monitoring results, in some surface water samples in the estuary discharging into Luong Gac canal, Ammonium concentration exceed permitted standards due to human activities. Therefore, surface water quality in the plant area can be directly affected by discharging source from outside of the plant or due to human activities. Therefore, it should recommend that people must careful in the using of this water source or have the treatment methods when using this source.

The coastal water

The 109th monitoring program in August 2024 has 12 coastal water samples to evaluate the coastal quality. Monitoring results showed that most parameters in coastal water samples meet allowed standard. Except that Ammonium concentration exceed permitted standards due to human activities.

The 37th environmental monitoring program in operation stage of ash pond 2 was conducted at the middle of August 2024, the sampling locations were approved according to plan, the environmental monitoring components includes: wastewater and noise. Based on the results of environmental monitoring, the assessment of environmental quality in the area of the plant in operation stage as follows:

Wastewater

Wastewater of the ash pond 2 includes wastewater samples in treatment tank, neutralization tank and samples after treatment. The results shown that all parameters met QCĐP 3:2020/QN.

Noise

At the monitoring location, the noise level meets the permissible standard of QCVN 26:2010/BTNMT. However, in the area where workers operate the system, they must be fully equipped with personal protective equipment and noise reduction devices such as helmets and earplugs

The environmental monitoring program in housing colony area was conducted at August 2024, the sampling locations were approved according to plan, the environmental monitoring components include: wastewater. Based on the results of environmental monitoring, the assessment of environmental quality in the area of the plant in operation stage as follows:

Sanitary wastewater

Monitoring results of the sanitary wastewater samples showed that all the monitoring parameters are allowed to the standards of QCVN 14:2008/BTNMT.

III.2. Recommendation

Based on the monitoring results of the 109th (August 2024) monitoring time in operation stage in Mong Duong 2 BOT Coal fired power plant, the monitoring team and implementing units give some recommendations to the management board of Mong Duong 2 BOT Coal Fired Power Plant and the contractor at the plant as follows:

Continue implementation of environmental monitoring activities periodically with the noise component, ambient air, emissions, wastewater, surface water, ground water, ecological environment according to plan, the roadmap setting out in the region during the operation stage of Mong Duong 2 BOT Coal Fired Power Plant. This is to detect early signs of environmental pollution due to the impact of the plant through each stage or other events affecting the region.

Continue and expand the assessment of the impact of plant's operations to the surrounding residential area. Especially we should focus on evaluating expansion and more detailed assessment of environmental ambient air, surface water area. Study and estimate the impact of 2 plants to people's living. Beside the influence of environment, it is need to assess the social impact on population in Mong Duong 2 BOT Coal Fired Power Plant area.

Providing updated information about the environment for the local area and building contractors to have plans for dealing with pollution as well as minimize the polluting activity to the regional environment.

APPENDIX

APPENDIX 1. APPLICATION OF QA/QC IN MONITORING PROGRAM

APPENDIX 2. IMAGES OF MONITORING ACTIVITIES ON FIELD

APPENDIX 3. MAP OF SAMPLING AREAS

APPENDIX 4. THE MONITORING RESULTS

APPENDIX 1. APPLICATION OF QA/QC PROGRAM FOR ENVIRONMETAL MONITORING IN MONG DUONG 2 BOT COAL FIRED POWER PLANT AND ASH POND 2

Applying QA/QC program for environmental monitoring Mong Duong 2 and ash pond 2 in August 2024

1. QA/QC in the design of environmental monitoring program

Activities to ensure quality in the design of environmental monitoring program for Mong Duong 2 BOT Coal Fired Power Plant are summarized in **Table 4.1** follows (compare current status with the requirements of Circular 10/2021/TT-BTNMT on 30/6/2021, Ministry of Natural Resources and Environment guiding the quality assurance and quality control in environmental monitoring).

Table 4.1. Summary of quality assurance activities in the design of environmental monitoring program in Mong Duong 2 Power Plant

No.	Activities	Current status in comparison to the requirements of Circular 10	Note
1	Determine the objectives of monitoring program	+	
2	Design the environmental monitoring program	+	Monitoring in ambient air, air emission, noise, cooling water, wastewater in the plant, AP2 and houssing colony, surface water around area
2.1.	Compliance with environmental protection programs and national strategies	+	
2.2.	To comply with the technical guidance, procedures and regulations for each environmental component	+	Circular 10/2021/TT-BTNMT of Ministry of Environment and Resources: Technical Regulation on environmental monitoring

2.3.	Follow all steps in design environmental monitoring program	+	

Note: (+) full (-) not enough

2. QA/QC on field monitoring

The activities on field can be classified as follows:

- ✓ QA/QC in direct measurement on field (this activity can be operated independently out of other activities);
- ✓ QA/QC in sampling, sample pretreatment, samples preservation;

In this environmental monitoring program for Mong Duong 2 Power Plant and ash pond 2, QC samples were carried out include: *On field blank sample (code: QCHT). This is defined as the small sample of handled clean material, which is stored, transported and analyzed in laboratory similar to real samples. These QC samples are used to control contamination in the sampling process.*

On-field blanks for ambient air are SO_2 and NO_2 (24h)

On-field blanks for wastewater are COD and TSS.

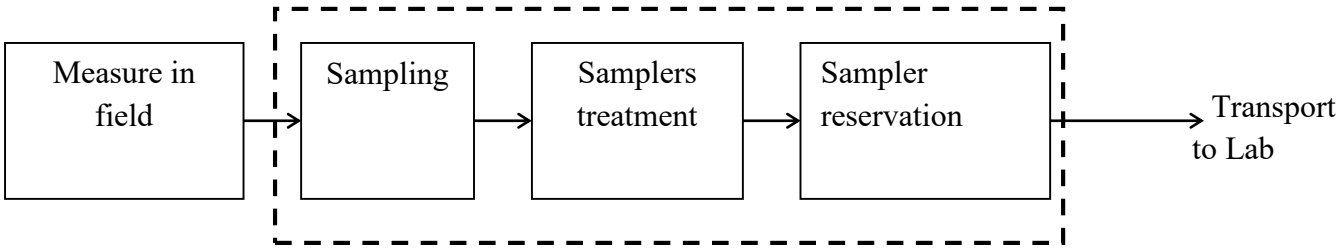
- ✓ QA/QC in transporting samples to the laboratory

QC sample was choosen transportation blank sample (code: QCVC). QCVC is a small sample of the clean material transporting and researching with true samples in the same environment, the preservation and analysis of laboratory parameters as true sample. This QC sample types are used to control contamination during transporting samples.

Transportation blanks sample for ambient air are: SO_2 and NO_2 (24h)

Transportation blanks sample for waste water: TSS and COD

QC sample at the laboratory (code: QCPTN) is replicate analyzed for the same above parameters.



Activities to quality assurance in the field of monitoring are summarized in **Table 4.2** follows:

Table 4.2. The current status of quality assurance and quality control activities on field (Mong Duong 2 BOT Coal Fired Power Plant)

No.	Activities	Current status in comparison to the requirements of Circular 10	Notes
1	**Environmental Monitoring on field**	+	Followed the plan
1.1.	Determination of environmental parameters	+	Represent for each environmental component, based on proposed report of EIA
1.2.	Analytical method	+	Current Vietnamese standards (TCVN)
1.3.	On-field environmental facilities and equipment	+	Periodically maintenance and calibration
1.4.	Chemicals, standards	+	Prepare before going to the field
1.5.	Personnel	+	Assign members of performing each items
1.6.	Data processing and reporting	+	
1.7.	Quality control	-	Applied QC samples for 02 parameters of ambient air and 02 parameters in wastewater, not for all parameters.
2.	**Sampling, samples pre-treatment and preservation on field**	+	Followed current Vietnamese standards (TCVN)
2.1.	Quality assurance	+	

No.	Activities	Current status in comparison to the requirements of Circular 10	Notes
2.1.1.	Determination of sampling site	+	Representative for the area, followed the surveyed results
2.1.2.	Assurance of monitoring parameters	+	Followed the plan
2.1.3.	Assurance of sampling time and frequency	-	Followed the plan, some changes in accordance to train schedule
2.1.4.	Sampling methods, samples pre-treatment and preservation	+	Followed current Vietnamese standards (TCVN)
2.1.5.	Equipment and instruments	+	Periodical maintenance and calibration
2.1.6.	Personnel	+	Group work
2.1.7.	Sample containers	+	Cleaned and sterilized
2.1.8.	Chemicals	+	
2.1.9.	On-field sampling minutes	+	
2.2.	Quality control	-	Applied QC samples for 02 parameters of ambient air and 02 parameters in wastewater samples, not for all parameters
3.	**Sample transportation to laboratory**	+	
3.1.	Quality assurance	+	
3.1.1.	Sample transportation	+	

No.	Activities	Current status in comparison to the requirements of Circular 10	Notes
3.1.2.	Sample delivery	+	Using delivery minute
3.2.	Quality control	-	Applied QC samples for 02 parameters of ambient air and 02 parameters in wastewater, not for all parameters

Notes: (+) full (-) not enough

3. Quality assurance and quality control (QA/QC) in laboratory

3.1. QA in laboratory

ISO/IEC 17025-2005 gives management requirements and technical requirements for the operation QA/QC laboratory. Here are the management requirements:

1. Organization.
2. Quality system.
3. Document control.
4. Review of requests, proposals and contracts.
5. Subcontracting of tests and calibrations.
6. Procurement services and supplies.
7. Service to customers.
8. Complaints (or suggestions).
9. Control testing and/or calibration mismatch
10. Remedies.
11. Precautions.
12. Control of records.
13. Internal assessment.
14. Review of leadership.

The technical requirements include:

1. General requirements.
2. Personnel.
3. Facilities andenvironmental conditions.
4. Test methods, calibration and approvedmethods.
5. Devices.
6. Traceabilityof measurement.
7. Sampling.
8. Sample managementand calibration.
9. Quality assurancetest resultsand calibration
10. Report the results.

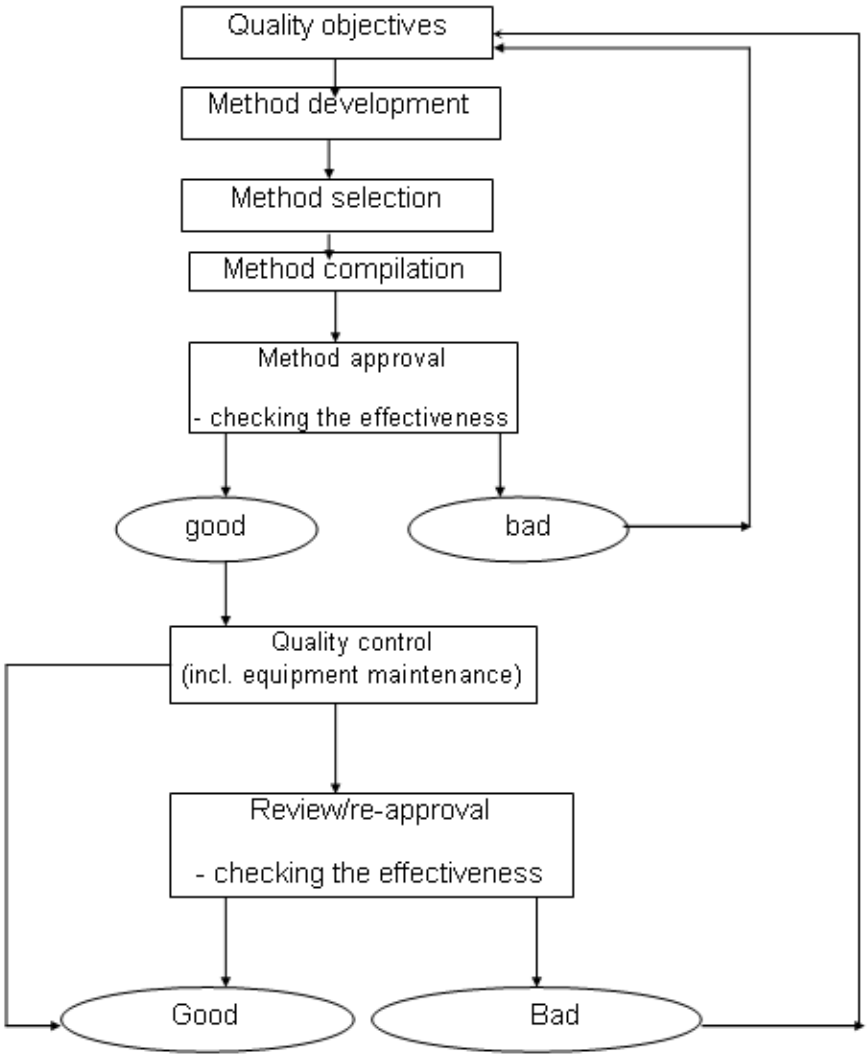


Figure 4.1. QA/QC in lab (ISO/IEC 17025:2005)

Table 4.3. The current status of quality assurance and quality control activities at the laboratory

No	Activities	Current statusin comparison to the requirements of Circular 10	Notes
4.	**QA/QC at the laboratory**	+	According to the laboratory regulations (ISO/IEC 17025 VILAS No 406 of R & D laboratory – Institute for Environmental Science and Technology)
4.1.	Management requirement	+	-as above-
4.1.1.	Determine the laboratory organization, appoint the duty and responsibility for each staff	+	-as above-
4.1.2.	Document system	+	-as above-
4.1.3.	Internal evaluation	+	-as above-
4.1.4.	Periodical review the quality management system and laboratory operation to ensure the effectiveness and continuous	+	-as above-
4.2.	Technical requirement	+	-as above-
4.2.1.	Quality assurance (analytical method, method selection, and method approval)	+	-as above-
	Facilities and equipment (calibration, labelling, maintenance)	+	-as above-
	Inter-laboratory comparison	+	-as above-
	Environmental condition	+	-as above-

No	Activities	Current statusin comparison to the requirements of Circular 10	Notes
	Sample management	+	-as above-
	Data quality assurance	+	-as above-
4.2.2.	Quality control	+	-as above-
	Using QC samples	+	-as above-
	Develop the QC accepted criteria	+	-as above-
5.	**QA/QC in data processing and reporting**	+	-as above-
5.1.	Environmental Monitoring data processing and management	+	Using software issued by Ministry of Natural resources and environment
5.1.1.	Documents related to monitoring process needed to update	+	According to the laboratory regulations (ISO/IEC 17025 VILAS No 406 of R & D laboratory – Institute for Environmental Science and Technology)
5.1.2.	Store all document related to monitoring process	+	Followed the form issued by Ministry of Natural Resources and Environment
5.1.3.	Check, calculate and process all data from the field and/or laboratory	+	According to the laboratory regulations (ISO/IEC 17025 VILAS No 406 of R & D laboratory – Institute for Environmental Science and Technology)
5.2.	Reporting	+	-as above-

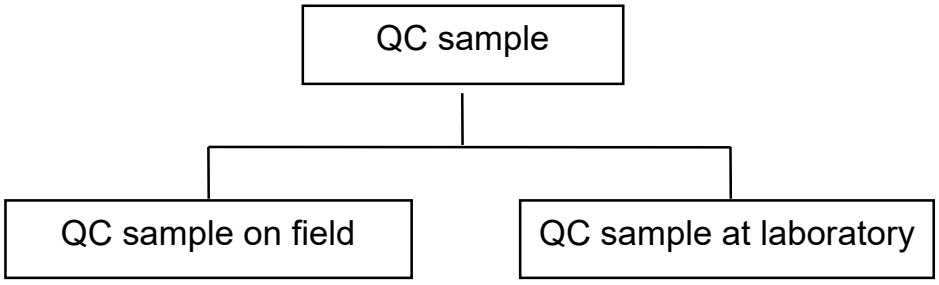
No	Activities	Current statusin comparison to the requirements of Circular 10	Notes
5.2.1.	Phase report needed to ensure the accuracy and honest	+	-as above-
5.2.2.	Review the reports	+	-as above-
5.2.3.	Report submitting	+	Submit to client and save the data

b. (QC) in Lab

QC samples include:

- QC sample for equipment
- QC sample for methods: Selected the duplicates at the Lab with the SO_2 and NO_2 in the ambient air and COD and TSS in water.

QC sample types:



In this environmental monitoring program for Mong Duong 2 BOT Coal Fired Power Plant and ash pond 2 in August 2024, QC samples (blanks and duplicates) were carried out at all sampling sites with some parameters of ambient air and wastewater in parallel with true samples.

QC sample on field is included: On-fields blank sample (code: QCHT), transportation blank sample (code: QCVC), applied for 02 parameters of ambient air (SO_2, NO_2) and 02 parameters of water (COD, TSS). The analytical requirement for blank is less

than MDL (method detection limit) or LOD (Limit of detection). In case the result is higher than these levels, it is needed to analyze again to remove the error cause.

QC sample at the laboratory (code: QCPTN) is replicately analyzed for the same above parameters.

Results were calculated, compared, followed the formula:

RPD: Relative Percent Difference

$$RPD = \frac{|LD1 - LD2|}{[(LD1 + LD2)/2]} \times 100(\%)$$

In which:

- RPD: Relative Percent Difference
- LD1: first analytical result
- LD2: second analytical result (duplicate)

The requirement of dispersion level between duplicate and true samples is not over ±20% (expected quality target of the laboratory).

c. QC sample analytical results

On-field blank sample analytical results

The 109th environmental monitoring time (August 2024) conducted with 04 QC samples: On-field blank sample, transportation blank sample of 04 parameters: SO_2, NO_2, COD, TSS.

Table 4.4. On-field blank samples (ambient air)

Type of sample	Code	SO_2 (µg/m^3)		NO_2 (µg/m^3)	
		% value ≤5	% value ≥5	% value ≤ 5	% value ≥5
QCHT: on-field blank samples	K1_0	100	0	100	0
	K5_0	100	0	100	0

Table 4.5. On-field blank samples (water)

Type of sample	Code	TSS (mg/L)		COD (mg/L)	
		% giá trị ≤ 3	% giá trị ≥ 3	% giá trị ≤ 3	% giá trị ≥ 3
	MD3_0	100	0	100	0

QCHT: on-field blank samples	CW2_0	100	0	100	0
	SW2_0	100	0	100	0
	SW12_0	100	0	100	0

d. Duplicate sample analytical results

Selected QC samples were duplicates in Lab (QCPTN) with parameters of SO_2, NO_2 in ambient air and TSS, COD in water. In detail:

Table 4.6. % RPD of QC duplicate samples (ambient air)

No.	Code	% RPD	
		SO_2	**NO_2**
1.	K1	15.4	13.7
2.	K3	14.2	12.8

Table 4.7. % RPD of QC duplicate samples (water)

No	Code	% RPD	
		COD	**TSS**
1.	MD3	12.5	16.5
2.	CW2	14.7	15.6
3.	SW2	11.3	16.4
4.	SW12	13.7	14.5

QA/QC activity was conducted fully as design in monitoring program; therefore, the above results shown rather good with the expected quality target of the laboratory within RPD ±20% (meet the requirements of the Lab).

e. Evaluation on completed monitoring data

Completed monitoring data is evaluated by percent of full data in comparison to the expected data in inital plan.

Formula using for percent of completed data as bellows:

$$C = \frac{V}{T} \times 100(\%)$$

In which:

- C: % of completed data
- V: number of acceptable samples
- T: total samples in beginning plan

Here C ≥ 95% is acceptable.

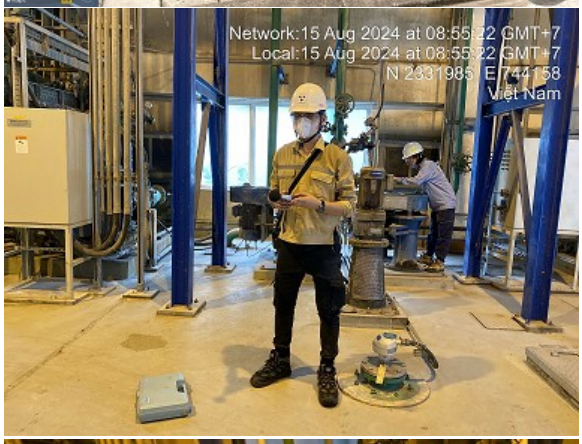
In this monitoring program (August 2024), number of measurements of monitoring samples in the Mong Duong 2 BOT coal fired power plant area, there are 05 ambient air samples, 58 noise samples, 58 vibration sample, 03 cooling water samples, 01 industrial wastewater sample, 21 surface water samples, 06 emission samples, and 03 sanitary wastewater samples. Number of measurements of monitoring samples in the ash pond 2 area, there are 02 wastewater samples, 02 noise samples. Number of measurements of monitoring samples in the housing colony area 02 sanitary wastewater samples. There are total 161 planned samples.

Therefore:

$$\mathrm{C} = \frac{\mathrm{V}}{\mathrm{T}} \times 100(\%) = \frac{161}{161} \times 100(\%) = 100\%$$

This result is ensured the completed data in this monitoring program of August 2024.

APPENDIX 2. IMAGES OF MONITORING ACTIVITIES ON FIELD



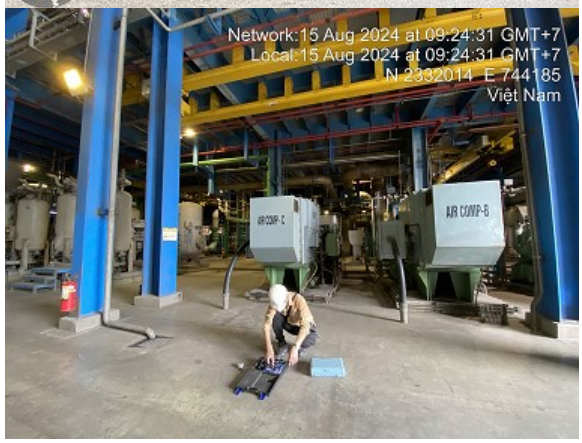


Figure 4.2. Measuring noise in plant area and taking air ambient samples

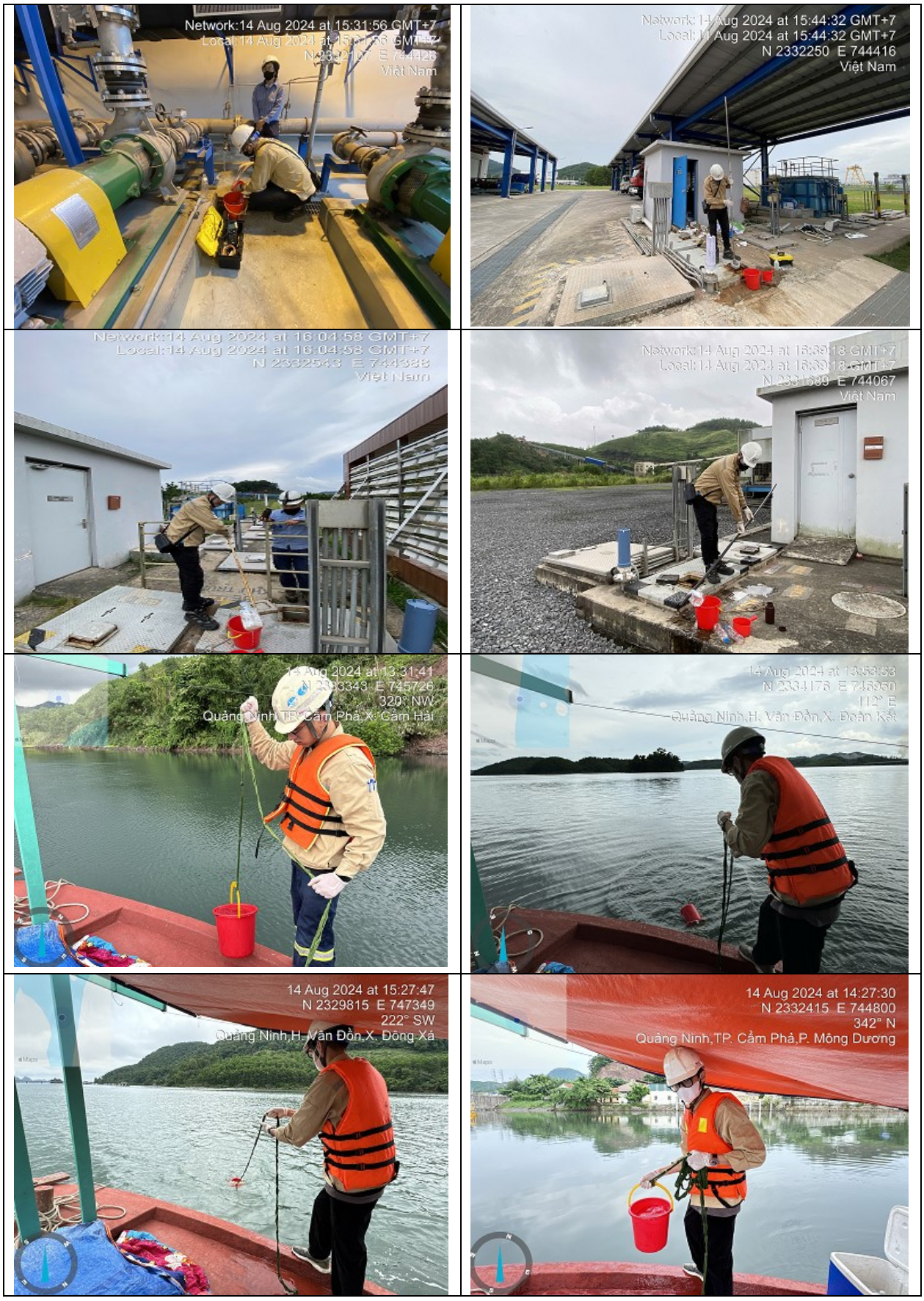


Figure 4.3. Sampling water in Mong Duong 2 BOT Coal Fired Power Plant

Figure 4.4. Sampling air emission in Mong Duong 2 BOT Coal Fired Power Plant

Figure 4.5. Taking surface wastewater samples and noise monitoring in the Ash pond 2

Figure 4.6. Sampling sanitary wastewater in the housing colony area

APPENDIX 3. MAP OF SAMPLING AREAS

Figure 4.7. Map of sampling areas

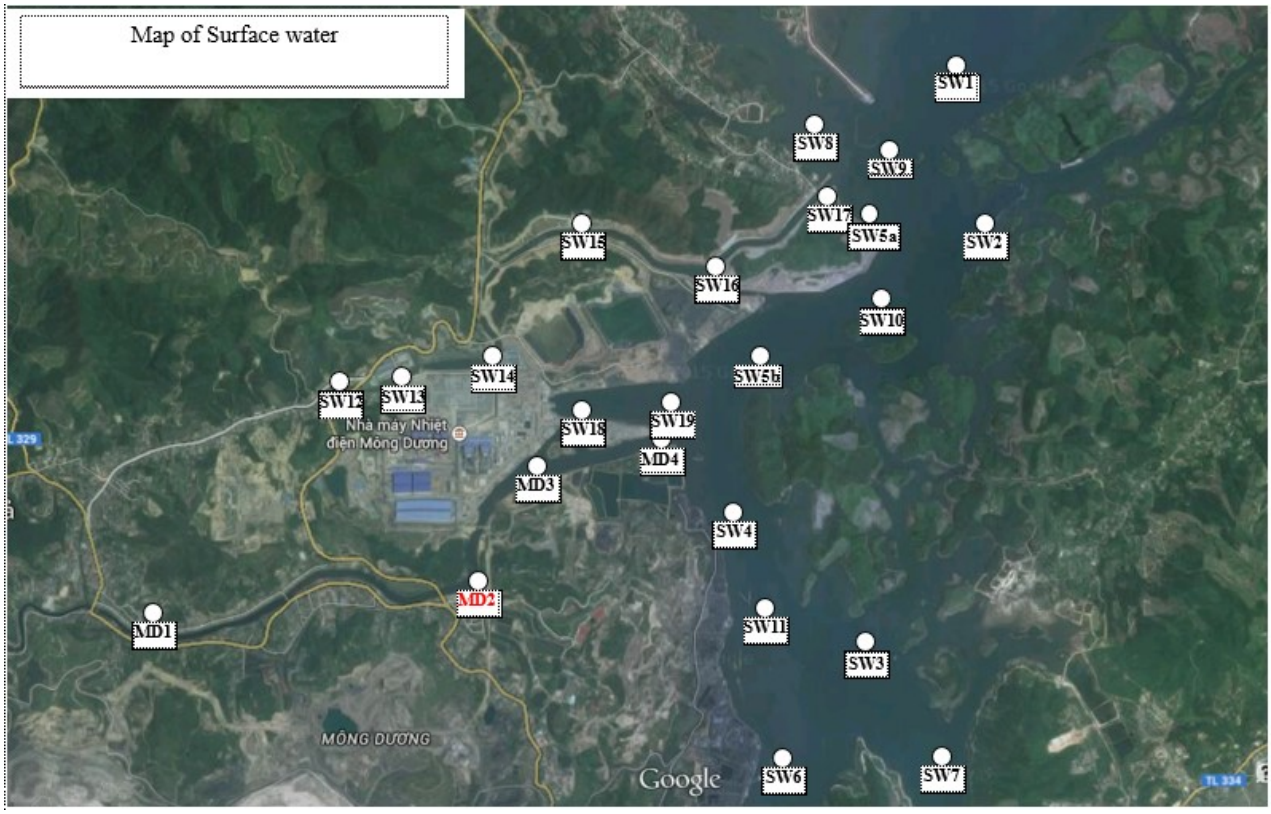


Figure 4.8. Map of monitoring surface water positions

Figure 4.9. Water sampling positions and noise monitoring

Figure 4.10. Wasewater sampling positions

APPENDIX 4: THE MONITORING RESULTS

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VILAS 406; VIMCERTS 055

No: 01/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 14-15/08/2024
Type of Samples : Ambient air
Number of Samples : 05 samples

No.	Parameters	Time	Unit	Measurement methods	Results					QCVN 05: 2023/BTNMT
					K1	K2	K3	K4	K5	
1.	Temperature	8h-16h	°C	QCVN 46:2022/BTNMT	29.4	29.1	29.7	30.7	30.2	-
2.	Humidity	8h-16h	%		94.1	94.7	93.8	89.4	90.7	-
3.	Wind velocity	8h-16h	m/s		2.5	2.4	1.9	2.6	2.5	-
4.	Wind direction	8h-16h	-		SE	SE	SE	SE	E	-
5.	Noise Leq	6h-21h	dB_A	TCVN 7878-2:2010	66	63	65	58	53	70(*)
	Leq	21h-6h	dB_A		55	52	54	49	47	55(*)
6.	SO_2	1 hour	$\mu g/m^3$	TCVN 5971:1995	96.3	90.5	103.2	84.3	93.0	350
		24 hours	$\mu g/m^3$	MASA method 704A	67.0	62.1	63.0	57.9	60.0	125
7.	NO_2	1 hour	$\mu g/m^3$	TCVN 6137:2009	63.8	61.0	75.7	67.6	65.6	200
		24 hours	$\mu g/m^3$	MASA method 406A	47.3	44.4	47.3	49.1	41.3	100
8.	CO	1 hour	$\mu g/m^3$	SOP-CO	3084.1	3169.0	3508.0	3198.5	3370.6	30,000
		24 hours	$\mu g/m^3$	SOP-PT-01	<3,000	<3,000	<3,000	<3,000	<3,000	-
9.	TSP	24 hours	$\mu g/m^3$	TCVN 5067:1995	139	148	156	136	133	200
10.	PM10	24 hours	$\mu g/m^3$	AS/NZS 3580.9.6:2003	40.7	54.6	59.7	46.3	42.6	100
11.	PM2.5 (**)	24 hours	$\mu g/m^3$	SOP-PM2.5	12.0	9.03	10.0	11.0	9.03	50

Notes:

- *The monitoring results were calculated at 25°C, 760 mmHg.*

Notes:

1. *The result is valid only for samples at the monitoring time.*
2. *Sample's information (sample's type, sampling position, sample's characteristics ...) is provided by the customer*
3. *The samples will be destroyed after 5 days from the date of issue of environmental monitoring results unless otherwise agreed with the customer.*
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- ***QCVN 05:2023/BTNMT*** *– National Technical Regulation on ambient air quality*
- *(*)**QCVN 26:2010/BTNMT** – National Technical Regulation on noise,*
- *Symbol (-): unstipulated; SE: "South East"; E: "East"; (**):Parameter is analyzed by sub-contractor.*
- *Sampling positions:*

	Coordinates	
	X	*Y*
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, September 09th, 2024

QA/QC

MSc. Ton Thu Giang

School of Environmental Science and Technology

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PGS.TS. Nguyễn Thị Ánh Tuyết

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VILAS 406
VIMCERTS 055

No: 02/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 15/08/2024
Type of Samples : Noise
Number of Samples : 29 samples x 2 times per day (day time and night time)

No	Sampling positions	Measurement methods	Day time		Night time	
			Leq (dB_A)	Lmax (dB_A)	Leq (dB_A)	Lmax (dB_A)
1.	N1	TCVN 7878-2:2018	97	100	95	99
2.	N2		98	103	96	100
3.	N3		94	98	92	96
4.	N4		100	104	95	97
5.	N5		94	98	87	92
6.	N6		95	99	90	94
7.	N7		98	102	94	98
8.	N8		95	99	93	96
9.	N9		92	95	86	91
10.	N10		98	101	95	98
11.	N11		99	104	96	101
12.	N12		96	100	91	95
13.	N13		88	94	85	88
14.	N14		91	95	85	93
15.	N15		87	90	84	86
16.	N16		96	103	93	97
17.	N17		94	97	91	96
18.	N18		90	95	87	90
19.	N19		88	93	85	89
20.	N20		93	98	90	94
21.	N21		95	98	92	96
22.	N22		97	100	94	97
23.	N23		92	97	86	94
24.	N24		88	92	85	88
25.	N25		94	99	88	96
26.	N26		94	102	90	95
27.	N27		91	100	86	96
28.	N28		91	101	87	97
29.	N29		90	100	91	101

Notes:

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Note:

- ***Sampling positions:***

		Coordinates	
		X	*Y*
N1	*Unit 1 area – pump for boiler – 1st floor – turbine building*	*2331206*	*458244*
N2	*Unit 1 area – compressor – 1st floor – turbine building*	*2331206*	*458244*
N3	*Unit 2 area – pump for boiler – 1st floor – turbine building*	*2331005*	*458247*
N4	*Unit 2 area – compressor – 1st floor – turbine building*	*2331207*	*458244*
N5	*Unit 1 – 2nd floor area – turbine building*	*2331215*	*455112*
N6	*Unit 2 – 2nd floor area – turbine building*	*2331132*	*458152*
N7	*Unit 1 – 3rd floor area – turbine building*	*2331198*	*458299*
N8	*Unit 2 – 3rd floor area – turbine building*	*2331174*	*458153*
N9	*Ball mill area – Unit 1 – 1st floor – coal crusher area*	*2331141*	*458294*
N10	*Ball mill area – Unit 2 – 1st floor – coal crusher area*	*2331164*	*458177*
N11	*Hopper pouring, heater ash hopper of Unit 1 – 1st floor – Boiler building*	*2331075*	*458294*
N12	*Hopper pouring, heater ash hopper of Unit 2 – 1st floor – Boiler building*	*2331073*	*458169*
N13	*Hopper pouring area of Unit 1 – 2nd floor – electrostatic precipitator area*	*2331031*	*458360*
N14	*Hopper pouring area of Unit 2 – 2nd floor – electrostatic precipitator area*	*2331053*	*458164*
N15	*Compressor – 1st floor – electrostatic precipitator area*	*2331053*	*458253*
N16	*Circulating pump and oxygen pump – FGD absorption tower of Unit 1*	*2330949*	*458241*
N17	*Circulating pump and oxygen pump – FGD absorption tower of Unit 2*	*2330949*	*458210*
N18	*Exhaust gases dryer including under shaft bearing and upper shaft bearing of Unit 1 – FGD and absorption tower area*	*2330976*	*458241*
N19	*Exhaust gases dryer including under shaft bearing and upper shaft bearing of Unit 2 – FGD and absorption tower area*	*2330978*	*458137*
N20	*Smoke fan area of ground floor of Unit 1 – FGD and absorption tower area*	*2330964*	*458281*
N21	*Smoke fan area of ground floor of Unit 2 – FGD and absorption tower area*	*2331116*	*458114*
N22	*Pump – Plaster building*	*2330956*	*458241*
N23	*Vacuum conveyor filter – 3rd floor – plaster building*	*2330974*	*458241*
N24	*Silo 1 – Area of slag silo at the bottom of furnace*	*2331115*	*458333*
N25	*Silo 2 - Area of slag silo at the bottom of furnace*	*2330915*	*458092*
N26	*Excavator – coal warehouse*	*2330727*	*458032*
N27	*Coal dividing machine of Unit 1 – Coal warehouse*	*2331166*	*458241*
N28	*Coal dividing machine of Unit 2 – Coal warehouse*	*2331165*	*458137*
N29	*Coal scraper – Coal warehouse*	*2330738*	*457721*

Ha Noi, September 09th, 2024

QA/QC

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School of Environmental Science and Technology

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VIỆN TRƯỞNG

PGS. TS. Nguyễn Thị Ánh Tuyết

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VILAS 406
VIMCERTS 055

No: 03/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 15/08/2024
Type of Samples : Vibration
Number of Samples : 29 samples x 2 times per day (day time and night time)

No	Sampling positions	Measurement methods	Day time		Night time	
			Leq (dB)	Lmax (dB)	Leq (dB)	Lmax (dB)
1.	V1	TCVN 6963:2001	51	55	49	53
2.	V2		62	66	58	62
3.	V3		50	54	48	51
4.	V4		58	63	55	59
5.	V5		56	60	53	55
6.	V6		58	62	55	59
7.	V7		61	65	58	62
8.	V8		57	61	56	59
9.	V9		54	57	52	55
10.	V10		55	58	52	55
11.	V11		37	42	34	38
12.	V12		35	39	34	38
13.	V13		62	66	57	60
14.	V14		63	67	60	65
15.	V15		38	42	36	39
16.	V16		58	62	54	69
17.	V17		52	56	49	54
18.	V18		72	79	65	74
19.	V19		74	85	70	82
20.	V20		41	47	36	42
21.	V21		40	45	35	40
22.	V22		47	51	44	47
23.	V23		49	53	47	50
24.	V24		38	42	36	39
25.	V25		36	39	33	37
26.	V26		34	37	32	36
27.	V27		71	78	69	75
28.	V28		48	51	48	51
29.	V29		64	66	63	65

Notes:

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Note:

- ***Sampling positions:***

		Coordinates	
		X	Y
V1	Unit 1 area – pump for boiler – 1st floor – turbine building	2331206	458244
V2	Unit 1 area – compressor – 1st floor – turbine building	2331206	458244
V3	Unit 2 area – pump for boiler – 1st floor – turbine building	2331005	458247
V4	Unit 2 area – compressor – 1st floor – turbine building	2331207	458244
V5	Unit 1 – 2nd floor area – turbine building	2331215	455112
V6	Unit 2 – 2nd floor area – turbine building	2331132	458152
V7	Unit 1 – 3rd floor area – turbine building	2331198	458299
V8	Unit 2 – 3rd floor area – turbine building	2331174	458153
V9	Ball mill area – Unit 1 – 1st floor – coal crusher area	2331141	458294
V10	Ball mill area – Unit 2 – 1st floor – coal crusher area	2331164	458177
V11	Hopper pouring, heater ash hopper of Unit 1 – 1st floor – Boiler building	2331075	458294
V12	Hopper pouring, heater ash hopper of Unit 2 – 1st floor – Boiler building	2331073	458169
V13	Hopper pouring area of Unit 1 – 2nd floor – electrostatic precipitator area	2331031	458360
V14	Hopper pouring area of Unit 2 – 2nd floor – electrostatic precipitator area	2331053	458164
V15	Compressor – 1st floor – electrostatic precipitator area	2331053	458253
V16	Circulating pump and oxygen pump – FGD absorption tower of Unit 1	2330949	458241
V17	Circulating pump and oxygen pump – FGD absorption tower of Unit 2	2330949	458210
V18	Exhaust gases dryer including under shaft bearing and upper shaft bearing of Unit 1 – FGD and absorption tower area	2330976	458241
V19	Exhaust gases dryer including under shaft bearing and upper shaft bearing of Unit 2 – FGD and absorption tower area	2330978	458137
V20	Smoke fan area of ground floor of Unit 1 – FGD and absorption tower area	2330964	458281
V21	Smoke fan area of ground floor of Unit 2 – FGD and absorption tower area	2331116	458114
V22	Pump – Plaster building	2330956	458241
V23	Vacuum conveyor filter – 3rd floor – plaster building	2330974	458241
V24	Silo 1 – Area of slag silo at the bottom of furnace	2331115	458333
V25	Silo 2 - Area of slag silo at the bottom of furnace	2330915	458092
V26	Excavator – coal warehouse	2330727	458032
V27	Coal dividing machine of Unit 1 – Coal warehouse	2331166	458241
V28	Coal dividing machine of Unit 2 – Coal warehouse	2331165	458137
V29	Coal scraper – Coal warehouse	2330738	457721

Ha Noi, September 09th, 2024

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MSc. Ton Thu Giang

School of Environmental Science and Technology

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PGS.TS. Nguyễn Thị Ánh Tuyết

Notes:

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VILAS 406
VIMCERTS 055

No: 04/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling area : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong Ward, Cam Pha City, Quang Ninh Province
Sampling date : 14/08/2024
Type of samples : Ambient air
Number of samples : 01 sample

No	Parameters	Time	Units	Results
				K1
1.	CO_2	14h-16h	mg/Nm^3	1333.1
2.	CH_4	14h-16h	mg/Nm^3	1.675
3.	N_2O	14h-16h	mg/Nm^3	0.637

Notes:

- *The monitoring results were calculated at 25°C. 760 mmHg.*
- *Sampling positions:*

K1: Plant area near coal store

Coordinates

X *Y*

21°04'13.4" N *107°20'56.2"E*

Ha Noi, September 09th, 2024

QA/QC

MSc. Ton Thu Giang

School of Environmental Science and Technology

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Tel.: (84-24).38681686 Email: inest@hust.edu.vn Fax: (84-24).38693551 http: //inest.hust.edu.vn

VILAS 406
VIMCERTS 055

Số: 05/27/KQQT/2024

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 14-15/08/2024
Type of Samples : Cooling water
Number of Samples : 03 samples

No.	Parameters	Unit	Analytical methods	Results			MDPCL-EHS-SP-02-006	QCĐP 3:2020/QN		QCVN 40: 2011/BTNMT	
				CW1	CW2	CW3		C (Column B)	C_{max}	C (Column B)	C_{max}
1.	Temperature	°C	SMEWW 2550B:2023	32.1	36.8	36.3	40	40	40	40	40
2.	Temperature difference (out-in)	°C	SMEWW 2550B:2023	-	4.7	4.2	8	-	-	-	-
3.	pH	-	TCVN 6492:2011	7.7	7.6	7.5	6.0-9.0	5,5 – 9,0	5,5 – 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	150	150
5.	COD	mg/L	SMEWW 5220C:2023	74	67	71	81	150	120	150	135
6.	BOD_5	mg/L	SMEWW 5210B:2023	27	24	25	40.5	50	40	50	45
7.	TSS	mg/L	TCVN 6625:2000	8	7	8	50	100	80	100	90
8.	Arsenic (As)	mg/L	EPA method 200.8	0.045	0.069	0.031	0.081	0,1	0.08	0.1	0.09
9.	Mercury (Hg)	mg/L	EPA method 200.8	<0.0005	<0.0005	<0.0005	0.005	0,01	0.008	0.01	0.009
10.	Lead (Pb)	mg/L	EPA method 200.8	<0.002	<0.002	<0.002	0.405	0,5	0.4	0.5	0.45
11.	Cadmium (Cd)	mg/L	EPA method 200.8	<0.0005	<0.0005	<0.0005	0.0081	0,1	0.08	0.1	0.09
12.	Chromium III	mg/L	EPA Method 200.8 & SMEWW 3500-Cr.B 2023	0.018	0.022	0.013	0.5	1	0.8	1	0.9
13.	Chromium VI	mg/L	SMEWW 3500-Cr.B 2023	<0.003	<0.003	<0.003	0.081	0,1	0.08	0.1	0.09
14.	Copper(Cu)	mg/L	EPA method 200.8	0.007	0.005	0.003	0.5	2	1.6	2	1.8
15.	Zinc (Zn)	mg/L	EPA method 200.8	0.207	0.006	0.151	1.0	3	2.4	3	2.7
16.	Nickel (Ni)	mg/L	EPA method 200.8	0.014	0.013	0.010	0.405	0,5	0.4	0.5	0.45
17.	Manganese (Mn)	mg/L	EPA method 200.8	0.004	0.005	<0.002	0.81	1	0.8	1	0.9
18.	Iron (Fe)	mg/L	EPA method 200.8	0.77	0.85	0.60	1	5	4	5	4.5
19.	Mineral Oil & Grease	mg/L	SMEWW5520B&F: 2023	<1.0	<1.0	<1.0	4.05	10	8	10	9
20.	Flouride (F^-)	mg/L	SMEWW 4500F^-.B&D:2023	1.46	1.43	1.39	8.1	10	8	10	9
21.	Sulfide (as H_2S)	mg/L	SMEWW 4500S2-.B&D:2023	<0.03	<0.03	<0.03	0.405	0,5	0.4	0.5	0.45
22.	Total N	mg/L	TCVN 6638:2000	3.5	3.5	3.5	24.3	40	32	40	36
23.	Total P	mg/L	TCVN 6202:2008	0.04	0.10	0.06	4.86	6	4.8	6	5.4
24.	Residue Chlorine	mg/L	TCVN 6225-3:2011	0.7	0.3	0.7	0.2	2	1.6	2	1.8
25.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2017	0.10	0.07	0.06	8.1	10	8	10	9

Notes:

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No.	Parameters	Unit	Analytical methods	Results			MDPCL-EHS-SP-02-006	QCĐP 3:2020/QN		QCVN 40: 2011/BTNMT	
				CW1	CW2	CW3		C (Column B)	C_{max}	C (Column B)	C_{max}
26.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	110	110	100	5,000	5,000	5,000	5,000	5,000

Note:

- ***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;

- ***QCĐP 3:2020/QN*** *- Local technical regulation on industrial wastewater in Quang Ninh province; Column B specifies the C value of pollution parameters in industrial wastewater when discharged into water sources not used for domestic water supply purposes, C_{max} is the maximum allowable value of pollution parameters in industrial wastewater when discharging into the receiving water source:*

$$C_{max} = C \times K_q \times K_f \times K_{QN} = C \times 1.0 \times 0.8 \times 1.0 = 0.8 \times C$$

In which:

+ C: Values of pollution parameters in industrial wastewater specified in QCĐP 3:2020/QN

+ K_q: Coefficient of wastewater receiving source corresponding to the flow volume of rivers, streams, canals and ditches, or corresponding to the volume of lakes, ponds, lagoons; the use purpose of the coastal sea area K_q = 1.0;

+ K_f: Wastewater flow coefficient corresponding to the total wastewater flow of industrial facilities when discharging into the receiving water source K_f = 0.8;

+ K_{QN}: Coefficient of additional application specific to QCĐP 03: 2020/QN for waste sources when discharged into rivers, streams, creeks, canals, lakes and reservoirs with different water use purposes and in different areas. different regions, K_{QN} = 1.0;

- *Symbol (-): unstipulated;*
- *Sampling positions:*

	Coordinates	
	X	Y
CW1: Intake point of cooling water	21°04'3..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
	2331698	458326

Ha Noi, September 9th, 2024

QA/QC

MSc. Ton Thu Giang

School of Environmental Science and Technology

VIỆN TRƯỞNG

PGS.TS. Nguyễn Thị Ánh Tuyết

Notes:

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VILAS 406
VIMCERTS 055

Số: 06/27/KQQT/2024

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 14/08/2024
Type of Samples : Industrial wastewater
Number of Samples : 01 sample

No.	Parameters	Unit	Analytical methods	Results	MDPCL-EHS-SP-02-006	QCĐP 3:2020/QN		QCVN 40: 2011/BTNMT	
				WW1		C *(Column B)*	Cmax	C *(Column B)*	Cmax
1.	Temperature	°C	SMEWW 2550B:2023	34.0	40	40	40	40	40
2.	pH	-	TCVN 6492:2011	8.4	6.0-9.0	5.5 – 9.0	5.5 – 9.0	5.5 – 9.0	5.5 – 9.0
3.	Color (pH=7)	Pt/Co	TCVN 6185:2015	<5	70	150	150	150	150
4.	COD	mg/L	SMEWW 5220C:2023	5	81	150	150	150	150
5.	BOD_5	mg/L	SMEWW 5210B:2023	3	40.5	50	50	50	50
6.	TSS	mg/L	TCVN 6625:2000	7	50	100	100	100	100
7.	Arsenic (As)	mg/L	EPA method 200.8	<0.0015	0.081	0.1	0.1	0.1	0.1
8.	Mercury (Hg)	mg/L	EPA method 200.8	<0.0005	0.005	0.01	0.01	0.01	0.01
9.	Lead (Pb)	mg/L	EPA method 200.8	<0.002	0.405	0.5	0.5	0.5	0.5
10.	Cadmium (Cd)	mg/L	EPA method 200.8	<0.0005	0.0081	0.1	0.1	0.1	0.1
11.	Chromium III	mg/L	EPA Method 200.8 & SMEWW 3500-Cr.B 2023	0.004	0.5	1	1	1	1
12.	Chromium VI	mg/L	SMEWW 3500-Cr.B 2023	<0.003	0.081	0.1	0.1	0.1	0.1
13.	Copper(Cu)	mg/L	EPA method 200.8	<0.001	0.5	2	2	2	2
14.	Zinc (Zn)	mg/L	EPA method 200.8	<0.005	1.0	3	3	3	3
15.	Nickel (Ni)	mg/L	EPA method 200.8	0.003	0.405	0.5	0.5	0.5	0.5
16.	Manganese (Mn)	mg/L	EPA method 200.8	0.002	0.81	1	1	1	1
17.	Iron (Fe)	mg/L	EPA method 200.8	0.19	1	5	5	5	5
18.	Mineral Oil & Grease	mg/L	SMEWW5520B&F:2023	<1.0	4.05	10	10	10	10
19.	Flouride (F^-)	mg/L	SMEWW 4500-F^- .B&D:2023	0.22	8.1	10	10	10	10
20.	Sulfide (as H_2S)	mg/L	SMEWW 4500 S^{2-} B&D:2023	<0.03	0.405	0.5	0.5	0.5	0.5
21.	Total N	mg/L	TCVN 6638:2000	3.5	24.3	40	40	40	40
22.	Total P	mg/L	TCVN 6202:2008	0.10	4.86	6	6	6	6
23.	Residue Chlorine	mg/L	TCVN 6225-3:2011	0.7	0.2	2	2	2	2

Notes:

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No.	Parameters	Unit	Analytical methods	Results	MDPCL-EHS-SP-02-006	QCĐP 3:2020/QN		QCVN 40: 2011/BTNMT	
				WW1		C (Column B)	Cmax	C (Column B)	Cmax
24.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2023	0.06	8.1	10	10	10	10
25.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	92	5,000	5,000	5,000	5,000	5,000

Note

- ***MDPCL-EHS-SP-02-006****: The standard of Mong Duong 2 BOT thermal power plant about permitted limit of industrial wastewater.*
- ***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:*

$$C_{max} = C \times K_q \times K_f = C \times 1.0 \times 1.0 = C$$

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 = 1.0

+ K_f: is the coefficient of discharged flow rate K_f=1.0

- ***QCĐP 3:2020/QN*** *- Local technical regulation on industrial wastewater in Quang Ninh province; Column B specifies the C value of pollution parameters in industrial wastewater when discharged into water sources not used for domestic water supply purposes, C_{max} is the maximum allowable value of pollution parameters in industrial wastewater when discharging into the receiving water source:*

$$C_{max} = C \times K_q \times K_f \times K_{QN} = C \times 1.0 \times 1.0 \times 1.0 = C$$

In which:

+ C: Values of pollution parameters in industrial wastewater specified in QCĐP 3:2020/QN

+ K_q: Coefficient of wastewater receiving source corresponding to the flow volume of rivers, streams, canals and ditches, or corresponding to the volume of lakes, ponds, lagoons; the use purpose of the coastal sea area K_q = 1.0;

+ K_f: Wastewater flow coefficient corresponding to the total wastewater flow of industrial facilities when discharging into the receiving water source K_f = 1.0;

+ K_{QN}: Coefficient of additional application specific to QCĐP 03: 2020/QN for waste sources when discharged into rivers, streams, creeks, canals, lakes and reservoirs with different water use purposes and in different areas. different regions, K_{QN} = 1.0;

- *Symbol (-): unstipulated;*
- *Sampling position:*

	Coordinates	
	X	*Y*
WW1: From discharge point to cooling water chanel	*21°04'33.8"N*	*107°21'4.69"E*
	(2331338)	*(458360)*

Ha Noi, September 9th, 2024

QA/QC

MSc. Ton Thu Giang

School of Environmental Science and Technology

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PGS.TS. Nguyễn Thị Ánh Tuyết

Notes:

1. *The result is valid only for samples at the monitoring time.*
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VILAS 406
VIMCERTS 055

No: 07/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 14/08/2024
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:2023	31.4	30.7	30.5	-	-
2.	pH	-	TCVN 6492:2011	7.5	7.0	7.2	5.0÷9.0	5.0÷9.0
3.	BOD_5	mg/L	SMEWW 5210B:2023	7	8	6	50	60
4.	TSS	mg/L	TCVN 6625:2000	15	14	13	100	120
5.	TDS	mg/L	SOP-TDS	812	715	935	1.000	1.200
6.	Sulfide (as H_2S)	mg/L	SMEWW 4500S2-.B&D:2023	<0.03	<0.03	<0.03	4.0	4.8
7.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2023	0.05	0.07	0.34	10	12
8.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500-NO_3^- E:2023	7.45	6.85	7.40	50	60
9.	Oil and grease	mg/L	SMEWW 5520 B&F:2023	<1.0	<1.0	<1.0	20	24
10.	Phosphate (PO_4^{3-}-P)	mg/L	TCVN 6202:2008	4.88	3.38	7.19	10	12
11.	Total surface active agents (*)	mg/L	SMEWW 5540B&C:2017	<0.015	<0.015	<0.015	10	12
12.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	220	250	270	5.000	5.000

Note:

- ***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*)*
- *Symbol (-): unstipulated; (*): Parameter is analyzed by sub-contractor Institute of Science and Technology for Energy & Environment, Vimcerts 079.*
- *Sampling positions:*

	Coordinates	
	X	*Y*
SH1: Sanitary waste water in Operation house	*21°04'39.6"N (2331603)*	*107°21'07.8"E (458369)*
SH2: Sanitary waste water in Chemical dosing building	*21°04'28.7"N*	*107°21'09.6"E*

Notes:

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SH3: Sanitary waste water in coal warehouse area	*(2331391)* *21°04'11.5"N* *(2331262)*	*(458375)* *107°20'56.5"E* *(458175)*

Ha Noi, September 09th, 2024

QA/QC

MSc. Ton Thu Giang

School of Environmental Science and Technology

VIỆN TRƯỞNG

PGS.TS. Nguyễn Thị Ánh Tuyết

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VILAS 406
VIMCERTS 055

Số: 08/27/KQQT/2024

ENVIRONMENTAL MONITORING RESULTS

Sampling area : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong Ward, Cam Pha City, Quang Ninh Province
Sampling date : 14/08/2024
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	72	72	72	-	-	-
2.	PM	mg/Nm^3	EPA Method 5	16.0	18.3	17.7	50	200	112
3.	SO_2	mg/Nm^3	EPA Method 6	44.5	47.1	44.5	280	500	280
4.	$CO^{(**)}$	mg/Nm^3	TCVN 7242:2003	<10	<10	<10	900	$1,000^{(*)}$	$640^{(*)}$
5.	NO_x *(Calculated by NO_2)*	mg/Nm^3	EPA Method 7	438.3	496.7	430.8	560	1,000	560

Notes:

- *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.*
- ***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 x Kp x Kv = 0.56 x 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 05:2020/QN** - Local 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 x Kp x Kv = 0.64 x C***

+ Kp is coefficient of flow sources. Kp=0.8; Kv is regional coefficient. Kv=0.8 (Urban city type II – Cam Pha City);

- Symbol (**): Parameter is analyzed by sub-contractor;

- *Sampling positions:*

	Coordinates: X	Y
S1.1: Stack of line 1. sample 1	*21°04'18.3" N*	*107°20'59.7"E*
S1.2: Stack of line 1. sample 2	*(2330961)*	*(458239)*
S1.3: Stack of line 1. sample 3		

- *Operation status: Stack of line 1 works with 365 MW of capacity.*

Ha Noi, September 9th, 2024

QA/QC

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VIỆN KHOA HỌC VÀ CÔNG NGHỆ MÔI TRƯỜNG

VIỆN TRƯỞNG

PGS.TS. Nguyễn Thị Ánh Tuyết

Notes:

1. *The result is valid only for samples at the monitoring time.*
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VILAS 406
VIMCERTS 055

Số: 09/27/KQQT/2024

ENVIRONMENTAL MONITORING RESULTS

Sampling area : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong Ward, Cam PhaCity, QuangNinh province
Sampling date : 14/08/2024
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		$C_{(Column B)}$	C_{max}
1.	Temperature	°C	SOP-KT.01	71	71	71	-	-	-
2.	PM	mg/Nm^3	EPA Method 5	21.7	22.8	21.6	50	200	112
3.	SO_2	mg/Nm^3	EPA Method 6	65.4	94.2	65.4	280	500	280
4.	CO(**)	mg/Nm^3	TCVN 7242:2003	<10	<10	<10	900	1,000(*)	640(*)
5.	NO_x *(Calculated by NO_2)*	mg/Nm^3	EPA Method 7	442.1	436.5	492.9	560	1,000	560

Notes:

- *The concentration of pollutants in stack emissions provided at the conditions (temperature 25°C, pressure 760 mm Hg).*
- ***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 x Kp x Kv = 0.56 x 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 05:2020/QN** - Local 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 x Kp x Kv = 0.64 x C****

+ Kp is coefficient of flow sources. Kp=0.8;
+ Kv is regional coefficient. Kv=0.8 (Urban city type II – Cam Pha City);
- Symbol (**): Parameter is analyzed by sub-contractor;

- *Sampling position* — *Coordinates:*

S2.1: Stack of line 2. Sample 1 — *21°04'18.3" N (2330961)* — *107°20'59.7"E (458233)*
S2.2: Stack of line 2. Sample 2
S2.3: Stack of line 2. Sample 3

- *Operation status: Stack of line 2 works with 357MW of capacity.*

Ha Noi, September 9th, 2024

QA/QC

MSc. Ton Thu Giang

School of Environmental Science and Technology

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Notes:

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VILAS 406
VIMCERTS 055

No: 10/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling area : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong Ward, Cam PhaCity, QuangNinh province
Sampling date : 14/08/2024
Type of samples : Air emission
Number of samples : 06 samples

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

Notes:

- *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.*
- *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
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 1 works with 365 MW of capacity.
Stack of line 2 works with 357MW of capacity.

Ha Noi, September 09th, 2024

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Notes:
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VILAS 406; VIMCERTS 055

No: 11/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 14-15/08/2024
Type of Samples : Surface water
Number of Samples : 04 samples

No.	Parameters	Unit	Analytical methods	Results				QCVN 10: 2023/BTNMT
				MD1	MD2	MD3	MD4	
1.	Temperature	°C	SMEWW 2550B:2023	28.3	28.1	27.4	27.9	-
2.	pH	-	TCVN 6492:2011	7.5	7.6	7.7	7.7	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2510B:2023	31.7	33.1	41.5	41.2	-
4.	DO	mg/L	TCVN 7325:2016	7.8	8.2	8.6	8.4	≥5
5.	BOD_5	mg/L	SMEWW 5210B:2017	22	24	23	25	-
6.	TSS	mg/L	TCVN 6625:2000	11	10	9	11	50
7.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-.E:2017	0.45	0.79	1.13	1.09	-
8.	Total N	mg/L	SMEWW 4500-N.C:2017	1.00	1.91	2.19	2.50	-
9.	Total P	mg/L	TCVN 6202:2008	0.11	0.10	0.10	0.07	-
10.	Ammonium (*)	mg/L	SMEWW 4500 NH_3.B&F:2023	<0.2	<0.2	<0.2	<0.2	0.1
11.	Arsenic (As)	mg/L	US EPA Method 200.8	0.002	0.004	0.002	0.003	0.02
12.	Mercury (Hg)(*)	mg/L	US EPA Method 6020A: 1998	0.0001	0.0001	0.0002	0.0001	0.0005
13.	Lead (Pb)	mg/L	US EPA Method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	0.05

Notes:
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No.	Parameters	Unit	Analytical methods	Results				QCVN 10: 2023/BTNMT
				MD1	MD2	MD3	MD4	
14.	Cadmium (Cd)	mg/L	US EPA Method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	0.005
15.	Chromium (Cr)	mg/L	US EPA Method 200.8	0.005	0.009	0.007	0.008	0.1
16.	Copper (Cu)	mg/L	US EPA Method 200.8	<0.003	<0.003	<0.003	<0.003	0.02
17.	Zinc (Zn)	mg/L	US EPA Method 200.8	<0.003	0.004	0.003	0.003	0.1
18.	Nickel (Ni)	mg/L	US EPA Method 6020A: 1998	0.017	0.046	0.040	0.031	-
19.	Manganese (Mn)	mg/L	US EPA Method 200.8	<0.0015	0.217	0.103	0.003	0.5
20.	Iron (Fe)	mg/L	US EPA Method 6020B	0.30	0.19	0.18	0.19	0.5
21.	Selenium (Se)	mg/L	US EPA Method 6020A: 1998	0.008	0.010	0.012	0.010	-
22.	Total oil and grease	mg/L	SMEWW 5520B&F:2023	<1.0	<1.0	<1.0	<1.0	5.0
23.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	200	370	370	200	1,000

Note:

- ***QCVN 10:2023/BTNMT** - National technical regulation on coastal water quality. Luong Gac, we apply limit value of polluted parameters in coastal.*
- *Symbol (-): unstipulated; (*): Parameter is analyzed by sub-contractor.*
- *Sampling sites: Mong Duong river where water run from Tran bridge (Zone 4, Mong Duong ward) to Luong Gac (Zone 4, Mong Duong ward)*
- *Sampling positions:*

	Coordinates	
	X	*Y*
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, September 9th, 2024

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VILAS 406; VIMCERTS 055

No: 12/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 14-15/08/2024
Type of Samples : Surface water
Number of Samples : 05 samples

No.	Parameters	Unit	Analytical methods	Results					QCVN 10: 2023/BTNMT
				SW12	SW13	SW14	SW15	SW16	
1.	Temperature	°C	SMEWW 2550B:2023	31.9	36.3	35.5	34.9	34.8	-
2.	pH	-	TCVN 6492:2011	7.5	7.7	7.6	7.7	7.7	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2510B:2023	15.7	49.2	50.1	53.4	56.8	-
4.	DO	mg/L	TCVN 7325:2016	7.2	7.5	7.7	7.7	7.9	≥5
5.	BOD_5	mg/L	SMEWW 5210B:2017	22	21	20	22	24	-
6.	TSS	mg/L	TCVN 6625:2000	12	10	12	9	12	50
7.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-.E:2017	0.3	0.4	0.34	0.3	0.28	-
8.	Total N	mg/L	SMEWW 4500-N.C:2017	1.26	1.72	1.11	2.35	1.56	-
9.	Total P	mg/L	TCVN 6202:2008	0.10	0.17	0.16	0.12	0.1	-
10.	Ammonium(*)	mg/L	SMEWW 4500 NH_3.B&F:2023	<0.2	<0.2	0.22	0.2	0.25	0.1
11.	Arsenic (As) (*)	mg/L	US EPA Method 200.8	0.012	0.037	0.037	0.044	0.047	0.02
12.	Mercury (Hg)(*)	mg/L	US EPA Method 6020A: 1998	0.0002	<0.0001	<0.0001	<0.0001	0.0002	0.0005
13.	Lead (Pb)	mg/L	US EPA Method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.05
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	0.007	0.018	0.018	0.019	0.017	0.1

Notes:
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No.	Parameters	Unit	Analytical methods	Results					QCVN 10: 2023/BTNMT
				SW12	SW13	SW14	SW15	SW16	
16.	Copper (Cu)	mg/L	US EPA Method 200.8	0.003	0.005	0.004	0.005	0.005	0.02
17.	Zinc (Zn)	mg/L	US EPA Method 200.8	0.027	0.027	0.005	0.008	0.007	0.1
18.	Nickel (Ni)	mg/L	US EPA Method 6020A: 1998	0.019	0.049	0.040	0.048	0.044	-
19.	Manganese (Mn)	mg/L	US EPA Method 200.8	0.003	0.002	<0.0015	0.002	0.011	0.5
20.	Iron (Fe)	mg/L	US EPA Method 6020B	0.22	0.19	0.19	0.16	0.17	0.5
21.	Selenium (Se)	mg/L	US EPA Method 6020A: 1998	0.033	0.016	0.016	0.022	0.021	-
22.	Total oil and grease	mg/L	SMEWW 5520B&F:2023	<1.0	<1.0	<1.0	<1.0	<1.0	5.0
23.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	400	360	370	200	330	1,000

Notes:

- ***QCVN 10:2023/BTNMT** - National technical regulation on coastal water quality. Luong Gac, we apply limit value of polluted parameters in coastal.*
- *Symbol (-): unstipulated; (*): Parameter is analyzed by sub-contractor.*
- *Sampling sites:Channel which leads cooling water of Mong Duong 1&2 Thermal Power Plants into Luong Gac*
- *Sampling positions:*

	Coordinates	
	X	*Y*
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, September 9th, 2024

QA/QC

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VILAS 406; VIMCERTS 055

No: 13/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 14-15/08/2024
Type of Samples : Coastal water
Number of Samples : 05 samples

No.	Parameters	Unit	Analytical methods	Results					QCVN 10: 2023/BTNMT
				SW2	SW3	SW4	SW5b	SW6	
1.	Temperature	°C	SMEWW 2550B:2023	30.7	29.8	29.5	29.4	29.0	-
2.	pH	-	TCVN 6492:2011	7.6	7.6	7.7	7.8	7.7	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2510B:2023	43.7	43.5	44.6	43.8	43.3	-
4.	DO	mg/L	TCVN 7325:2016	7.7	7.9	7.7	8.0	7.8	≥5
5.	BOD_5	mg/L	SMEWW 5210B:2017	3.5	3.8	3.4	3.7	3.8	-
6.	TSS	mg/L	TCVN 6625:2000	9	10	11	12	15	50
7.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-.E:2017	0.11	0.11	0.12	0.11	0.12	-
8.	Total N	mg/L	SMEWW 4500-N.C:2017	5.16	3.81	3.03	3.25	3.92	-
9.	Total P	mg/L	TCVN 6202:2008	0.4	0.03	0.15	0.18	0.15	-
10.	Ammonium(*)	mg/L	SMEWW 4500 NH_3.B&F:2023	0.29	0.31	0.24	0.24	0.32	0.1
11.	Arsenic (As)	mg/L	US EPA Method 200.8	0.0403	0.0464	0.0477	0.0492	0.0512	0.02
12.	Mercury (Hg)(*)	mg/L	US EPA Method 6020A: 1998	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0005
13.	Lead (Pb)	mg/L	US EPA Method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.05
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	0.0155	0.0099	0.0314	0.0132	0.0188	0.1
16.	Copper (Cu)	mg/L	US EPA Method 200.8	<0.003	<0.003	<0.003	<0.003	<0.003	0.02

Notes:

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No.	Parameters	Unit	Analytical methods	Results					QCVN 10: 2023/BTNMT
				SW2	SW3	SW4	SW5b	SW6	
17.	Zinc (Zn)	mg/L	US EPA Method 200.8	0.0138	0.0149	0.0162	0.0124	0.0128	0.1
18.	Nickel (Ni)	mg/L	US EPA Method 6020A: 1998	0.052	0.032	0.061	0.057	0.061	-
19.	Manganese (Mn)	mg/L	US EPA Method 200.8	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	0.5
20.	Iron (Fe)	mg/L	US EPA Method 6020B	0.17	0.03	0.03	0.05	0.03	0.5
21.	Selenium (Se)	mg/L	US EPA Method 6020A: 1998	0.019	0.022	0.021	0.021	0.020	-
22.	Total oil and grease	mg/L	SMEWW 5520B&F:2023	<1.0	<1.0	<1.0	<1.0	<1.0	5.0
23.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	310	320	250	260	270	1,000

Note:

- ***QCVN 10:2023/BTNMT** - National technical regulation on coastal water quality. Luong Gac, we apply limit value of polluted parameters in coastal.*
- *Symbol (-): unstipulated; (*): Parameter is analyzed by sub-contractor.*
- *Sampling positions:*

	Coordinates	
	X	*Y*
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, September 9th, 2024

QA/QC

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VIỆN TRƯỞNG

PGS.TS. Nguyễn Thị Ánh Tuyết

Notes:

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VILAS 406; VIMCERTS 055

No: 14/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 14-15/08/2024
Type of Samples : Coastal water
Number of Samples : 07 samples

No.	Parameters	Unit	Analytical methods	Results							QCVN 10: 2023/BTNMT
				SW7	SW8	SW9	SW10	SW11	SW18	SW19	
1.	Temperature	°C	SMEWW 2550B:2023	28.7	30.5	30.2	29.2	29.2	28.9	28.8	-
2.	pH	-	TCVN 6492:2011	7.7	7.5	7.8	7.7	7.9	7.4	7.7	6.5 – 8.5
3.	EC	mS/cm	SMEWW 2510B:2023	44.4	43.9	43.5	45.4	43.7	49.5	50.7	-
4.	DO	mg/L	TCVN 7325:2016	7.9	7.8	7.7	8.1	7.8	8.2	7.9	≥5
5.	BOD_5	mg/L	SMEWW 5210B:2017	3.8	4.0	3.3	3.8	3.6	3.8	3.5	-
6.	TSS	mg/L	TCVN 6625:2000	14	13	12	12	11	12	12	50
7.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-.E:2017	0.16	0.23	0.12	0.12	0.13	0.13	0.18	-
8.	Total N	mg/L	SMEWW 4500-N.C:2017	3.59	3.7	3.36	3.41	3.31	3.14	3.75	-
9.	Total P	mg/L	TCVN 6202:2008	0.07	0.11	0.12	0.13	0.15	0.15	0.03	-
10.	Ammonium(*)	mg/L	SMEWW 4500 NH_3.B&F:2023	0.27	0.28	0.27	0.31	0.24	0.24	0.3	0.1
11.	Arsenic (As)	mg/L	US EPA Method 200.8	0.0506	0.0656	0.0480	0.0510	0.0550	0.0510	0.0480	0.02
12.	Mercury (Hg)(*)	mg/L	US EPA Method 6020A: 1998	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	0.0005
13.	Lead (Pb)	mg/L	US EPA Method 200.8	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.05
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	0.0137	0.0147	0.0119	0.0156	0.0103	0.0196	0.0289	0.1

Notes:

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No.	Parameters	Unit	Analytical methods	Results							QCVN 10: 2023/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	0.008	0.005	0.02
17.	Zinc (Zn)	mg/L	US EPA Method 200.8	0.0196	0.0124	0.0211	0.0133	0.0167	0.0163	0.0162	0.1
18.	Nickel (Ni)	mg/L	US EPA Method 6020A: 1998	0.054	0.043	0.063	0.050	0.059	0.057	0.051	-
19.	Manganese (Mn)	mg/L	US EPA Method 200.8	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	0.5
20.	Iron (Fe)	mg/L	US EPA Method 6020B	0.05	0.05	0.03	0.03	0.05	0.04	0.03	0.5
21.	Selenium (Se)	mg/L	US EPA Method 6020A: 1998	0.022	0.017	0.020	0.022	0.023	0.019	0.021	-
22.	Total oil and grease	mg/L	SMEWW 5520B&F:2023	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0
23.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	330	310	360	270	260	270	310	1,000

Note:

- ***QCVN 10:2023/BTNMT*** *- National technical regulation on coastal water quality. Luong Gac, we apply limit value of polluted parameters in coastal.*
- *Symbol (-): unstipulated; (*): Parameter is analyzed by sub-contractor.*
- *Sampling positions:*

	Coordinates	
	X	*Y*
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, September 9th, 2024

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Notes:

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VILAS 406
VIMCERTS 055

No: 15/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Ash pond 2 - Mong Duong 2 BOT Coal Fired Power Plant
Address : Cong Hoa commune – Cam Pha city – Quang Ninh province
Sampling Date : 15/08/2024
Type of Samples : Wastewater
Number of Samples : 02 samples

No.	Parameters	Unit	Analytical methods	Results		QCĐP 3:2020/QN	
				AP-W1	AP-W2	$C_{(Column\ B)}$	C_{max}
1.	Temperature	°C	SMEWW 2550B:2023	32.4	32.1	40	40
2.	pH	-	TCVN 6492:2011	7.5	7.4	5.5 – 9.0	5.5 - 9.0
3.	Color (pH=7)	Pt/Co	TCVN 6185:2015	<5	<5	150	150
4.	TSS	mg/L	TCVN 6625:2000	13	11	100	90
5.	COD	mg/L	SMEWW 5220C:2023	19	9	150	135
6.	BOD_5	mg/L	SMEWW 5220C:2023	9	5	50	45
7.	Arsenic (As)	mg/L	EPA method 200.8	0.0030	<0.0015	0.1	0.09
8.	Mercury(Hg)	mg/L	EPA method 200.8	<0.0005	<0.0005	0.01	0.009
9.	Lead (Pb)	mg/L	EPA method 200.8	<0.002	<0.002	0.5	0.45
10.	Cadmium (Cd)	mg/L	EPA method 200.8	<0.0005	0.0006	0.1	0.09
11.	Chromium III	mg/L	EPA Method 200.8 & SMEWW 3500-Cr.B.2023	0.014	0.014	1	0.9
12.	Chromium VI	mg/L	SMEWW 3500-Cr.B.2023	<0.003	<0.003	0.1	0.09
13.	Copper (Cu)	mg/L	EPA method 200.8	0.002	0.003	2	1.8
14.	Zinc (Zn)	mg/L	EPA method 200.8	<0.005	<0.005	3	2.7
15.	Nikel (Ni)	mg/L	EPA method 200.8	0.017	0.018	0.5	0.45
16.	Manganese (Mn)	mg/L	EPA method 200.8	0.076	0.026	1	0.9
17.	Iron (Fe)	mg/L	EPA method 200.8	1.2	1.2	5	4.5
18.	Total mineral oil & grease	mg/L	SMEWW5520B&F:2023	<1.0	<1.0	10	9
19.	Residue Chlorine	mg/L	TCVN 6225-3:2011	1.7	1.7	2	1.8
20.	Sulfide (as H_2S)	mg/L	SMEWWS^{2-}B&D:2023	<0.03	<0.03	0.5	0.45
21.	Total N	mg/L	TCVN 6638:2000	3.5	3.5	40	36
22.	Total P	mg/L	TCVN 6202:2008	0.10	0.09	6	5.4
23.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2023	0.10	0.09	10	9
24.	Fluoride (F^-)	mg/L	SMEWW 4500-F^- .B&D:2023	6.16	6.69	10	9

Notes:

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No.	Parameters	Unit	Analytical methods	Results		QCĐP 3:2020/QN	
				AP-W1	AP-W2	$C_{(Column\ B)}$	C_{max}
25.	Total Cyanide (CN^-) (*)	mg/L	SMEWW 4500 CN^- C&E:2017	<0.004	<0.004	0.1	0.09
26.	Total Phenol	mg/L	SMEWW 5530 B&C:2023	<0.001	<0.001	0.5	0.45
27.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	330	220	5,000	5,000

Note

- ***QCĐP 3:2020/QN** - Local technical regulation on industrial wastewater in Quang Ninh province; Column B specifies the C value of pollution parameters in industrial wastewater when discharged into water sources not used for domestic water supply purposes, C_{max} is the maximum allowable value of pollution parameters in industrial wastewater when discharging into the receiving water source:*

$$C_{max} = C \times K_q \times K_f \times K_{QN} = C \times 1.0 \times 0.9 \times 1.0 = 0.9 \times C$$

In which:

+ C: Values of pollution parameters in industrial wastewater specified in QCĐP 3:2020/QN

+ K_q: Coefficient of wastewater receiving source corresponding to the flow volume of rivers, streams, canals and ditches, or corresponding to the volume of lakes, ponds, lagoons; the use purpose of the coastal sea area $K_q = 1.0$;

+ K_f: Wastewater flow coefficient corresponding to the total wastewater flow of industrial facilities when discharging into the receiving water source $K_f = 0.9$;

+ K_{QN}: Coefficient of additional application specific to QCĐP 03: 2020/QN for waste sources when discharged into rivers, streams, creeks, canals, lakes and reservoirs with different water use purposes and in different areas. different regions, $K_{QN} = 1.0$

- Symbol (-): unstipulated; (*): Parameter is analyzed by sub-contractor Institute of Science and Technology for Energy & Environment, Vimcerts 079.

- *Sampling position:*

	Coordinates	
AP-W1: Wastewater from AP2 Reservoir	*21°06'40.9"N*	*107°21'19.8"E*
AP-W2: Output of wastewater treatment system – Ash pond 2	*21°06'42.5"N*	*107°21'12.9"E*
	(2335395)	*(458628)*

Ha Noi, September 9th, 2024

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ĐẠI HỌC BÁCH KHOA HÀ NỘI

VIỆN TRƯỞNG

PGS.TS. Nguyễn Thị Ánh Tuyết

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VILAS 406
VIMCERTS 055

No: 16/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Ash pond 2 - Mong Duong 2 BOT Coal Fired Power Plant
Address : Cong Hoa commune – Cam Pha city – Quang Ninh province
Sampling Date : 15/08/2024
Type of Samples : Noise
Number of Samples : 01 sample x 2 times per day (day time and night time)

No.	Sampling positions	Measurement methods	Results			
			6h-21h		21h-6h	
			Leq (dB_A)	Lmax (dB_A)	Leq (dB_A)	Lmax (dB_A)
1.	AP2-N	TCVN 7878-2:2018	58	63	52	55
QCVN 26:2010/BTNMT			**70**	-	**55**	-

Notes:

- *Symbol (-): unstipulated;*
- ***QCVN 26:2010/BTNMT** – National Technical Regulation on noise*
- *Sampling positions*

AP2-N: Wastewater treatment system — *Coordinates* *21° 6'43.23"N (2335415)* *107°21'15.47"E (458700)*

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VILAS 406
VIMCERTS 055

No: 17/27/KQQT/2024-EN

ENVIRONMENTAL MONITORING RESULTS

Sampling Site : Housing Colony – Mong Duong 2 BOT Coal Fired Power Plant
Address : Mong Duong ward – Cam Pha city – Quang Ninh province
Sampling Date : 15/08/2024
Type of Samples : Domestic wastewater
Number of Samples : 02 samples

No.	Parameters	Unit	Analytical methods	Result		QCVN 14: 2008/BTNMT	
				HS-NT1	HS-NT2	C (Column B)	C_{max}
1.	Temperature	°C	SMEWW 2550B:2023	30.5	31.6	-	-
2.	pH	-	TCVN 6492:2011	7.8	7.3	5.0– 9.0	5.0– 9.0
3.	TDS	mg/L	SOP-TDS	358	315	1,000	1,000
4.	TSS	mg/L	TCVN 6625:2000	17	10	100	100
5.	BOD_5	mg/L	SMEWW 5210B:2023	48	7	50	50
6.	Sulfide (as H_2S)	mg/L	SMEWW 4500S2-.B&D:2023	<0.03	<0.03	4.0	4.0
7.	Ammonium (NH_4^+)	mg/L	SMEWW 4500 NH_3.B&F:2023	5.65	0.7	10	10
8.	Nitrate (NO_3^--N)	mg/L	SMEWW 4500 NO_3^-E:2023	<0.06	6.85	50	50
9.	Phosphate (PO_4^{3-}-P)	mg/L	TCVN 6202:2008	7.2	1.66	10	10
10.	Surfactant (*)	mg/L	SMEWW 5540B&C:2017	<0.015	<0.015	10	10
11.	Animal Oil & Grease	mg/L	SMEWW 5520B&F:2023	<1.0	<1.0	20	20
12.	Coliform	MPN/ 100mL	SMEWW 9221B:2023	630	270	5,000	5,000

Note:

*- **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: $C_{max} = C \times K = C$*

+ K coefficient =1.0 corresponding to condominiums and residential areas which have 50 apartments and more

- Symbol (-): unstipulated; (*): Parameter is analyzed by sub-contractor.

- Sampling positions:	Coordinates	
HS-NT1: Domestic wastewater at collection tank before treatment	21°04'16.2''N	107°20'01.1''E
HS-NT2: Domestic wastewater after treatment system	21°04'16.2''N	107°20'01.2''E
	(2330894)	(456546)

Ha Noi, September 9th, 2024

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VIỆN TRƯỞNG

PGS.TS. Nguyễn Thị Ánh Tuyết

Ghi chú:

1. *Kết quả này chỉ có giá trị đối với mẫu tại thời điểm quan trắc.*
2. *Thông tin về mẫu (loại mẫu, vị trí lấy mẫu, đặc điểm mẫu...) do khách hàng cung cấp và chịu trách nhiệm*
3. *Mẫu sẽ được hủy bỏ sau 5 ngày kể từ khi kết quả phân tích được ban hành nếu khách hàng không có yêu cầu khác*
4. *Không được trích sao một phần phiếu kết quả phân tích nếu không được sự đồng ý bằng văn bản của Viện KH & CNMT*