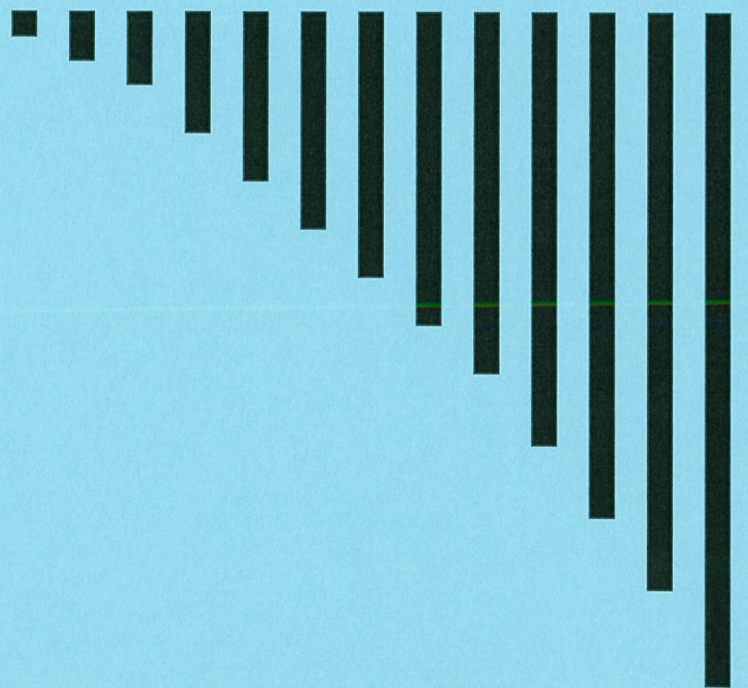


ภาคผนวก

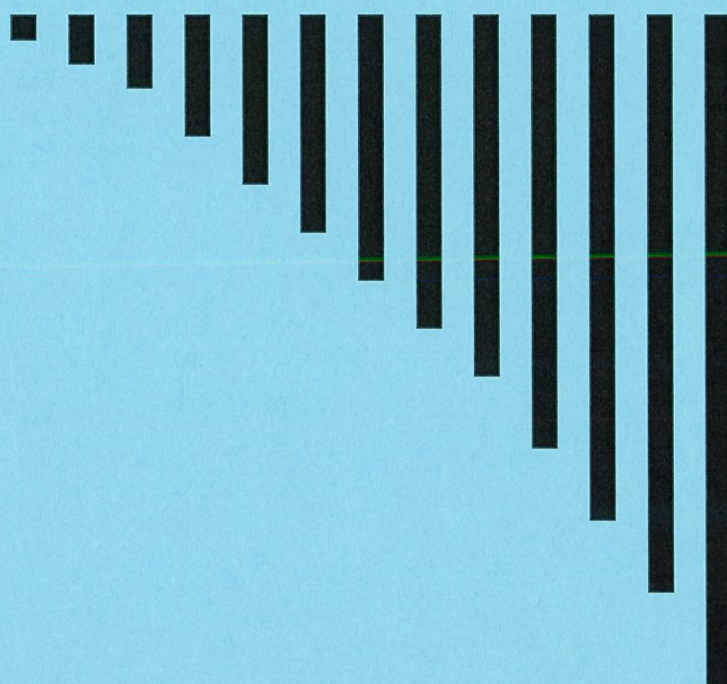






ภาคผนวก ก

หนังสือรับรองผลการตรวจวิเคราะห์





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หน้าจากกระบวนการผลิต

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Report No. : 2023-5007608 / 001-1 (Page 1 of 1)

Issued date : August 23, 2023

CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED  
CONTACT :  
ADDRESS :

## Analysis Report

SAMPLE DESIGNATED AS : Produced Water Analysis  
SAMPLING LOCATION : Water Injection Pump on MOPU  
(Wassana Field)

SAMPLING DATE : August 2, 2023  
SAMPLING BY : Client

Parameter	Unit	LOQ	Result
<b>Total Petroleum Hydrocarbon (TPH)</b>			
- C6 - C9	mg/L	0.05	0.67
- C10 - C19	mg/L	0.05	142.53
- C20 - C36	mg/L	0.002	91.150
<b>Heavy Metals</b>			
- Arsenic (As)	mg/L	0.01	1.37
- Mercury (Hg)	mg/L	0.0005	0.0451

Remarks : - Analysis Method is based on Standard Methods for the Examination of Water and Wastewater part 3120 B for Arsenic, recommended by APHA-AWWA-WEF.  
- Analysis Method is based on USEPA 245.1 revision 3.0 for Mercury and USEPA 8015 D for Total Petroleum Hydrocarbons.  
- LOQ: Limit of Quantitation

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TY/Client/PJ/PJ

WARNING: The sample(s) to which the findings recorded herein (the findings) relate was(were) drawn and/or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability regarding the origin or source from which the sample(s) is/are said to be extracted.

Technical Manager

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t +66 (0)2 678 18 13 f +66 (0)2 678 06 22 www.sgs.com

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**Report No. : 2023-5007085 / 001-1 (Page 1 of 1)**

**Issued date : July 14, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS : Seawater Quality Analysis**

**SAMPLING DATE : June 5, 2023**

**SAMPLING METHOD : Grab Sampling**

**SAMPLING TIME : 07:15-09:13 hrs.**

**SAMPLING LOCATION : Station 5 (Northwest of MOPU at 500 m)**

**SAMPLING BY :**

**COORDINATE (WGS84) : 07° 56' 58.75" N, 101° 22' 48.79" E**

**DEPTH : 50 m**

Parameters	Units	LOQ	Results				Standard*
			1 m below surface	20 m below surface	40 m below surface	1 m above bottom	
Color	°C	-	1 (Blue)				1/
Floatable Solids	-	-	invisible	invisible	invisible	invisible	Not objectionable
pH	-	-	8.19	8.18	8.14	8.12	7.0-8.5
Transparency	m.	-	20.0				$\Delta \leq 10\%$ 2/
Odor	-	-	None	None	None	None	Not objectionable 3/
Dissolved Oxygen (DO)	mg/l	-	6.21	6.15	5.84	5.36	$\geq 4$
Suspended Solids (SS)	mg/l	2.5	<2.5	<2.5	<2.5	<2.5	5/
Salinity	PSU	-	32.2	32.3	32.7	33.1	$\Delta \leq 10\%$ 6/
Conductivity	mS/cm	-	49.3	49.4	49.9	50.5	-
Oil & Grease	mg/l	1.0	<1.0	<1.0	<1.0	<1.0	Not visible to naked eyes
Temperature	-	-	30.6	30.3	29.9	29.7	$\Delta \leq 1^{\circ}$ 4/
Turbidity	NTU	-	0.74	0.27	0.79	0.92	-
Total Petroleum Hydrocarbon (TPH)	µg/l	0.05	0.21	0.19	0.23	0.19	$\leq 0.5$
Arsenic (As)	µg/l	1.00	3.34	3.35	3.34	3.25	$\leq 10$
Barium (Ba)	µg/l	2.0	8.1	8.0	7.8	7.6	-
Cadmium (Cd)	µg/l	0.10	<0.10	<0.10	<0.10	<0.10	$\leq 5$
Total Chromium (Cr)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Copper (Cu)	µg/l	0.4	<0.4	<0.4	<0.4	<0.4	$\leq 8$
Iron (Fe)	µg/l	2.0	9.9	9.7	9.5	9.4	$\leq 300$
Lead (Pb)	µg/l	0.20	<0.20	<0.20	<0.20	<0.20	$\leq 8.5$
Manganese (Mn)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Total Mercury (Hg)	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	$\leq 0.1$
Nickel (Ni)	µg/l	0.150	<0.150	<0.150	<0.150	<0.150	-
Zinc (Zn)	µg/l	4.0	<4.0	<4.0	<4.0	<4.0	$\leq 50$

**Remarks :** - Analysis Methods followed Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.

- LOQ: Limit of Quantitation

1/ The color of marine water measured in scale of the Forel-Ule solution, ranging from 1 to 22.

2/ The decrease of transparency from natural condition should not exceed 10% of the minimum transparency.

3/ No offensive smell from sources, such as crude oil, "rotten egg", chemicals, litter and decaying organic matters.

4/ The results should not increase more than 1°C from the natural temperature

5/ The results should not increase more than the average value within 1 day, 1 month or 1 year added by its corresponding deviation value.

6/ The results should not be changed exceed 10% of the minimum salinity.

**Source :** \* The Marine Water Quality Standards for natural resource preservation, prescribed by Notification of the National Environment Board, B.E. 2564 (2021)



Technical Manager

TY/CG/SV/SV

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SGS (Thailand) Limited

Environment, Health and Safety 100 Nanglinchee Road Chongnonsee Yannawa Bangkok 10120  
t +66 (0)2 678 18 13 f +66 (0)2 678 06 22 www.sgs.com



**Report No. : 2023-5007085 / 001-2 (Page 1 of 1)**

**Issued date : July 14, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS : Seawater Quality Analysis**

**SAMPLING DATE : June 5, 2023**

**SAMPLING METHOD : Grab Sampling**

**SAMPLING TIME : 10:00-11:15 hrs.**

**SAMPLING LOCATION : Station 6 (Southeast of MOPU at 500 m)**

**SAMPLING BY :**

**COORDINATE (WGS84) : 07° 56' 33.67" N, 101° 23' 9.56" E**

**DEPTH : 50 m**

Parameters	Units	LOQ	Results				Standard*
			1 m below surface	20 m below surface	40 m below surface	1 m above bottom	
Color	°C	-	1 (Blue)				- <sup>1/</sup>
Floatable Solids	-	-	invisible	invisible	invisible	invisible	Not objectionable
pH	-	-	8.21	8.22	8.14	8.11	7.0-8.5
Transparency	m.	-	18.0				$\Delta \leq 10\%$ <sup>2/</sup>
Odor	-	-	None	None	None	None	Not objectionable <sup>3/</sup>
Dissolved Oxygen (DO)	mg/l	-	6.19	6.17	5.70	5.29	$\geq 4$
Suspended Solids (SS)	mg/l	2.5	<2.5	<2.5	<2.5	<2.5	- <sup>5/</sup>
Salinity	PSU	-	32.3	32.5	32.8	33.0	$\Delta \leq 10\%$ <sup>6/</sup>
Conductivity	mS/cm	-	49.4	49.7	50.1	50.4	-
Oil & Grease	mg/l	1.0	<1.0	<1.0	<1.0	<1.0	Not visible to naked eyes
Temperature	-	-	30.5	30.4	29.8	29.5	$\Delta \leq 1$ <sup>4/</sup>
Turbidity	NTU	-	0.92	0.52	0.58	0.86	-
Total Petroleum Hydrocarbon (TPH)	µg/l	0.05	0.19	0.22	0.25	0.21	$\leq 0.5$
Arsenic (As)	µg/l	1.00	3.36	3.34	3.27	3.27	$\leq 10$
Barium (Ba)	µg/l	2.0	8.2	8.1	7.9	7.7	-
Cadmium (Cd)	µg/l	0.10	<0.10	<0.10	<0.10	<0.10	$\leq 5$
Total Chromium (Cr)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Copper (Cu)	µg/l	0.4	<0.4	<0.4	<0.4	<0.4	$\leq 8$
Iron (Fe)	µg/l	2.0	9.9	9.8	9.6	9.5	$\leq 300$
Lead (Pb)	µg/l	0.20	<0.20	<0.20	<0.20	<0.20	$\leq 8.5$
Manganese (Mn)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Total Mercury (Hg)	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	$\leq 0.1$
Nickel (Ni)	µg/l	0.150	<0.150	<0.150	<0.150	<0.150	-
Zinc (Zn)	µg/l	4.0	<4.0	<4.0	<4.0	<4.0	$\leq 50$

**Remarks :** - Analysis Methods followed Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.

- LOQ: Limit of Quantitation

<sup>1/</sup> The color of marine water measured in scale of the Forel-Ule solution, ranging from 1 to 22.

<sup>2/</sup> The decrease of transparency from natural condition should not exceed 10% of the minimum transparency.

<sup>3/</sup> No offensive smell from sources, such as crude oil, "rotten egg", chemicals, litter and decaying organic matters.

<sup>4/</sup> The results should not increase more than 1°C from the natural temperature

<sup>5/</sup> The results should not increase more than the average value within 1 day, 1 month or 1 year added by its corresponding deviation value.

<sup>6/</sup> The results should not be changed exceed 10% of the minimum salinity.

**Source :** \* The Marine Water Quality Standards for natural resource preservation, prescribed by Notification of the National Environment Board, B.E. 2564 (2021)



Technical Manager

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SGS (Thailand) Limited

Environment, Health and Safety 100 Nanglinchee Road Chongnonsee Yannawa Bangkok 10120  
t +66 (0)2 678 18 13 f +66 (0)2 678 06 22 www.sgs.com



**Report No. : 2023-5007085 / 001-3 (Page 1 of 1)**

**Issued date :** July 14, 2023

**CLIENT :** VALEURA ENERGY (GULF OF THAILAND) LIMITED

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seawater Quality Analysis

**SAMPLING DATE :** June 4, 2023

**SAMPLING METHOD :** Grab Sampling

**SAMPLING TIME :** 14:30-16:45 hrs.

**SAMPLING LOCATION :** Station F1 (Northwest of FSO at 500 m)

**SAMPLING BY :**

**COORDINATE (WGS84) :** 07° 56' 57.93" N, 101° 23' 52.01" E

**DEPTH :** 50 m

Parameters	Units	LOQ	Results				Standard*
			1 m below surface	20 m below surface	40 m below surface	1 m above bottom	
Color	°C	-	1 (Blue)				1/
Floatable Solids	-	-	invisible	invisible	invisible	invisible	Not objectionable
pH	-	-	8.21	8.20	8.17	8.14	7.0-8.5
Transparency	m.	-	15.0				$\Delta \leq 10\%$ 2/
Odor	-	-	None	None	None	None	Not objectionable 3/
Dissolved Oxygen (DO)	mg/l	-	6.12	5.91	5.75	5.31	$\geq 4$
Suspended Solids (SS)	mg/l	2.5	<2.5	<2.5	<2.5	<2.5	5/
Salinity	PSU	-	32.2	32.4	32.7	33.0	$\Delta \leq 10\%$ 6/
Conductivity	mS/cm	-	49.3	49.5	49.9	50.4	-
Oil & Grease	mg/l	1.0	<1.0	<1.0	<1.0	<1.0	Not visible to naked eyes
Temperature	-	-	30.5	30.4	29.8	29.4	$\Delta \leq 1$ 4/
Turbidity	NTU	-	0.62	0.61	0.73	1.57	-
Total Petroleum Hydrocarbon (TPH)	µg/l	0.05	0.25	0.21	0.19	0.23	$\leq 0.5$
Arsenic (As)	µg/l	1.00	3.36	3.35	3.31	3.30	$\leq 10$
Barium (Ba)	µg/l	2.0	8.4	8.2	8.1	7.9	-
Cadmium (Cd)	µg/l	0.10	<0.10	<0.10	<0.10	<0.10	$\leq 5$
Total Chromium (Cr)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Copper (Cu)	µg/l	0.4	<0.4	<0.4	<0.4	<0.4	$\leq 8$
Iron (Fe)	µg/l	2.0	9.8	9.8	9.7	9.6	$\leq 300$
Lead (Pb)	µg/l	0.20	<0.20	<0.20	<0.20	<0.20	$\leq 8.5$
Manganese (Mn)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Total Mercury (Hg)	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	$\leq 0.1$
Nickel (Ni)	µg/l	0.150	<0.150	<0.150	<0.150	<0.150	-
Zinc (Zn)	µg/l	4.0	<4.0	<4.0	<4.0	<4.0	$\leq 50$

**Remarks :**

- Analysis Methods followed Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.
- LOQ: Limit of Quantitation

1/ The color of marine water measured in scale of the Forel-Ule solution, ranging from 1 to 22.

2/ The decrease of transparency from natural condition should not exceed 10% of the minimum transparency.

3/ No offensive smell from sources, such as crude oil, "rotten egg", chemicals, litter and decaying organic matters.

4/ The results should not increase more than 1°C from the natural temperature

5/ The results should not increase more than the average value within 1 day, 1 month or 1 year added by its corresponding deviation value.

6/ The results should not be changed exceed 10% of the minimum salinity.

**Source :** \* The Marine Water Quality Standards for natural resource preservation, prescribed by Notification of the National Environment Board, B.E. 2564 (2021)

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Technical Manager

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E 273073



**Report No. : 2023-5007085 / 001-4 (Page 1 of 1)**

**Issued date : July 14, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**



TEL : 02-000-0700

E-mail address : natooe@valeuraenergy.com

## Analysis Report

**SAMPLE DESIGNATED AS : Seawater Quality Analysis**

**SAMPLING DATE : June 4, 2023**

**SAMPLING METHOD : Grab Sampling**

**SAMPLING TIME : 09:40-14:00 hrs.**

**SAMPLING LOCATION : Station F2 (Southeast of FSO at 500 m)**

**SAMPLING BY :**

**COORDINATE (WGS84) : 07° 56' 33.25" N, 101° 24' 13.28" E**

**DEPTH : 50 m**

Parameters	Units	LOQ	Results				Standard*
			1 m below surface	20 m below surface	40 m below surface	1 m above bottom	
Color	°C	-	1 (Blue)				1 <sup>1/</sup>
Floatable Solids	-	-	invisible	invisible	invisible	invisible	Not objectionable
pH	-	-	8.18	8.16	8.13	8.10	7.0-8.5
Transparency	m.	-	20.0				$\Delta \leq 10\%$ <sup>2/</sup>
Odor	-	-	None	None	None	None	Not objectionable <sup>3/</sup>
Dissolved Oxygen (DO)	mg/l	-	6.18	6.10	5.70	5.43	$\geq 4$
Suspended Solids (SS)	mg/l	2.5	<2.5	<2.5	<2.5	<2.5	5 <sup>5/</sup>
Salinity	PSU	-	32.3	32.4	32.8	33.1	$\Delta \leq 10\%$ <sup>6/</sup>
Conductivity	mS/cm	-	49.4	49.5	50.2	50.5	-
Oil & Grease	mg/l	1.0	<1.0	<1.0	<1.0	<1.0	Not visible to naked eyes
Temperature	-	-	30.5	30.3	29.9	29.6	$\Delta \leq 1$ <sup>4/</sup>
Turbidity	NTU	-	0.61	0.62	0.62	0.81	-
Total Petroleum Hydrocarbon (TPH)	µg/l	0.05	0.20	0.21	0.18	0.18	$\leq 0.5$
Arsenic (As)	µg/l	1.00	3.35	3.35	3.33	3.32	$\leq 10$
Barium (Ba)	µg/l	2.0	8.4	8.2	7.9	7.8	-
Cadmium (Cd)	µg/l	0.10	<0.10	<0.10	<0.10	<0.10	$\leq 5$
Total Chromium (Cr)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Copper (Cu)	µg/l	0.4	<0.4	<0.4	<0.4	<0.4	$\leq 8$
Iron (Fe)	µg/l	2.0	9.9	9.9	9.8	9.7	$\leq 300$
Lead (Pb)	µg/l	0.20	<0.20	<0.20	<0.20	<0.20	$\leq 8.5$
Manganese (Mn)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Total Mercury (Hg)	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	$\leq 0.1$
Nickel (Ni)	µg/l	0.150	<0.150	<0.150	<0.150	<0.150	-
Zinc (Zn)	µg/l	4.0	<4.0	<4.0	<4.0	<4.0	$\leq 50$

**Remarks :** - Analysis Methods followed Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.

- LOQ: Limit of Quantitation

<sup>1/</sup> The color of marine water measured in scale of the Forel-Ule solution, ranging from 1 to 22.

<sup>2/</sup> The decrease of transparency from natural condition should not exceed 10% of the minimum transparency.

<sup>3/</sup> No offensive smell from sources, such as crude oil, "rotten egg", chemicals, litter and decaying organic matters.

<sup>4/</sup> The results should not increase more than 1°C from the natural temperature

<sup>5/</sup> The results should not increase more than the average value within 1 day, 1 month or 1 year added by its corresponding deviation value.

<sup>6/</sup> The results should not be changed exceed 10% of the minimum salinity.

**Source :** \* The Marine Water Quality Standards for natural resource preservation, prescribed by Notification of the National Environment Board, B.E. 2564 (2021)



Technical Manager

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E 273074



**Report No. : 2023-5007085 / 001-5 (Page 1 of 1)**

**Issued date : July 14, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS : Seawater Quality Analysis**

**SAMPLING DATE : June 6, 2023**

**SAMPLING METHOD : Grab Sampling**

**SAMPLING TIME : 08:35-14:00 hrs.**

**SAMPLING LOCATION : Reference Station**

**SAMPLING BY :**

**COORDINATE (WGS84) : 08° 01' 22.1" N, 101° 11' 46.1" E**

**DEPTH : 50 m**

Parameters	Units	LOQ	Results				Standard*
			1 m below surface	20 m below surface	40 m below surface	1 m above bottom	
Color	°C	-	1 (Blue)				- <sup>1/</sup>
Floatable Solids	-	-	invisible	invisible	invisible	invisible	Not objectionable
pH	-	-	8.21	8.17	8.13	8.10	7.0-8.5
Transparency	m.	-	17.0				$\Delta \leq 10\%$ <sup>2/</sup>
Odor	-	-	None	None	None	None	Not objectionable <sup>3/</sup>
Dissolved Oxygen (DO)	mg/l	-	6.23	6.18	5.66	5.30	$\geq 4$
Suspended Solids (SS)	mg/l	2.5	<2.5	<2.5	<2.5	<2.5	- <sup>5/</sup>
Salinity	PSU	-	32.3	32.4	32.8	33.1	$\Delta \leq 10\%$ <sup>6/</sup>
Conductivity	mS/cm	-	49.3	49.5	50.1	50.4	-
Oil & Grease	mg/l	1.0	<1.0	<1.0	<1.0	<1.0	Not visible to naked eyes
Temperature	-	-	30.4	30.2	29.9	29.5	$\Delta \leq 1$ <sup>4/</sup>
Turbidity	NTU	-	0.92	0.58	0.42	1.14	-
Total Petroleum Hydrocarbon (TPH)	µg/l	0.05	0.26	0.25	0.25	0.21	$\leq 0.5$
Arsenic (As)	µg/l	1.00	3.35	3.33	3.34	3.30	$\leq 10$
Barium (Ba)	µg/l	2.0	8.3	8.2	7.9	7.8	-
Cadmium (Cd)	µg/l	0.10	<0.10	<0.10	<0.10	<0.10	$\leq 5$
Total Chromium (Cr)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Copper (Cu)	µg/l	0.4	<0.4	<0.4	<0.4	<0.4	$\leq 8$
Iron (Fe)	µg/l	2.0	9.9	9.9	9.7	9.7	$\leq 300$
Lead (Pb)	µg/l	0.20	<0.20	<0.20	<0.20	<0.20	$\leq 8.5$
Manganese (Mn)	µg/l	2.0	<2.0	<2.0	<2.0	<2.0	$\leq 100$
Total Mercury (Hg)	µg/l	0.05	<0.05	<0.05	<0.05	<0.05	$\leq 0.1$
Nickel (Ni)	µg/l	0.150	<0.150	<0.150	<0.150	<0.150	-
Zinc (Zn)	µg/l	4.0	<4.0	<4.0	<4.0	<4.0	$\leq 50$

**Remarks :** - Analysis Methods followed Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.

- LOQ: Limit of Quantitation

<sup>1/</sup> The color of marine water measured in scale of the Forel-Ule solution, ranging from 1 to 22.

<sup>2/</sup> The decrease of transparency from natural condition should not exceed 10% of the minimum transparency.

<sup>3/</sup> No offensive smell from sources, such as crude oil, "rotten egg", chemicals, litter and decaying organic matters.

<sup>4/</sup> The results should not increase more than 1°C from the natural temperature

<sup>5/</sup> The results should not increase more than the average value within 1 day, 1 month or 1 year added by its corresponding deviation value.

<sup>6/</sup> The results should not be changed exceed 10% of the minimum salinity.

**Source :** \* The Marine Water Quality Standards for natural resource preservation, prescribed by Notification of the National Environment Board, B.E. 2564 (2021)

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คุณภาพตะกอนพื้นท้องทะเล

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**Report No. : 2023-5007085 / 002-1 (Page 1 of 2)**

**Issued date : July 7, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

Tel : 02-500-0700

E-mail address : nattee@valeuraenergy.com

## Analysis Report

**SAMPLE DESIGNATED AS** : Seabed Sediment  
**SAMPLING METHOD** : Grab Sampling (Van Veen Grab)  
**SAMPLING LOCATION** : Station 1 (Northwest of MOPU about 100 m)  
**COORDINATE (WGS84)** : 07° 56' 49.86" N, 101° 22' 55.76" E

**SAMPLING DATE** : June 5, 2023  
**SAMPLING TIME** : 14:40-15:05 hrs.  
**SAMPLING BY** :

Parameters	Units	LOQ	Results	Guidelines*		Standard**
				ERL	ERM	PCD
Total Petroleum Hydrocarbon (TPH)						
C6 - C9	mg/kg dry wt.	5.0	<5.0	-	-	-
C10 - C19	mg/kg dry wt.	5.0	<5.0	-	-	-
C20 - C36	mg/kg dry wt.	20.0	<20.0	-	-	-
Heavy Metals						
Arsenic (As)	mg/kg dry wt.	1.0	2.9	8.2	70	7
Barium (Ba)	mg/kg dry wt.	2.0	830.3	-	-	-
Cadmium (Cd)	mg/kg dry wt.	1.0	<1	1.2	9.6	2
Total Chromium (Cr)	mg/kg dry wt.	2.0	13.9	81	370	42
Copper (Cu)	mg/kg dry wt.	2.0	5.0	34	270	25
Total Mercury (Hg)	mg/kg dry wt.	0.1	0.2	0.15	0.71	0.4
Nickel (Ni)	mg/kg dry wt.	2.0	10.0	20.9	51.6	-
Lead (Pb)	mg/kg dry wt.	5.0	7.2	46.7	218	52
Zinc (Zn)	mg/kg dry wt.	2.0	17.1	150	410	102

**Remarks :** - Analysis method for Total Petroleum Hydrocarbon followed U.S. EPA Method 8015D, and BTEXs followed U.S. EPA Method 8260, 5035  
 - Analysis method for Heavy Metals followed U.S. EPA Method 3050B  
 - LOQ: Limit of Quantitation ERL: Effects Range-Low ERM: Effects Range-Median

**Source :** \* Guidelines presented in Final Report of Proposed Marine and Coastal Sediment Quality Guidelines (Pollution Control Department, 2006)  
 \*\* Notification of Pollution Control Department, subjected "Coastal Sediment Quality Guideline", dated October 9, B.E. 2558 (2015)

(Thepsan Yommana)  
 Technical Manager

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**Report No. : 2023-5007085 / 002-2 (Page 1 of 2)**

**Issued date : July 7, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

energy.com

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab Sampling (Van Veen Grab)  
**SAMPLING LOCATION :** Station 2 (Northeast of MOPU about 100 m)  
**COORDINATE (WGS84) :** 07° 56' 50.06" N, 101° 23' 2.49" E

**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 15:10-15:35 hrs.  
**SAMPLING BY :**

Parameters	Units	LOQ	Results	Guidelines*		Standard**
				ERL	ERM	PCD
Total Petroleum Hydrocarbon (TPH)						
C6 - C9	mg/kg dry wt.	5	<5.0	-	-	-
C10 - C19	mg/kg dry wt.	5	<5.0	-	-	-
C20 - C36	mg/kg dry wt.	20	<20.0	-	-	-
Heavy Metals						
Arsenic (As)	mg/kg dry wt.	1	3.0	8.2	70	7
Barium (Ba)	mg/kg dry wt.	2	441.7	-	-	-
Cadmium (Cd)	mg/kg dry wt.	1	<1	1.2	9.6	2
Total Chromium (Cr)	mg/kg dry wt.	2	12.7	81	370	42
Copper (Cu)	mg/kg dry wt.	2	4.5	34	270	25
Total Mercury (Hg)	mg/kg dry wt.	0.1	0.1	0.15	0.71	0.4
Nickel (Ni)	mg/kg dry wt.	2	8.9	20.9	51.6	-
Lead (Pb)	mg/kg dry wt.	5	8.4	46.7	218	52
Zinc (Zn)	mg/kg dry wt.	2	13.4	150	410	102

**Remarks :** - Analysis method for Total Petroleum Hydrocarbon followed U.S. EPA Method 8015D, and BTEXs followed U.S. EPA Method 8260, 5035  
 - Analysis method for Heavy Metals followed U.S. EPA Method 3050B  
 - LOQ: Limit of Quantitation ERL: Effects Range-Low ERM: Effects Range-Median

**Source :** \* Guidelines presented in Final Report of Proposed Marine and Coastal Sediment Quality Guidelines (Pollution Control Department, 2006)  
 \*\* Notification of Pollution Control Department, subjected "Coastal Sediment Quality Guideline", dated October 9, B.E. 2558 (2015)

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**Report No. : 2023-5007085 / 002-3 (Page 1 of 2)**

**Issued date : July 7, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab Sampling (Van Veen Grab)  
**SAMPLING LOCATION :** Station 3 (Southeast of MOPU about 100 m)  
**COORDINATE (WGS84) :** 07° 56' 42.09" N, 101° 23' 2.31" E

**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 15:45-16:15 hrs.  
**SAMPLING BY :**

Parameters	Units	LOQ	Results	Guidelines*		Standard**
				ERL	ERM	PCD
Total Petroleum Hydrocarbon (TPH)						
C6 - C9	mg/kg dry wt.	5	<5.0	-	-	-
C10 - C19	mg/kg dry wt.	5	<5.0	-	-	-
C20 - C36	mg/kg dry wt.	20	<20.0	-	-	-
Heavy Metals						
Arsenic (As)	mg/kg dry wt.	1	2.2	8.2	70	7
Barium (Ba)	mg/kg dry wt.	2	352.9	-	-	-
Cadmium (Cd)	mg/kg dry wt.	1	<1	1.2	9.6	2
Total Chromium (Cr)	mg/kg dry wt.	2	13.6	81	370	42
Copper (Cu)	mg/kg dry wt.	2	4.0	34	270	25
Total Mercury (Hg)	mg/kg dry wt.	0.1	0.2	0.15	0.71	0.4
Nickel (Ni)	mg/kg dry wt.	2	9.5	20.9	51.6	-
Lead (Pb)	mg/kg dry wt.	5	6.3	46.7	218	52
Zinc (Zn)	mg/kg dry wt.	2	14.4	150	410	102

**Remarks :** - Analysis method for Total Petroleum Hydrocarbon followed U.S. EPA Method 8015D, and BTEXs followed U.S. EPA Method 8260, 5035  
 - Analysis method for Heavy Metals followed U.S. EPA Method 3050B  
 - LOQ: Limit of Quantitation ERL: Effects Range-Low ERM: Effects Range-Median

**Source :** \* Guidelines presented in Final Report of Proposed Marine and Coastal Sediment Quality Guidelines (Pollution Control Department, 2006)  
 \*\* Notification of Pollution Control Department, subjected "Coastal Sediment Quality Guideline", dated October 9, B.E. 2558 (2015)



Technical Manager

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**Report No. : 2023-5007085 / 002-4 (Page 1 of 2)**

**Issued date : July 7, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab Sampling (Van Veen Grab)  
**SAMPLING LOCATION :** Station 4 (Southwest of MOPU about 100 m)  
**COORDINATE (WGS84) :** 07° 56' 42.92" N, 101° 22' 55.82" E

**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 16:14-16:55 hrs.  
**SAMPLING BY :**

Parameters	Units	LOQ	Results	Guidelines*		Standard**
				ERL	ERM	PCD
Total Petroleum Hydrocarbon (TPH)						
C6 - C9	mg/kg dry wt.	5	<5.0	-	-	-
C10 - C19	mg/kg dry wt.	5	<5.0	-	-	-
C20 - C36	mg/kg dry wt.	20	<20.0	-	-	-
Heavy Metals						
Arsenic (As)	mg/kg dry wt.	1	2.7	8.2	70	7
Barium (Ba)	mg/kg dry wt.	2	53.8	-	-	-
Cadmium (Cd)	mg/kg dry wt.	1	<1	1.2	9.6	2
Total Chromium (Cr)	mg/kg dry wt.	2	12.5	81	370	42
Copper (Cu)	mg/kg dry wt.	2	3.9	34	270	25
Total Mercury (Hg)	mg/kg dry wt.	0.1	<0.1	0.15	0.71	0.4
Nickel (Ni)	mg/kg dry wt.	2	9.0	20.9	51.6	-
Lead (Pb)	mg/kg dry wt.	5	6.6	46.7	218	52
Zinc (Zn)	mg/kg dry wt.	2	12.4	150	410	102

**Remarks :** - Analysis method for Total Petroleum Hydrocarbon followed U.S. EPA Method 8015D, and BTEXs followed U.S. EPA Method 8260, 5035  
 - Analysis method for Heavy Metals followed U.S. EPA Method 3050B  
 - LOQ: Limit of Quantitation ERL: Effects Range-Low ERM: Effects Range-Median

**Source :** \* Guidelines presented in Final Report of Proposed Marine and Coastal Sediment Quality Guidelines (Pollution Control Department, 2006)  
 \*\* Notification of Pollution Control Department, subjected "Coastal Sediment Quality Guideline", dated October 9, B.E. 2558 (2015)

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**Report No. : 2023-5007085 / 002-5 (Page 1 of 2)**

**Issued date : July 7, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab Sampling (Van Veen Grab)  
**SAMPLING LOCATION :** Station F1 (Northwest of FSO at 500 m)  
**COORDINATE (WGS84) :** 07° 56' 57.93" N, 101° 23' 52.01" E

**SAMPLING DATE :** June 4, 2023  
**SAMPLING TIME :** 14:30-16:45 hrs.  
**SAMPLING BY :**

Parameters	Units	LOQ	Results	Guidelines*		Standard**
				ERL	ERM	PCD
Total Petroleum Hydrocarbon (TPH)						
C6 - C9	mg/kg dry wt.	5	<5.0	-	-	-
C10 - C19	mg/kg dry wt.	5	<5.0	-	-	-
C20 - C36	mg/kg dry wt.	20	<20.0	-	-	-
Heavy Metals						
Arsenic (As)	mg/kg dry wt.	1	2.5	8.2	70	7
Barium (Ba)	mg/kg dry wt.	2	10.4	-	-	-
Cadmium (Cd)	mg/kg dry wt.	1	<1	1.2	9.6	2
Total Chromium (Cr)	mg/kg dry wt.	2	12.7	81	370	42
Copper (Cu)	mg/kg dry wt.	2	3.9	34	270	25
Total Mercury (Hg)	mg/kg dry wt.	0.1	0.1	0.15	0.71	0.4
Nickel (Ni)	mg/kg dry wt.	2	9.1	20.9	51.6	-
Lead (Pb)	mg/kg dry wt.	5	7.1	46.7	218	52
Zinc (Zn)	mg/kg dry wt.	2	14.0	150	410	102

**Remarks :** - Analysis method for Total Petroleum Hydrocarbon followed U.S. EPA Method 8015D, and BTEXs followed U.S. EPA Method 8260, 5035  
 - Analysis method for Heavy Metals followed U.S. EPA Method 3050B  
 - LOQ: Limit of Quantitation ERL: Effects Range-Low ERM: Effects Range-Median

**Source :** \* Guidelines presented in Final Report of Proposed Marine and Coastal Sediment Quality Guidelines (Pollution Control Department, 2006)  
 \*\* Notification of Pollution Control Department, subjected "Coastal Sediment Quality Guideline", dated October 9, B.E. 2558 (2015)

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**Report No. : 2023-5007085 / 002-6 (Page 1 of 2)**

**Issued date : July 7, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab Sampling (Van Veen Grab)  
**SAMPLING LOCATION :** Station F2 (Southeast of FSO at 500 m)  
**COORDINATE (WGS84) :** 07° 56' 33.25" N, 101° 24' 13.28" E

**SAMPLING DATE :** June 4, 2023  
**SAMPLING TIME :** 09:40-14:00 hrs.  
**SAMPLING BY :**

Parameters	Units	LOQ	Results	Guidelines*		Standard**
				ERL	ERM	PCD
Total Petroleum Hydrocarbon (TPH)						
C6 - C9	mg/kg dry wt.	5	<5.0	-	-	-
C10 - C19	mg/kg dry wt.	5	<5.0	-	-	-
C20 - C36	mg/kg dry wt.	20	<20.0	-	-	-
Heavy Metals						
Arsenic (As)	mg/kg dry wt.	1	2.6	8.2	70	7
Barium (Ba)	mg/kg dry wt.	2	12.1	-	-	-
Cadmium (Cd)	mg/kg dry wt.	1	<1	1.2	9.6	2
Total Chromium (Cr)	mg/kg dry wt.	2	13.7	81	370	42
Copper (Cu)	mg/kg dry wt.	2	3.5	34	270	25
Total Mercury (Hg)	mg/kg dry wt.	0.1	<0.1	0.15	0.71	0.4
Nickel (Ni)	mg/kg dry wt.	2	10.0	20.9	51.6	-
Lead (Pb)	mg/kg dry wt.	5	7.2	46.7	218	52
Zinc (Zn)	mg/kg dry wt.	2	14.1	150	410	102

**Remarks :** - Analysis method for Total Petroleum Hydrocarbon followed U.S. EPA Method 8015D, and BTEXs followed U.S. EPA Method 8260, 5035  
 - Analysis method for Heavy Metals followed U.S. EPA Method 3050B  
 - LOQ: Limit of Quantitation ERL: Effects Range-Low ERM: Effects Range-Median

**Source :** \* Guidelines presented in Final Report of Proposed Marine and Coastal Sediment Quality Guidelines (Pollution Control Department, 2006)  
 \*\* Notification of Pollution Control Department, subjected "Coastal Sediment Quality Guideline", dated October 9, B.E. 2558 (2015)

Technical Manager



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**Report No. : 2023-5007085 / 002-7 (Page 1 of 2)**

**Issued date : July 7, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**

**CONTACT :**

**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab Sampling (Van Veen Grab)  
**SAMPLING LOCATION :** Reference Station  
**COORDINATE (WGS84) :** 08° 01' 22.1" N, 101° 11' 46.1" E

**SAMPLING DATE :** June 6, 2023  
**SAMPLING TIME :** 08:35-14:00 hrs.  
**SAMPLING BY :**

Parameters	Units	LOQ	Results	Guidelines*		Standard**
				ERL	ERM	PCD
Total Petroleum Hydrocarbon (TPH)						
C6 - C9	mg/kg dry wt.	5	<5.0	-	-	-
C10 - C19	mg/kg dry wt.	5	<5.0	-	-	-
C20 - C36	mg/kg dry wt.	20	<20.0	-	-	-
Heavy Metals						
Arsenic (As)	mg/kg dry wt.	1	2.1	8.2	70	7
Barium (Ba)	mg/kg dry wt.	2	9.3	-	-	-
Cadmium (Cd)	mg/kg dry wt.	1	<1	1.2	9.6	2
Total Chromium (Cr)	mg/kg dry wt.	2	16.9	81	370	42
Copper (Cu)	mg/kg dry wt.	2	5.7	34	270	25
Total Mercury (Hg)	mg/kg dry wt.	0.1	<0.1	0.15	0.71	0.4
Nickel (Ni)	mg/kg dry wt.	2	12.2	20.9	51.6	-
Lead (Pb)	mg/kg dry wt.	5	8.1	46.7	218	52
Zinc (Zn)	mg/kg dry wt.	2	20.0	150	410	102

**Remarks :** - Analysis method for Total Petroleum Hydrocarbon followed U.S. EPA Method 8015D, and BTEXs followed U.S. EPA Method 8260, 5035  
 - Analysis method for Heavy Metals followed U.S. EPA Method 3050B  
 - LOQ: Limit of Quantitation ERL: Effects Range-Low ERM: Effects Range-Median

**Source :** \* Guidelines presented in Final Report of Proposed Marine and Coastal Sediment Quality Guidelines (Pollution Control Department, 2006)  
 \*\* Notification of Pollution Control Department, subjected "Coastal Sediment Quality Guideline", dated October 9, B.E. 2558 (2015)

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**Report No. : 2023-5007085 / 002-1 (Page 1 of 1)**

**Issued date :** August 9, 2023

**CLIENT :** VALEURA ENERGY (GULF OF THAILAND) LIMITED  
**CONTACT :**  
**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab sampling (Van Veen grab)  
**SAMPLING LOCATION :** Station 1 (Northwest of MOPU about 100 m)  
**COORDINATE (WGS 84) :** 7° 56' 49.86" N, 101° 22' 55.76" E

**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 14:40-15:05 hrs.  
**SAMPLING BY :**

Item	Particle Size		Particle Size Distribution (percent by volume, %)
	Range (µm)	Detail	
1	<1	Clay	4.15
2	1-5	Clay to very fine Silty Clay	12.16
3	5-10	Very fine Silt	7.41
4	10-50	Fine to coarse Silt	46.93
5	50-100	Silt to very fine Sand	25.99
6	100-200	Sand	3.37
7	>200	Sand and Gravel	0.00

**Remark :** - Analysis method followed ASTM D422-63 (2007), "Specification for Geotechnical Standard"  
DOI: 10.1520/D0422-63R07 and using the apparatus, Laser, Particle Size Analyzer, Mastersizer-2000,  
MALVERN.

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**Report No. : 2023-5007085 / 002-2 (Page 1 of 1)**

**Issued date :** August 9, 2023

**CLIENT :** VALEURA ENERGY (GULF OF THAILAND) LIMITED  
**CONTACT :**  
**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab sampling (Van Veen grab)  
**SAMPLING LOCATION :** Station 2 (Northeast of MOPU about 100 m)  
**COORDINATE (WGS 84) :** 07° 56' 50.06" N, 101° 23' 2.49" E

**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 15:10-15:35 hrs.  
**SAMPLING BY :**

Item	Particle Size		Particle Size Distribution (percent by volume, %)
	Range (µm)	Detail	
1	<1	Clay	5.06
2	1-5	Clay to very fine Silty Clay	13.03
3	5-10	Very fine Silt	8.17
4	10-50	Fine to coarse Silt	45.32
5	50-100	Silt to very fine Sand	21.71
6	100-200	Sand	3.83
7	>200	Sand and Gravel	2.89

**Remark : -** Analysis method followed ASTM D422-63 (2007), "Specification for Geotechnical Standard" DOI: 10.1520/D0422-63R07 and using the apparatus, Laser, Particle Size Analyzer, Mastersizer-2000, MALVERN.

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**Report No. : 2023-5007085 / 002-3 (Page 1 of 1)**

**Issued date :** August 9, 2023

**CLIENT :** VALEURA ENERGY (GULF OF THAILAND) LIMITED  
**CONTACT :**  
**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab sampling (Van Veen grab)  
**SAMPLING LOCATION :** Station 3 (Southeast of MOPU about 100 m)  
**COORDINATE (WGS 84) :** 07° 56' 42.09" N, 101° 23' 2.31" E

**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 15:45-16:15 hrs.  
**SAMPLING BY :**

Item	Particle Size		Particle Size Distribution (percent by volume, %)
	Range (µm)	Detail	
1	<1	Clay	4.10
2	1-5	Clay to very fine Silty Clay	13.86
3	5-10	Very fine Silt	9.77
4	10-50	Fine to coarse Silt	43.44
5	50-100	Silt to very fine Sand	22.87
6	100-200	Sand	4.70
7	>200	Sand and Gravel	1.26

**Remark :** - Analysis method followed ASTM D422-63 (2007), "Specification for Geotechnical Standard"  
 DOI: 10.1520/D0422-63R07 and using the apparatus, Laser, Particle Size Analyzer, Mastersizer-2000,  
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**Report No. : 2023-5007085 / 002-4 (Page 1 of 1)**

**Issued date :** August 9, 2023

**CLIENT :** VALEURA ENERGY (GULF OF THAILAND) LIMITED  
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**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab sampling (Van Veen grab)  
**SAMPLING LOCATION :** Station 4 (Southwest of MOPU about 100 m)  
**COORDINATE (WGS 84) :** 07° 56' 42.92" N, 101° 22' 55.82" E

**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 16:14-16:55 hrs.  
**SAMPLING BY :** Chakrasumrit Phunthong

Item	Particle Size		Particle Size Distribution (percent by volume, %)
	Range (µm)	Detail	
1	<1	Clay	3.59
2	1-5	Clay to very fine Silty Clay	10.48
3	5-10	Very fine Silt	6.62
4	10-50	Fine to coarse Silt	39.28
5	50-100	Silt to very fine Sand	28.53
6	100-200	Sand	8.16
7	>200	Sand and Gravel	3.33

**Remark :** - Analysis method followed ASTM D422-63 (2007), "Specification for Geotechnical Standard"  
 DOI: 10.1520/D0422-63R07 and using the apparatus, Laser, Particle Size Analyzer, Mastersizer-2000, MALVERN.

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**Report No. : 2023-5007085 / 002-5 (Page 1 of 1)**

**Issued date :** August 9, 2023

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**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab sampling (Van Veen grab)  
**SAMPLING LOCATION :** Station F1 (Northwest of FSO at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 57.93" N, 101° 23' 52.01" E

**SAMPLING DATE :** June 4, 2023  
**SAMPLING TIME :** 14:30-16:45 hrs.  
**SAMPLING BY :** Chalamratt Rattakom

Item	Particle Size		Particle Size Distribution (percent by volume, %)
	Range (µm)	Detail	
1	<1	Clay	4.10
2	1-5	Clay to very fine Silty Clay	11.49
3	5-10	Very fine Silt	6.80
4	10-50	Fine to coarse Silt	40.75
5	50-100	Silt to very fine Sand	26.02
6	100-200	Sand	6.89
7	>200	Sand and Gravel	3.95

**Remark :** - Analysis method followed ASTM D422-63 (2007), "Specification for Geotechnical Standard"  
 DOI: 10.1520/D0422-63R07 and using the apparatus, Laser, Particle Size Analyzer, Mastersizer-2000, MALVERN.

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**Report No. : 2023-5007085 / 002-6 (Page 1 of 1)**

**Issued date :** August 9, 2023

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## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab sampling (Van Veen grab)  
**SAMPLING LOCATION :** Station F2 (Southeast of FSO at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 33.25" N, 101° 24' 13.28" E

**SAMPLING DATE :** June 4, 2023  
**SAMPLING TIME :** 09:40-14:00 hrs.  
**SAMPLING BY :**

Item	Particle Size		Particle Size Distribution (percent by volume, %)
	Range (µm)	Detail	
1	<1	Clay	3.35
2	1-5	Clay to very fine Silty Clay	10.71
3	5-10	Very fine Silt	6.45
4	10-50	Fine to coarse Silt	35.00
5	50-100	Silt to very fine Sand	27.25
6	100-200	Sand	10.74
7	>200	Sand and Gravel	6.50

**Remark :** - Analysis method followed ASTM D422-63 (2007), "Specification for Geotechnical Standard"  
 DOI: 10.1520/D0422-63R07 and using the apparatus, Laser, Particle Size Analyzer, Mastersizer-2000, MALVERN.

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**Report No. : 2023-5007085 / 002-7 (Page 1 of 1)**

**Issued date : August 9, 2023**

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## Analysis Report

**SAMPLE DESIGNATED AS :** Seabed Sediment  
**SAMPLING METHOD :** Grab sampling (Van Veen grab)  
**SAMPLING LOCATION :** Reference Station  
**COORDINATE (WGS 84) :** 08° 01' 22.1" N, 101° 11' 46.1" E

**SAMPLING DATE :** June 6, 2023  
**SAMPLING TIME :** 08:35-14:00 hrs.  
**SAMPLING BY :**

Item	Particle Size		Particle Size Distribution (percent by volume, %)
	Range (µm)	Detail	
1	<1	Clay	4.86
2	1-5	Clay to very fine Silty Clay	20.69
3	5-10	Very fine Silt	14.34
4	10-50	Fine to coarse Silt	51.60
5	50-100	Silt to very fine Sand	8.24
6	100-200	Sand	0.27
7	>200	Sand and Gravel	0.00

**Remark : -** Analysis method followed ASTM D422-63 (2007), "Specification for Geotechnical Standard"  
 DOI: 10.1520/D0422-63R07 and using the apparatus, Laser, Particle Size Analyzer, Mastersizer-2000,  
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**Report No. : 2023-5007085 / 003-1 (page 1 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT :**  
**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Station 5 (Northwest of MOPU at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 58.75" N, 101° 22' 48.79" E  
**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 07:15-09:15 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Cyanophyta</b>				
<b>Class Cyanophyceae (Blue-Green Algae)</b>				
<b>Order Nostocales</b>				
<b>Family Oscillatoriaceae</b>				
<i>Oscillatoria erythraea</i>	332	312	235	139
<i>O. thiebautii</i>	811	619	447	256
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms)</b>				
<b>Suborder Coscinodiscineae</b>				
<b>Family Thalassiosiraceae</b>				
<i>Cyclotella</i> sp.	12	16	-	-
<i>Thalassiosira</i> sp.	166	133	-	-
<i>T. subtilis</i>	208	239	199	117
<b>Family Leptocylindraceae</b>				
<i>Corethron criophilum</i>	-	-	-	-
<i>Leptocylindrus danicus</i>	-	-	-	-
<b>Family Coscinodiscaceae</b>				
<i>C. nodulifera</i>	-	-	-	-
<i>Palmeria hardmaniana</i>	-	-	-	-
<b>Family Hemidiscaceae</b>				
<i>Hemidiscus cuneiformis</i>	-	-	-	-
<b>Family Asterolampraceae</b>				
<i>Asteromphalus imbricatus</i>	-	-	-	-
<b>Suborder Rhizosoleniineae</b>				
<b>Family Rhizosoleniaceae</b>				
<i>Dactyliosolen blavyanus</i>	-	-	-	-
<i>Guinardia striata</i>	27	37	22	18
<i>Proboscia alata</i>	35	49	31	23
<i>Pseudosolenia calcar avis</i>	10	12	-	-
<b>Suborder Biddulphiineae</b>				
<b>Family Hemiaulaceae</b>				
<i>Cerataulina pelagica</i>	-	-	-	-
<i>Hemiaulus hauckii</i>	-	-	-	-
<i>H. indicus</i>	-	-	-	-
<i>H. membranaceus</i>	18	25	15	11
<i>H. sinensis</i>	27	37	22	18

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**Report No. : 2023-5007085 / 003-1 (page 2 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT :**  
**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Station 5 (Northwest of MOPU at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 58.75" N, 101° 22' 48.79" E  
**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 07:15-09:15 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms) (cont'd)</b>				
<b>Suborder Biddulphiineae</b>				
<b>Family Chaetoceraceae</b>				
<i>Bacteriastrum comosum</i>	99	86	79	46
<i>B. elongatum</i>	-	-	-	-
<i>B. hyalinum</i>	-	-	-	-
<i>Chaetoceros affinis</i>	205	202	164	132
<i>C. compressus</i>	136	188	115	86
<i>C. concavicornis</i>	62	86	53	39
<i>C. diadema</i>	-	-	-	-
<i>C. lacinus</i>	101	141	86	66
<i>C. lorenzianus</i>	249	229	210	159
<i>C. peruvianus</i>	12	-	-	7
<b>Family Eupodiscaceae</b>				
<i>Odontella sinensis</i>	-	-	-	-
<b>Order Bacillariales (Pennate Diatoms)</b>				
<b>Suborder Fragilariineae</b>				
<b>Family Thalassionemataceae</b>				
<i>Thalassionema frauenfeldii</i>	57	43	48	36
<i>T. nitzschioides</i>	67	47	28	22
<i>Thalassiothrix longissima</i>	12	16	-	-
<b>Suborder Bacillariineae</b>				
<b>Family Naviculaceae</b>				
<i>Haslea tromphii</i>	22	31	-	-
<b>Family Bacillariaceae</b>				
<i>Nitzschia</i> sp.	-	-	-	-
<b>Family Surirellaceae</b>				
<i>Entomoneis</i> sp.	-	-	-	-
<b>Class Dictyochophyceae (Silicoflagellates)</b>				
<b>Order Dictyochaales</b>				
<b>Family Dictyochophyceae</b>				
<i>Dictyocha fibula</i>	23	-	-	-

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**Report No. : 2023-5007085 / 003-1 (page 3 of 4)**

**Issued date : August 9, 2023**

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**CONTACT :**  
**ADDRESS :**

Tel: 02-509-8700 E-mail address: nattee.s@valeuraenergy.com

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification **SAMPLING DATE :** June 5, 2023  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm). **SAMPLING TIME :** 07:15-09:15 hrs.  
**SAMPLING LOCATION :** Station 5 (Northwest of MOPU at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 58.75" N, 101° 22' 48.79" E **DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta (cont'd)</b>				
<b>Class Dinophyceae (Dinoflagellates)</b>				
<b>Order Prorocentrales</b>				
<b>Family Prorocentraceae</b>				
<i>Prorocentrum compressum</i>	-	-	-	-
<i>P. micans</i>	-	-	-	-
<b>Order Dinophysiales</b>				
<b>Family Amphisoleniaceae</b>				
<i>Amphisolenia bidentata</i>	9	12	10	-
<b>Family Dinophysiaceae</b>				
<i>Phalacroma doryphorum</i>	9	12	-	-
<b>Order Gymnodiniales</b>				
<b>Family Gymnodiniaceae</b>				
<i>Gymnodinium</i> sp.	13	17	10	-
<i>Gyrodinium</i> sp.	-	-	-	-
<b>Order Ptychodiscales</b>				
<b>Family Ptychodiscaceae</b>				
<i>Baechina coerulea</i>	-	-	-	-
<b>Order Gonyaulacales</b>				
<b>Family Ceratiaceae</b>				
<i>Ceratium fusus</i>	52	33	18	15
<i>C. kofoidii</i>	45	34	20	13
<i>C. massiliense</i>	-	-	-	8
<i>C. trichoceros</i>	-	-	-	-
<b>Family GoniDOMACEAE</b>				
<i>Alexandrium</i> sp.	-	-	-	-
<b>Family Gonyaulacaceae</b>				
<i>Gonyaulax</i> sp.	13	19	-	-
<b>Family Pyrophacaceae</b>				
<i>P. vancampoae</i>	-	-	-	-

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**Report No. : 2023-5007085 / 003-1 (page 4 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Station 5 (Northwest of MOPU at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 58.75" N, 101° 22' 48.79" E  
**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 07:15-09:15 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Dinophyceae (Dinoflagellates) (cont'd)</b>				
<b>Order Peridinales</b>				
<b>Family Calciadinellaceae</b>				
<i>Scrippsiella</i> sp.	-	-	-	-
<b>Family Podolampadaceae</b>				
<i>Podolampas bipes</i>	-	-	-	-
<i>P. palmipes</i>	47	17	10	16
<b>Family Protoperidiniaceae</b>				
<i>Protoperidinium stenii</i>	37	12	20	15
<i>P. Thorianum</i>	56	-	-	-
<b>Total Species of Phytoplankton (Species)</b>	<b>31</b>	<b>28</b>	<b>21</b>	<b>21</b>
<b>Total Density of Phytoplankton (Cell/L)</b>	<b>2,972</b>	<b>2,704</b>	<b>1,842</b>	<b>1,242</b>
<b>Species Richness Index<sup>1/</sup></b>	<b>3.75</b>	<b>3.42</b>	<b>2.66</b>	<b>2.81</b>
<b>Biodiversity Index<sup>2/</sup></b>	<b>2.69</b>	<b>2.70</b>	<b>2.46</b>	<b>2.55</b>
<b>Evenness Index<sup>3/</sup></b>	<b>0.78</b>	<b>0.81</b>	<b>0.81</b>	<b>0.84</b>

**Remarks :** <sup>1/</sup> The species richness was calculated by using the Margalef's Index.  
<sup>2/</sup> The biodiversity index was calculated by using the Shannon-Wiener's Index.  
<sup>3/</sup> The evenness index was calculated by using the Pielou's Index.

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SGS (Thailand) Limited | Environment, Health and Safety 100 Nanglinchee Road Chongnonsee Yannawa Bangkok 10120  
t +66 (0)2 678 18 13 f +66 (0)2 678 06 22 www.sgs.com

Member of the SGS Group



**Report No. : 2023-5007085 / 003-2 (page 1 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT :**  
**ADDRESS :**

Tel: 02-509-8700 E-mail address: nattee.s@valeuraenergy.com

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Station 6 (Southeast of MOPU at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 33.67" N, 101° 23' 9.56" E  
**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 10:15-11:15 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Cyanophyta</b>				
<b>Class Cyanophyceae (Blue-Green Algae)</b>				
<b>Order Nostocales</b>				
<b>Family Oscillatoriaceae</b>				
<i>Oscillatoria erythraea</i>	270	164	95	88
<i>O. thiebautii</i>	779	726	671	623
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms)</b>				
<b>Suborder Coscinodiscineae</b>				
<b>Family Thalassiosiraceae</b>				
<i>Cyclotella</i> sp.	-	-	-	41
<i>Thalassiosira</i> sp.	23	35	21	-
<i>T. subtilis</i>	-	-	-	-
<b>Family Leptocylindraceae</b>				
<i>Corethron criophilum</i>	113	23	-	-
<i>Leptocylindrus danicus</i>	-	-	-	-
<b>Family Coscinodiscaceae</b>				
<i>C. nodulifera</i>	127	107	-	53
<i>Palmeria hardmaniana</i>	-	-	-	-
<b>Family Hemidiscaceae</b>				
<i>Hemidiscus cuneiformis</i>	-	-	-	-
<b>Family Asterolampraceae</b>				
<i>Asteromphalus imbricatus</i>	8	12	6	-
<b>Suborder Rhizosoleniineae</b>				
<b>Family Rhizosoleniaceae</b>				
<i>Dactyliosolen blavyanus</i>	-	-	-	-
<i>Guinardia striata</i>	126	89	52	49
<i>Proboscia alata</i>	29	45	26	24
<i>Pseudosolenia calcar avis</i>	36	53	31	29
<b>Suborder Biddulphiineae</b>				
<b>Family Hemiaulaceae</b>				
<i>Cerataulina pelagica</i>	-	-	-	-
<i>Hemiaulus hauckii</i>	-	-	-	-
<i>H. indicus</i>	-	-	-	-
<i>H. membranaceus</i>	76	117	68	62
<i>H. sinensis</i>	11	18	-	10

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**Report No. : 2023-5007085 / 003-2 (page 2 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT :**  
**ADDRESS :**

Tel: 02-509-0700 E-mail address: nattee.s@valeuraenergy.com

## Analysis Report

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**SAMPLING LOCATION :** Station 6 (Southeast of MOPU at 500 m)  
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**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 10:15-11:15 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms) (cont'd)</b>				
<b>Suborder Biddulphiineae</b>				
<b>Family Chaetoceraceae</b>				
<i>Bacteriastrum comosum</i>	65	99	57	52
<i>B. elongatum</i>	-	-	-	-
<i>B. hyalinum</i>	-	-	-	-
<i>Chaetoceros affinis</i>	168	64	-	-
<i>C. compressus</i>	-	-	-	-
<i>C. concavicornis</i>	-	-	-	-
<i>C. diadema</i>	-	-	-	-
<i>C. lacinus</i>	140	115	111	91
<i>C. lorenzianus</i>	52	80	45	43
<i>C. peruvianus</i>	14	23	12	12
<b>Family Eupodiscaceae</b>				
<i>Odontella sinensis</i>	29	45	27	25
<b>Order Bacillariales (Pennate Diatoms)</b>				
<b>Suborder Fragilariineae</b>				
<b>Family Thalassionemataceae</b>				
<i>Thalassionema frauenfeldii</i>	-	-	-	-
<i>T. nitzschoides</i>	-	-	-	-
<i>Thalassiothrix longissima</i>	59	23	12	-
<b>Suborder Bacillariineae</b>				
<b>Family Naviculaceae</b>				
<i>Haslea tromphii</i>	62	45	27	25
<b>Family Bacillariaceae</b>				
<i>Nitzschia</i> sp.	34	23	12	12
<b>Family Surirellaceae</b>				
<i>Entomoneis</i> sp.	-	-	-	-
<b>Class Dictyochophyceae (Silicoflagellates)</b>				
<b>Order Dictyochaes</b>				
<b>Family Dictyochophyceae</b>				
<i>Dictyocha fibula</i>	51	46	39	28

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**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

Tel: 02-500-0700 E-mail address: natthorn@valeuraenergy.com

## Analysis Report

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Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta (cont'd)</b>				
<b>Class Dinophyceae (Dinoflagellates)</b>				
<b>Order Prorocentrales</b>				
<b>Family Prorocentraceae</b>				
<i>Prorocentrum compressum</i>	77	-	-	-
<i>P. micans</i>	-	-	-	-
<b>Order Dinophysiales</b>				
<b>Family Amphisoleniaceae</b>				
<i>Amphisolenia bidentata</i>	11	-	-	-
<b>Family Dinophysaceae</b>				
<i>Phalacroma doryphorum</i>	61	-	-	-
<b>Order Gymnodiniales</b>				
<b>Family Gymnodiniaceae</b>				
<i>Gymnodinium</i> sp.	-	-	-	-
<i>Gyrodinium</i> sp.	-	-	-	-
<b>Order Ptychodiscales</b>				
<b>Family Ptychodiscaceae</b>				
<i>Baechina coerulea</i>	45	-	-	-
<b>Order Gonyaulacales</b>				
<b>Family Ceratiaceae</b>				
<i>Ceratium fusus</i>	29	-	-	-
<i>C. kofoedii</i>	41	14	-	-
<i>C. massiliense</i>	-	-	-	-
<i>C. trichoceros</i>	16	25	-	14
<b>Family Goniidomaceae</b>				
<i>Alexandrium</i> sp.	16	-	14	-
<b>Family Gonyaulacaceae</b>				
<i>Gonyaulax</i> sp.	25	38	23	20
<b>Family Pyrophacaceae</b>				
<i>P. vancampoae</i>	-	-	-	-

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**Report No. : 2023-5007085 / 003-2 (page 4 of 4)**

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**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

## Analysis Report

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**SAMPLING DATE :** June 5, 2023  
**SAMPLING TIME :** 10:15-11:15 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Dinophyceae (Dinoflagellates) (cont'd)</b>				
<b>Order Peridiniales</b>				
<b>Family Calciadinellaceae</b>				
<i>Scrippsiella</i> sp.	-	-	-	-
<b>Family Podolampadaceae</b>				
<i>Podolampas bipes</i>	-	-	-	-
<i>P. palmipes</i>	51	35	31	22
<b>Family Protoperidiniaceae</b>				
<i>Protoperidinium stenii</i>	-	-	-	-
<i>P. Thorianum</i>	51	45	40	33
<b>Total Species of Phytoplankton (Species)</b>	<b>32</b>	<b>26</b>	<b>21</b>	<b>21</b>
<b>Total Density of Phytoplankton (Cell/L)</b>	<b>2,695</b>	<b>2,109</b>	<b>1,420</b>	<b>1,356</b>
<b>Species Richness Index<sup>1/</sup></b>	<b>3.92</b>	<b>3.27</b>	<b>2.76</b>	<b>2.77</b>
<b>Biodiversity Index<sup>2/</sup></b>	<b>2.81</b>	<b>2.61</b>	<b>2.15</b>	<b>2.21</b>
<b>Evenness Index<sup>3/</sup></b>	<b>0.81</b>	<b>0.80</b>	<b>0.71</b>	<b>0.73</b>

**Remarks :** <sup>1/</sup> The species richness was calculated by using the Margalef's Index.  
<sup>2/</sup> The biodiversity index was calculated by using the Shannon-Wiener's Index.  
<sup>3/</sup> The evenness index was calculated by using the Pielou's Index.



Technical Manager

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**Report No. : 2023-5007085 / 003-3 (page 1 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Station F1 (Northwest of FSO at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 57.93" N, 101° 23' 52.01" E  
**SAMPLING DATE :** June 4, 2023  
**SAMPLING TIME :** 14:30-16:45 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Cyanophyta</b>				
<b>Class Cyanophyceae (Blue-Green Algae)</b>				
<b>Order Nostocales</b>				
<b>Family Oscillatoriaceae</b>				
<i>Oscillatoria erythraea</i>	224	312	290	207
<i>O. thiebautii</i>	1,096	672	560	550
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms)</b>				
<b>Suborder Coscinodiscineae</b>				
<b>Family Thalassiosiraceae</b>				
<i>Cyclotella</i> sp.	64	13	13	-
<i>Thalassiosira</i> sp.	103	53	50	53
<i>T. subtilis</i>	-	-	-	-
<b>Family Leptocyliodraceae</b>				
<i>Corethron criophilum</i>	-	-	-	-
<i>Leptocyliodrus danicus</i>	130	-	-	-
<b>Family Coscinodiscaceae</b>				
<i>C. nodulifera</i>	-	-	-	115
<i>Palmeria hardmaniana</i>	-	26	24	-
<b>Family Hemidiscaceae</b>				
<i>Hemidiscus cuneiformis</i>	-	199	122	-
<b>Family Asterolampraceae</b>				
<i>Asteromphalus imbricatus</i>	-	55	43	-
<b>Suborder Rhizosoleniineae</b>				
<b>Family Rhizosoleniaceae</b>				
<i>Dactyliosolen blavyanus</i>	-	-	-	-
<i>Guinardia striata</i>	21	201	118	-
<i>Proboscia alata</i>	62	62	-	74
<i>Pseudosolenia calcar avis</i>	225	73	68	115
<b>Suborder Biddulphiineae</b>				
<b>Family Hemiaulaceae</b>				
<i>Cerataulina pelagica</i>	-	-	-	-
<i>Hemiaulus hauckii</i>	-	31	29	53
<i>H. indicus</i>	-	41	39	-
<i>H. membranaceus</i>	40	93	89	-
<i>H. sinensis</i>	-	31	-	33

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Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms) (cont'd)</b>				
<b>Suborder Biddulphiineae</b>				
<b>Family Chaetoceraceae</b>				
<i>Bacteriastrum comosum</i>	182	93	89	95
<i>B. elongatum</i>	-	83	78	-
<i>B. hyalinum</i>	142	137	128	41
<i>Chaetoceros affinis</i>	-	-	-	-
<i>C. compressus</i>	-	175	150	-
<i>C. concavicornis</i>	-	-	-	95
<i>C. diadema</i>	117	-	-	-
<i>C. lacinus</i>	420	106	100	-
<i>C. lorenzianus</i>	103	307	151	177
<i>C. peruvianus</i>	12	40	37	-
<b>Family Eupodiscaceae</b>				
<i>Odontella sinensis</i>	-	-	-	-
<b>Order Bacillariales (Pennate Diatoms)</b>				
<b>Suborder Fragilariineae</b>				
<b>Family Thalassionemataceae</b>				
<i>Thalassionema frauenfeldii</i>	372	40	37	121
<i>T. nitzschoides</i>	-	-	-	-
<i>Thalassiothrix longissima</i>	27	40	66	-
<b>Suborder Bacillariineae</b>				
<b>Family Naviculaceae</b>				
<i>Haslea tromphii</i>	117	-	-	-
<b>Family Bacillariaceae</b>				
<i>Nitzschia</i> sp.	-	-	-	-
<b>Family Surirellaceae</b>				
<i>Entomoneis</i> sp.	-	203	-	-
<b>Class Dictyochophyceae (Silicoflagellates)</b>				
<b>Order Dictyochaes</b>				
<b>Family Dictyochophyceae</b>				
<i>Dictyocha fibula</i>	57	39	22	-

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E 272971

SGS (Thailand) Limited

Environment, Health and Safety 100 Nanglinchee Road Chongnonsee Yannawa Bangkok 10120  
 t +66 (0)2 678 18 13 f +66 (0)2 678 06 22 www.sgs.com



**Report No. : 2023-5007085 / 003-3 (page 3 of 4)**

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Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta (cont'd)</b>				
<b>Class Dinophyceae (Dinoflagellates)</b>				
<b>Order Prorocentrales</b>				
<b>Family Prorocentraceae</b>				
<i>Prorocentrum compressum</i>	29	40	34	-
<i>P. micans</i>	-	128	62	-
<b>Order Dinophysiales</b>				
<b>Family Amphisoleniaceae</b>				
<i>Amphisolenia bidentata</i>	-	13	-	-
<b>Family Dinophysiaceae</b>				
<i>Phalacroma doryphorum</i>	-	-	-	-
<b>Order Gymnodiniales</b>				
<b>Family Gymnodiniaceae</b>				
<i>Gymnodinium</i> sp.	-	19	15	-
<i>Gyrodinium</i> sp.	29	-	-	-
<b>Order Ptychodiscales</b>				
<b>Family Ptychodiscaceae</b>				
<i>Baechina coerulea</i>	14	-	-	-
<b>Order Gonyaulacales</b>				
<b>Family Ceratiaceae</b>				
<i>Ceratium fusus</i>	35	-	-	-
<i>C. kofoidii</i>	26	19	15	-
<i>C. massiliense</i>	31	-	-	-
<i>C. trichoceros</i>	43	19	15	39
<b>Family Goniidomaceae</b>				
<i>Alexandrium</i> sp.	-	19	15	-
<b>Family Gonyaulacaceae</b>				
<i>Gonyaulax</i> sp.	-	19	15	42
<b>Family Pyrophacaceae</b>				
<i>P. vancampoeae</i>	-	68	-	-

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SGS (Thailand) Limited

Environment, Health and Safety 100 Nanglinchee Road Chongnonsee Yannawa Bangkok 10120  
t +66 (0)2 678 18 13 f +66 (0)2 678 06 22 www.sgs.com

**Report No. : 2023-5007085 / 003-3 (page 4 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Station F1 (Northwest of FSO at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 57.93" N, 101° 23' 52.01" E  
**SAMPLING DATE :** June 4, 2023  
**SAMPLING TIME :** 14:30-16:45 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Dinophyceae (Dinoflagellates) (cont'd)</b>				
<b>Order Peridiniales</b>				
<b>Family Calciadinellaceae</b>				
<i>Scrippsiella</i> sp.	14	-	-	-
<b>Family Podolampadaceae</b>				
<i>Podolampas bipes</i>	-	19	-	-
<i>P. palmipes</i>	-	-	-	-
<b>Family Protoperidiniaceae</b>				
<i>Protoperidinium stenii</i>	-	39	-	-
<i>P. Thorianum</i>	-	-	-	-
<b>Total Species of Phytoplankton (Species)</b>	<b>27</b>	<b>36</b>	<b>29</b>	<b>15</b>
<b>Total Density of Phytoplankton (Cell/L)</b>	<b>3,735</b>	<b>3,527</b>	<b>2,474</b>	<b>1,810</b>
<b>Species Richness Index<sup>1/</sup></b>	<b>3.16</b>	<b>4.28</b>	<b>3.58</b>	<b>1.87</b>
<b>Biodiversity Index<sup>2/</sup></b>	<b>2.60</b>	<b>3.05</b>	<b>2.86</b>	<b>2.34</b>
<b>Evenness Index<sup>3/</sup></b>	<b>0.79</b>	<b>0.85</b>	<b>0.85</b>	<b>0.87</b>

**Remarks :** <sup>1/</sup> The species richness was calculated by using the Margalef's Index.  
<sup>2/</sup> The biodiversity index was calculated by using the Shannon-Wiener's Index.  
<sup>3/</sup> The evenness index was calculated by using the Pielou's Index.



Technical Manager

TY/CS/SV/SV

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**Report No. : 2023-5007085 / 003-4 (page 1 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

Tel: 02-500-0700 E-mail address: nattee.s@valeuraenergy.com

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Station F2 (Southeast of FSO at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 33.25" N, 101° 24' 13.28" E  
**SAMPLING DATE :** June 4, 2023  
**SAMPLING TIME :** 09:40-14:00 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Cyanophyta</b>				
<b>Class Cyanophyceae (Blue-Green Algae)</b>				
<b>Order Nostocales</b>				
<b>Family Oscillatoriaceae</b>				
<i>Oscillatoria erythraea</i>	342	317	215	213
<i>O. thiebautii</i>	575	934	729	385
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms)</b>				
<b>Suborder Coscinodiscineae</b>				
<b>Family Thalassiosiraceae</b>				
<i>Cyclotella</i> sp.	-	-	-	-
<i>Thalassiosira</i> sp.	-	52	36	22
<i>T. subtilis</i>	-	-	-	-
<b>Family Leptocyliodraceae</b>				
<i>Corethron criophilum</i>	78	-	-	-
<i>Leptocyliodrus danicus</i>	92	-	-	-
<b>Family Coscinodiscaceae</b>				
<i>C. nodulifera</i>	-	27	15	-
<i>Palmeria hardmaniana</i>	78	11	7	5
<b>Family Hemidiscaceae</b>				
<i>Hemidiscus cuneiformis</i>	94	57	33	16
<b>Family Asterolampraceae</b>				
<i>Asteromphalus imbricatus</i>	72	-	19	11
<b>Suborder Rhizosoleniineae</b>				
<b>Family Rhizosoleniaceae</b>				
<i>Dactyliosolen blavyanus</i>	-	-	-	-
<i>Guinardia striata</i>	116	-	-	-
<i>Proboscia alata</i>	-	-	-	34
<i>Pseudosolenia calcar avis</i>	89	-	-	-
<b>Suborder Biddulphiineae</b>				
<b>Family Hemiaulaceae</b>				
<i>Cerataulina pelagica</i>	-	-	36	22
<i>Hemiaulus hauckii</i>	-	-	-	-
<i>H. indicus</i>	78	41	28	17
<i>H. membranaceus</i>	69	-	-	-
<i>H. sinensis</i>	58	-	-	-

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**Report No. : 2023-5007085 / 003-4 (page 2 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT :**  
**ADDRESS :**

Tel: 02-500-0700 E-mail address: natco.s@valeuraenergy.com

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification **SAMPLING DATE :** June 4, 2023  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm). **SAMPLING TIME :** 09:40-14:00 hrs.  
**SAMPLING LOCATION :** Station F2 (Southeast of FSO at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 33.25" N, 101° 24' 13.28" E **DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms) (cont'd)</b>				
<b>Suborder Biddulphiineae</b>				
<b>Family Chaetoceraceae</b>				
<i>Bacteriastrum comosum</i>	52	-	-	-
<i>B. elongatum</i>	45	65	44	27
<i>B. hyalinum</i>	74	41	-	-
<i>Chaetoceros affinis</i>	-	62	43	26
<i>C. compressus</i>	94	83	56	35
<i>C. concavicornis</i>	89	211	78	-
<i>C. diadema</i>	-	49	33	20
<i>C. laciniosus</i>	-	41	29	17
<i>C. lorenzianus</i>	165	-	-	110
<i>C. peruvianus</i>	21	87	60	31
<b>Family Eupodiscaceae</b>				
<i>Odontella sinensis</i>	-	32	23	14
<b>Order Bacillariales (Pennate Diatoms)</b>				
<b>Suborder Fragilariineae</b>				
<b>Family Thalassionemataceae</b>				
<i>Thalassionema frauenfeldii</i>	101	176	139	84
<i>T. nitzschoides</i>	98	62	43	26
<i>Thalassiothrix longissima</i>	114	-	-	-
<b>Suborder Bacillariineae</b>				
<b>Family Naviculaceae</b>				
<i>Haslea tromphii</i>	-	21	14	17
<b>Family Bacillariaceae</b>				
<i>Nitzschia</i> sp.	-	56	-	-
<b>Family Surirellaceae</b>				
<i>Entomoneis</i> sp.	122	-	-	27
<b>Class Dictyochophyceae (Silicoflagellates)</b>				
<b>Order Dictyochaes</b>				
<b>Family Dictyochophyceae</b>				
<i>Dictyocha fibula</i>	20	71	-	12

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**Report No. : 2023-5007085 / 003-4 (page 3 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

Tel: 02-500-0700 E-mail address: natthorn@valeuraenergy.com

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification **SAMPLING DATE :** June 4, 2023  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm). **SAMPLING TIME :** 09:40-14:00 hrs.  
**SAMPLING LOCATION :** Station F2 (Southeast of FSO at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 33.25" N, 101° 24' 13.28" E **DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta (cont'd)</b>				
<b>Class Dinophyceae (Dinoflagellates)</b>				
<b>Order Prorocentrales</b>				
<b>Family Prorocentraceae</b>				
<i>Prorocentrum compressum</i>	21	37	43	26
<i>P. micans</i>	44	-	138	47
<b>Order Dinophysiales</b>				
<b>Family Amphisoleniaceae</b>				
<i>Amphisolenia bidentata</i>	-	-	14	-
<b>Family Dinophysiaceae</b>				
<i>Phalacroma doryphorum</i>	-	27	-	-
<b>Order Gymnodiniales</b>				
<b>Family Gymnodiniaceae</b>				
<i>Gymnodinium</i> sp.	12	34	21	12
<i>Gyrodinium</i> sp.	-	37	-	-
<b>Order Ptychodiscales</b>				
<b>Family Ptychodiscaceae</b>				
<i>Baechina coerulea</i>	112	17	-	-
<b>Order Gonyaulacales</b>				
<b>Family Ceratiaceae</b>				
<i>Ceratium fusus</i>	-	44	-	-
<i>C. kofoidii</i>	12	32	21	12
<i>C. massiliense</i>	-	39	-	-
<i>C. trichoceros</i>	78	54	21	12
<b>Family GoniDOMACEAE</b>				
<i>Alexandrium</i> sp.	-	78	22	12
<b>Family Gonyaulacaceae</b>				
<i>Gonyaulax</i> sp.	-	-	12	12
<b>Family Pyrophacaceae</b>				
<i>P. vancampoae</i>	-	99	73	-

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**Report No. : 2023-5007085 / 003-4 (page 4 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

Tel: 02-500-0700 E-mail: address: hakeem@valeuraenergy.com

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Station F2 (Southeast of FSO at 500 m)  
**COORDINATE (WGS 84) :** 07° 56' 33.25" N, 101° 24' 13.28" E  
**SAMPLING DATE :** June 4, 2023  
**SAMPLING TIME :** 09:40-14:00 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Dinophyceae (Dinoflagellates) (cont'd)</b>				
<b>Order Peridiniales</b>				
<b>Family Calciadinellaceae</b>				
<i>Scrippsiella</i> sp.	-	17	-	-
<b>Family Podolampadaceae</b>				
<i>Podolampas bipes</i>	-	-	21	-
<i>P. palmipes</i>	-	-	-	-
<b>Family Protoperidiniaceae</b>				
<i>Protoperidinium stenii</i>	69	-	-	-
<i>P. Thorianum</i>	88	31	-	-
<b>Total Species of Phytoplankton (Species)</b>	<b>32</b>	<b>34</b>	<b>30</b>	<b>29</b>
<b>Total Density of Phytoplankton (Cell/L)</b>	<b>3,172</b>	<b>3,042</b>	<b>2,066</b>	<b>1,304</b>
<b>Species Richness Index<sup>1/</sup></b>	<b>3.85</b>	<b>4.11</b>	<b>3.80</b>	<b>3.90</b>
<b>Biodiversity Index<sup>2/</sup></b>	<b>3.12</b>	<b>2.83</b>	<b>2.60</b>	<b>2.63</b>
<b>Evenness Index<sup>3/</sup></b>	<b>0.90</b>	<b>0.80</b>	<b>0.77</b>	<b>0.78</b>

**Remarks :** <sup>1/</sup> The species richness was calculated by using the Margalef's Index.  
<sup>2/</sup> The biodiversity index was calculated by using the Shannon-Wiener's Index.  
<sup>3/</sup> The evenness index was calculated by using the Pielou's Index.

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SGS (THAILAND) LIMITED



Technical Manager

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SGS (Thailand) Limited

Environment, Health and Safety 100 Nanglinchee Road Chongnonsee Yannawa Bangkok 10120  
 t +66 (0)2 678 18 13 f +66 (0)2 678 06 22 www.sgs.com

Member of the SGS Group



**Report No. : 2023-5007085 / 003-5 (page 1 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : Khun Nittas Sungsawas**  
**ADDRESS : [REDACTED]**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Reference Station  
**COORDINATE (WGS 84) :** 08° 01' 22.1" N, 101° 11' 46.1" E  
**SAMPLING DATE :** June 6, 2023  
**SAMPLING TIME :** 08:35-14:00 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Cyanophyta</b>				
<b>Class Cyanophyceae (Blue-Green Algae)</b>				
<b>Order Nostocales</b>				
<b>Family Oscillatoriaceae</b>				
<i>Oscillatoria erythraea</i>	254	167	137	121
<i>O. thiebautii</i>	763	436	324	129
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms)</b>				
<b>Suborder Coscinodiscineae</b>				
<b>Family Thalassiosiraceae</b>				
<i>Cyclotella</i> sp.	45	-	-	-
<i>Thalassiosira</i> sp.	40	37	19	-
<i>T. subtilis</i>	78	67	34	22
<b>Family Leptocyliodraceae</b>				
<i>Corethron criophilum</i>	91	86	49	57
<i>Leptocyliodrus danicus</i>	-	34	-	-
<b>Family Coscinodiscaceae</b>				
<i>C. nodulifera</i>	-	-	-	-
<i>Palmeria hardmaniana</i>	14	98	45	57
<b>Family Hemidiscaceae</b>				
<i>Hemidiscus cuneiformis</i>	92	87	76	61
<b>Family Asterolampraceae</b>				
<i>Asteromphalus imbricatus</i>	20	39	32	31
<b>Suborder Rhizosoleniineae</b>				
<b>Family Rhizosoleniaceae</b>				
<i>Dactyliosolen blavyanus</i>	83	78	43	32
<i>Guinardia striata</i>	89	45	-	-
<i>Proboscia alata</i>	92	87	45	33
<i>Pseudosolenia calcar avis</i>	114	108	55	41
<b>Suborder Biddulphiineae</b>				
<b>Family Hemiaulaceae</b>				
<i>Cerataulina pelagica</i>	26	83	36	29
<i>Hemiaulus hauckii</i>	-	-	-	-
<i>H. indicus</i>	52	45	32	24
<i>H. membranaceus</i>	67	55	-	-
<i>H. sinensis</i>	-	-	45	31

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**Report No. : 2023-5007085 / 003-5 (page 2 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT :**   
**ADDRESS :**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification **SAMPLING DATE :** June 6, 2023  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm). **SAMPLING TIME :** 08:35-14:00 hrs.  
**SAMPLING LOCATION :** Reference Station  
**COORDINATE (WGS 84) :** 08° 01' 22.1" N, 101° 11' 46.1" E **DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Bacillariophyceae (Diatoms)</b>				
<b>Order Biddulphiales (Centric Diatoms) (cont'd)</b>				
<b>Suborder Biddulphiineae</b>				
<b>Family Chaetoceraceae</b>				
<i>Bacteriastrum comosum</i>	62	58	30	23
<i>B. elongatum</i>	62	58	30	23
<i>B. hyalinum</i>	52	49	25	19
<i>Chaetoceros affinis</i>	-	-	-	-
<i>C. compressus</i>	182	174	89	67
<i>C. concavicornis</i>	188	167	135	123
<i>C. diadema</i>	62	58	30	23
<i>C. laciniosus</i>	-	-	-	-
<i>C. lorenzianus</i>	367	346	178	145
<i>C. peruvianus</i>	-	-	-	-
<b>Family Eupodiscaceae</b>				
<i>Odontella sinensis</i>	-	-	-	-
<b>Order Bacillariales (Pennate Diatoms)</b>				
<b>Suborder Fragilariineae</b>				
<b>Family Thalassionemataceae</b>				
<i>Thalassionema frauenfeldii</i>	91	86	22	-
<i>T. nitzschoides</i>	-	-	-	-
<i>Thalassiothrix longissima</i>	65	62	32	24
<b>Suborder Bacillariineae</b>				
<b>Family Naviculaceae</b>				
<i>Haslea tromphii</i>	19	-	9	-
<b>Family Bacillariaceae</b>				
<i>Nitzschia</i> sp.	98	-	17	-
<b>Family Surirellaceae</b>				
<i>Entomoneis</i> sp.	50	-	17	-
<b>Class Dictyochophyceae (Silicoflagellates)</b>				
<b>Order Dictyochaes</b>				
<b>Family Dictyochophyceae</b>				
<i>Dictyocha fibula</i>	74	42	65	23

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**Report No. : 2023-5007085 / 003-5 (page 3 of 4)**

**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Reference Station  
**COORDINATE (WGS 84) :** 08° 01' 22.1" N, 101° 11' 46.1" E  
**SAMPLING DATE :** June 6, 2023  
**SAMPLING TIME :** 08:35-14:00 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta (cont'd)</b>				
<b>Class Dinophyceae (Dinoflagellates)</b>				
<b>Order Prorocentrales</b>				
<b>Family Prorocentraceae</b>				
<i>Prorocentrum compressum</i>	46	48	27	56
<i>P. micans</i>	-	155	49	41
<b>Order Dinophysiales</b>				
<b>Family Amphisoleniaceae</b>				
<i>Amphisolenia bidentata</i>	-	16	-	-
<b>Family Dinophysiaceae</b>				
<i>Phalacroma doryphorum</i>	46	34	-	-
<b>Order Gymnodiniales</b>				
<b>Family Gymnodiniaceae</b>				
<i>Gymnodinium</i> sp.	98	78	45	55
<i>Gyrodinium</i> sp.	-	-	-	34
<b>Order Ptychodiscales</b>				
<b>Family Ptychodiscaceae</b>				
<i>Baechina coerulea</i>	21	-	-	-
<b>Order Gonyaulacales</b>				
<b>Family Ceratiaceae</b>				
<i>Ceratium fusus</i>	55	-	-	33
<i>C. kofoidii</i>	40	23	12	10
<i>C. massiliense</i>	-	121	-	45
<i>C. trichoceros</i>	-	67	43	26
<b>Family Goniidomaceae</b>				
<i>Alexandrium</i> sp.	-	23	33	25
<b>Family Gonyaulacaceae</b>				
<i>Gonyaulax</i> sp.	-	63	12	22
<b>Family Pyrophacaceae</b>				
<i>P. vancampoae</i>	35	82	75	-

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**Issued date : August 9, 2023**

**CLIENT : VALEURA ENERGY (GULF OF THAILAND) LIMITED**  
**CONTACT : [REDACTED]**  
**ADDRESS : [REDACTED]**

## Analysis Report

**SAMPLE DESIGNATED AS :** Phytoplankton Identification  
**SAMPLING METHOD :** Seawater was collected by using water sampler and filtered through plankton net (mesh size 20 µm).  
**SAMPLING LOCATION :** Reference Station  
**COORDINATE (WGS 84) :** 08° 01' 22.1" N, 101° 11' 46.1" E  
**SAMPLING DATE :** June 6, 2023  
**SAMPLING TIME :** 08:35-14:00 hrs.  
**DEPTH :** 50 m

Scientific Classification	Phytoplankton (Cell/L)			
	1 m below the surface		Base of euphotic zone	
	Replication		Replication	
	I	II	I	II
<b>Division Chromophyta</b>				
<b>Class Dinophyceae (Dinoflagellates) (cont'd)</b>				
<b>Order Peridinales</b>				
<b>Family Calciadinellaceae</b>				
<i>Scrippsiella</i> sp.	37	-	-	-
<b>Family Podolampadaceae</b>				
<i>Podolampas bipes</i>	-	-	-	-
<i>P. palmipes</i>	-	-	-	-
<b>Family Protoperidiniaceae</b>				
<i>Protoperidinium stenii</i>	56	47	-	-
<i>P. Thorianum</i>	-	-	88	27
<b>Total Species of Phytoplankton (Species)</b>	<b>38</b>	<b>38</b>	<b>36</b>	<b>33</b>
<b>Total Density of Phytoplankton (Cell/L)</b>	<b>3,726</b>	<b>3,409</b>	<b>2,035</b>	<b>1,512</b>
<b>Species Richness Index<sup>1/</sup></b>	<b>4.50</b>	<b>4.55</b>	<b>4.59</b>	<b>4.37</b>
<b>Biodiversity Index<sup>2/</sup></b>	<b>3.17</b>	<b>3.35</b>	<b>3.23</b>	<b>3.27</b>
<b>Evenness Index<sup>3/</sup></b>	<b>0.87</b>	<b>0.92</b>	<b>0.90</b>	<b>0.94</b>

**Remarks :** <sup>1/</sup> The species richness was calculated by using the Margalef's Index.  
<sup>2/</sup> The biodiversity index was calculated by using the Shannon-Wiener's Index.  
<sup>3/</sup> The evenness index was calculated by using the Pielou's Index.

TY/CS/SV/SV

SGS (THAILAND) LIMITED



Technical Manager

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