

## เอกสารแนบที่ 121

รายงานผลการวิเคราะห์ปริมาณโลหะในเศษหินจากการเจาะ  
ที่เก็บตัวอย่างในระหว่างการเจาะหลุมสำรวจปิโตรเลียมของโครงการฯ



STS GREEN CO., LTD.

3/23 Moo 6, Lai Sawai, Lam Luk Ka, Pathum Thani 12150, Thailand  
Tel: +66 2101 3074-76 Fax: +66 21062513  
E-mail: stsgreenlab@sts.co.th http://www.sts.co.th

## TEST REPORT

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Viphavadi Rangsil Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non  
Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting  
Samples for TMA-22A&TMA-40A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : September 25, 2021

Work Request No. : 574/21 Revise 1  
Sample Received Date : November 1, 2021  
Report No. : 1201/21  
Reported Date : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/9	TMA-40A Cutting Wet Cutting Unwash (OBM) 6.25						
		Arsenic (TTLC)	Hydride Generation Atomic Absorption Spectrometric Method	November 8, 2021	0.82	mg/kg	-
		Barium (TTLC)	Direct Nitrous Oxide-Acetylene Flame Method	November 7, 2021	9.409	mg/kg	-
		Cadmium (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	<1.00	mg/kg	-
		Chromium (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	7.35	mg/kg	-
		Copper (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	16.14	mg/kg	-
		Iron (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	6.698	mg/kg	-
		Lead (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	<5.00	mg/kg	-
		Manganese (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	176.43	mg/kg	-
		Mercury (TTLC)	Cold-Vapor Atomic Absorption Spectrometric Method	November 5, 2021	0.12	mg/kg	-
		Nickel (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	10.92	mg/kg	-
		Zinc (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	19.09	mg/kg	-

Method : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Witsinee Phiwpanya)  
Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)  
Laboratory Supervisor

November 30, 2021



STS GREEN CO., LTD.

3/23 Moo 6, Lai Sawai, Lam Luk Ka, Pathum Thani 12150, Thailand  
Tel: +66 2101 3074-76 Fax: +66 21062513  
E-mail: stsgreenlab@sts.co.th http://www.sts.co.th

## TEST REPORT

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Viphavadi Rangsil Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non  
Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting  
Samples for TMA-22A&TMA-40A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : September 25, 2021

Work Request No. : 574/21 Revise 1  
Sample Received Date : November 1, 2021  
Report No. : 1201/21  
Reported Date : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/9	TMA-40A Cutting Wet Cutting Unwash (OBM) 6.25						
		Arsenic (STLC)	Hydride Generation Atomic Absorption Spectrometric Method	November 12, 2021	0.0234	mg/L	-
		Barium (STLC)	Direct Nitrous Oxide-Acetylene Flame Method	November 10, 2021	1.01	mg/L	-
		Cadmium (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.02	mg/L	-
		Chromium (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.05	mg/L	-
		Copper (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.10	mg/L	-
		Iron (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	27.82	mg/L	-
		Lead (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.10	mg/L	-
		Manganese (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.62	mg/L	-
		Mercury (STLC)	Cold-Vapor Atomic Absorption Spectrometric Method	November 11, 2021	0.0007	mg/L	-
		Nickel (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.05	mg/L	-
		Zinc (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.01	mg/L	-

Method : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Witsinee Phiwpanya)  
Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)  
Laboratory Supervisor

November 30, 2021



## STS GREEN CO., LTD.

3/23 Moo 5, Lat Sawai, Lam Luk Ka, Pathum Thani 12150, Thailand

Tel: +66 2101 3074-76 Fax: +66 21062513

E-mail: stsgreenlab@sts.co.th http://www.sts.co.th

## TEST REPORT

Client : PTT Exploration and Production Public Company Limited Work Request No. : 574/21 Revise 1  
 Address : 555/1 Viphavadi Rangsit Rd. Chalachak Bangkok 10900 Thailand Sample Received Date : November 1, 2021  
 Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Report No. : 1201/21  
 Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Reported Date : November 30, 2021  
 Samples for TMA-22A&TMA-40A  
 Sample Type : Cutting  
 Sampling By : PTT Exploration and Production Public Company Limited  
 Sampling Date : September 25, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/9	TMA-40A Cutting Wet Cutting Unwash (OBM) 6.25'						
		Total Petroleum Hydrocarbon	Soxhlet Extraction, Gravimetric Method	November 8, 2021	170.750	mg/kg	-
					17.08	%	-

Method : Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23<sup>rd</sup> edition, 2017.  
 Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.  
 % Solids = 69.17%  
 % Moisture = 30.83%

(Ms. Wilasinee Phiwpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 30, 2021

STS Group



## STS GREEN CO., LTD.

3/23 Moo 5, Lat Sawai, Lam Luk Ka, Pathum Thani 12150, Thailand

Tel: +66 2101 3074-76 Fax: +66 21062513

E-mail: stsgreenlab@sts.co.th http://www.sts.co.th

## TEST REPORT

Client : PTT Exploration and Production Public Company Limited Work Request No. : 574/21 Revise 1  
 Address : 555/1 Viphavadi Rangsit Rd. Chalachak Bangkok 10900 Thailand Sample Received Date : November 1, 2021  
 Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Report No. : 1201/21  
 Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Reported Date : November 30, 2021  
 Samples for TMA-22A&TMA-40A  
 Sample Type : Cutting  
 Sampling By : PTT Exploration and Production Public Company Limited  
 Sampling Date : September 13, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/10	TMA-40A Cutting Wet Cutting Unwash (WBM) 8.50'						
		Arsenic (TTLC)	Hydride Generation Atomic Absorption Spectrometric Method	November 8, 2021	0.70	mg/kg	-
		Barium (TTLC)	Direct Nitrous Oxide-Acetylene Flame Method	November 7, 2021	4.368	mg/kg	-
		Cadmium (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	<1.00	mg/kg	-
		Chromium (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	18.97	mg/kg	-
		Copper (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	13.40	mg/kg	-
		Iron (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	16,610	mg/kg	-
		Lead (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	10.28	mg/kg	-
		Manganese (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	859.50	mg/kg	-
		Mercury (TTLC)	Cold-Vapor Atomic Absorption Spectrometric Method	November 5, 2021	<0.10	mg/kg	-
		Nickel (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	14.19	mg/kg	-
		Zinc (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	35.90	mg/kg	-

Method : U.S. Environmental Protection Agency, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Wilasinee Phiwpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 30, 2021

STS Group



## TEST REPORT

**Client** : PTT Exploration and Production Public Company Limited  
**Address** : 555/1 Vipavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
**Project Name** : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
**Sample Type** : Cutting  
**Sampling By** : PTT Exploration and Production Public Company Limited  
**Sampling Date** : September 13, 2021  
**Work Request No.** : 574/21 Revise 1  
**Sample Received Date** : November 1, 2021  
**Report No.** : 1201/21  
**Reported Date** : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/10	TMA-40A Cutting Wet Cutting Unwash (WBM) 8.50'						
		Arsenic (STLC)	Hydride Generation Atomic Absorption Spectrometric Method	November 12, 2021	0.0476	mg/L	-
		Barium (STLC)	Direct Nitrous Oxide-Acetylene Flame Method	November 10, 2021	1.61	mg/L	-
		Cadmium (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.02	mg/L	-
		Chromium (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.05	mg/L	-
		Copper (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.08	mg/L	-
		Iron (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	231.28	mg/L	-
		Lead (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.14	mg/L	-
		Manganese (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	13.74	mg/L	-
		Mercury (STLC)	Cold-Vapor Atomic Absorption Spectrometric Method	November 11, 2021	0.0012	mg/L	-
		Nickel (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.44	mg/L	-
		Zinc (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.06	mg/L	-

**Method** : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

**Remarks** : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Witasinee Phivpanya)  
Chemist

November 30, 2021

(Mr. Kasidit Yesongkram)  
Laboratory Supervisor

November 30, 2021

## TEST REPORT

**Client** : PTT Exploration and Production Public Company Limited  
**Address** : 555/1 Vipavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
**Project Name** : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
**Sample Type** : Cutting  
**Sampling By** : PTT Exploration and Production Public Company Limited  
**Sampling Date** : September 13, 2021  
**Work Request No.** : 574/21 Revise 1  
**Sample Received Date** : November 1, 2021  
**Report No.** : 1201/21  
**Reported Date** : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/10	TMA-40A Cutting Wet Cutting Unwash (WBM) 8.50'						
		Total Petroleum Hydrocarbon	Soxhlet Extraction, Gravimetric Method	November 8, 2021	93.78	mg/kg	-
					0.09	%	-

**Method** : Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23<sup>rd</sup> edition, 2017.

**Remarks** : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

% Solids = 64.41%  
% Moisture = 35.59%

(Ms. Witasinee Phivpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yesongkram)

Laboratory Supervisor

November 30, 2021

**STS GREEN CO., LTD.**

3/23 Moo 5, Lat Sawai, Lam Luk Ka, Pathum Thani 12150, Thailand  
Tel: +66 2101 3074-76 Fax: +66 21062513  
E-mail: stsgreenlab@sts.co.th http://www.sts.co.th

**TEST REPORT**

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Viphavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non  
Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting  
Samples for TMA-22A&TMA-40A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : July 20, 2021

Work Request No. : 574/21 Revise 1  
Sample Received Date : November 1, 2021  
Report No. : 1201/21  
Reported Date : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/11	TMA-22A Cutting Wet Cutting Unwash (OBM) 6.25"						
		Arsenic (TTLC)	Hydride Generation Atomic Absorption Spectrometric Method	November 8, 2021	1.14	mg/kg	-
		Barium (TTLC)	Direct Nitrous Oxide-Acetylene Flame Method	November 7, 2021	9.068	mg/kg	-
		Cadmium (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	<1.00	mg/kg	-
		Chromium (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	7.18	mg/kg	-
		Copper (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	14.99	mg/kg	-
		Iron (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	8,315	mg/kg	-
		Lead (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	<5.00	mg/kg	-
		Manganese (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	277.59	mg/kg	-
		Mercury (TTLC)	Cold-Vapor Atomic Absorption Spectrometric Method	November 8, 2021	0.10	mg/kg	-
		Nickel (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	9.81	mg/kg	-
		Zinc (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	20.81	mg/kg	-

Method : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Witasinee Phivpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yasoongkram)

Laboratory Supervisor

November 30, 2021

**STS GREEN CO., LTD.**

3/23 Moo 5, Lat Sawai, Lam Luk Ka, Pathum Thani 12150, Thailand  
Tel: +66 2101 3074-76 Fax: +66 21062513  
E-mail: stsgreenlab@sts.co.th http://www.sts.co.th

**TEST REPORT**

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Viphavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non  
Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting  
Samples for TMA-22A&TMA-40A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : July 20, 2021

Work Request No. : 574/21 Revise 1  
Sample Received Date : November 1, 2021  
Report No. : 1201/21  
Reported Date : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/11	TMA-22A Cutting Wet Cutting Unwash (OBM) 6.25"						
		Arsenic (STLC)	Hydride Generation Atomic Absorption Spectrometric Method	November 12, 2021	0.0430	mg/L	-
		Barium (STLC)	Direct Nitrous Oxide-Acetylene Flame Method	November 10, 2021	0.57	mg/L	-
		Cadmium (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.02	mg/L	-
		Chromium (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.05	mg/L	-
		Copper (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.05	mg/L	-
		Iron (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	28.65	mg/L	-
		Lead (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.10	mg/L	-
		Manganese (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	1.17	mg/L	-
		Mercury (STLC)	Cold-Vapor Atomic Absorption Spectrometric Method	November 11, 2021	0.0004	mg/L	-
		Nickel (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.05	mg/L	-
		Zinc (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.01	mg/L	-

Method : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Witasinee Phivpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yasoongkram)

Laboratory Supervisor

November 30, 2021



**STS GREEN CO., LTD.**

3/23 Moo 5, Lat Sawai, Lam Luk Ka, Pathum Thani 12160, Thailand  
 Tel: +66 2101 3074-76 Fax: +66 21062313  
 E-mail: stsgreen@sts.co.th http://www.sts.co.th

**TEST REPORT**

Client : PTT Exploration and Production Public Company Limited  
 Address : 555/1 Viphavadi Rangsil Rd. Chatuchak Bangkok 10900 Thailand  
 Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non  
 Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting  
 Samples for TMA-22A&TMA-40A  
 Sample Type : Cutting  
 Sampling By : PTT Exploration and Production Public Company Limited  
 Sampling Date : July 20, 2021

Work Request No. : 574/21 Revise 1  
 Sample Received Date : November 1, 2021  
 Report No. : 1201/21  
 Reported Date : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/11	TMA-22A Cutting Wet Cutting Unwash (OBM) 6.25'						
		Total Petroleum Hydrocarbon	Soxhlet Extraction, Gravimetric Method	November 24, 2021	153.092	mg/kg	-
					15.31	%	-

Method : Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23<sup>rd</sup> edition, 2017.  
 Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.  
 % Solids = 75.91%  
 % Moisture = 24.09%

(Ms. Wiasinee Phiwpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yesongkram)

Laboratory Supervisor

November 30, 2021

**STS Group****STS GREEN CO., LTD.**

3/23 Moo 5, Lat Sawai, Lam Luk Ka, Pathum Thani 12160, Thailand  
 Tel: +66 2101 3074-76 Fax: +66 21062313  
 E-mail: stsgreen@sts.co.th http://www.sts.co.th

**TEST REPORT**

Client : PTT Exploration and Production Public Company Limited  
 Address : 555/1 Viphavadi Rangsil Rd. Chatuchak Bangkok 10900 Thailand  
 Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non  
 Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting  
 Samples for TMA-22A&TMA-40A  
 Sample Type : Cutting  
 Sampling By : PTT Exploration and Production Public Company Limited  
 Sampling Date : June 22, 2021

Work Request No. : 574/21 Revise 1  
 Sample Received Date : November 1, 2021  
 Report No. : 1201/21  
 Reported Date : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/13	TMA-22A Cutting Wet Cutting Unwash (WBM) 12.25'						
		Arsenic (TTLC)	Hydride Generation Atomic Absorption Spectrometric Method	November 8, 2021	1.72	mg/kg	-
		Barium (TTLC)	Direct Nitrous Oxide-Acetylene Flame Method	November 7, 2021	5.137	mg/kg	-
		Cadmium (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	<1.00	mg/kg	-
		Chromium (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	8.55	mg/kg	-
		Copper (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	13.53	mg/kg	-
		Iron (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	26.081	mg/kg	-
		Lead (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	11.09	mg/kg	-
		Manganese (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	1.075	mg/kg	-
		Mercury (TTLC)	Cold-Vapor Atomic Absorption Spectrometric Method	November 5, 2021	0.10	mg/kg	-
		Nickel (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	10.13	mg/kg	-
		Zinc (TTLC)	Direct Air-Acetylene Flame Method	November 2, 2021	42.18	mg/kg	-

Method : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Wiasinee Phiwpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yesongkram)

Laboratory Supervisor

November 30, 2021

**STS Group**

## TEST REPORT

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : June 22, 2021

Work Request No. : 574/21 Revise 1  
Sample Received Date : November 1, 2021  
Report No. : 1201/21  
Reported Date : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/13	TMA-22A Cutting Wet Cutting Unwash (WBM) 12.25						
		Arsenic (STLC)	Hydride Generation Atomic Absorption Spectrometric Method	November 12, 2021	0.0644	mg/L	-
		Barium (STLC)	Direct Nitrous Oxide-Acetylene Flame Method	November 10, 2021	36.03	mg/L	-
		Cadmium (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	<0.02	mg/L	-
		Chromium (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.31	mg/L	-
		Copper (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.28	mg/L	-
		Iron (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	418.10	mg/L	-
		Lead (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.36	mg/L	-
		Manganese (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	7.35	mg/L	-
		Mercury (STLC)	Cold-Vapor Atomic Absorption Spectrometric Method	November 11, 2021	0.0045	mg/L	-
		Nickel (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.46	mg/L	-
		Zinc (STLC)	Direct Air-Acetylene Flame Method	November 10, 2021	0.73	mg/L	-

Method : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste. Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Wiasinee Phiepanya)

Chemist

November 29, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 29, 2021

## TEST REPORT

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : June 22, 2021

Work Request No. : 574/21 Revise 1  
Sample Received Date : November 1, 2021  
Report No. : 1201/21  
Reported Date : November 30, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
011121/13	TMA-22A Cutting Wet Cutting Unwash (WBM) 12.25						
		Total Petroleum Hydrocarbon	Soxhlet Extraction, Gravimetric Method	November 24, 2021	1.256	mg/kg	-
					0.13	%	-

Method : Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23<sup>rd</sup> edition, 2017.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

% Solids = 64.18%

% Moisture = 35.82%

(Ms. Wiasinee Phiepanya)

Chemist

November 29, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 29, 2021

- End of Report -



## TEST REPORT

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsil Rd. Chaluchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22&TMA-29A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : August 19, 2021

Work Request No. : 531/21  
Sample Received Date : September 24, 2021  
Report No. : 1149/21  
Reported Date : October 28, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
240821/36	TMA-29A Cutting SDF 6 <sup>1</sup> / <sub>6</sub>						
		Arsenic (TTLC)	Hydride Generation Atomic Absorption Spectrometric Method	September 28, 2021	3.67	mg/kg	-
		Barium (TTLC)	Direct Nitrous Oxide-Acetylene Flame Method	October 6, 2021	7.428	mg/kg	-
		Cadmium (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	<1.00	mg/kg	-
		Chromium (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	9.31	mg/kg	-
		Copper (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	21.95	mg/kg	-
		Iron (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	15.916	mg/kg	-
		Lead (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	<5.00	mg/kg	-
		Manganese (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	275.42	mg/kg	-
		Mercury (TTLC)	Cold-Vapor Atomic Absorption Spectrometric Method	October 21, 2021	0.12	mg/kg	-
		Nickel (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	15.29	mg/kg	-
		Zinc (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	41.60	mg/kg	-

Method : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Witasinee Phivpanya)

Chemist

October 25, 2021

(Mr. Kasidit Yesongkram)

Laboratory Supervisor

October 28, 2021

## TEST REPORT

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsil Rd. Chaluchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22&TMA-29A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : August 19, 2021

Work Request No. : 531/21  
Sample Received Date : September 24, 2021  
Report No. : 1149/21  
Reported Date : October 28, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
240921/36	TMA-29A Cutting SDF 6 <sup>1</sup> / <sub>6</sub>						
		Arsenic (STLC)	Hydride Generation Atomic Absorption Spectrometric Method	October 12, 2021	0.0504	mg/L	-
		Barium (STLC)	Direct Nitrous Oxide-Acetylene Flame Method	October 6, 2021	1.75	mg/L	-
		Cadmium (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	<0.02	mg/L	-
		Chromium (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	0.06	mg/L	-
		Copper (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	0.10	mg/L	-
		Iron (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	138.80	mg/L	-
		Lead (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	<0.10	mg/L	-
		Manganese (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	7.70	mg/L	-
		Mercury (STLC)	Cold-Vapor Atomic Absorption Spectrometric Method	October 22, 2021	0.0021	mg/L	-
		Nickel (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	0.17	mg/L	-
		Zinc (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	0.10	mg/L	-

Method : U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Witasinee Phivpanya)

Chemist

October 28, 2021

(Mr. Kasidit Yesongkram)

Laboratory Supervisor

October 28, 2021



## TEST REPORT

**Client** : PTT Exploration and Production Public Company Limited  
**Address** : 555/1 Vipavadi Rangsil Rd. Chatuchak Bangkok 10900 Thailand  
**Project Name** : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22&TMA-29A  
**Sample Type** : Cutting  
**Sampling By** : PTT Exploration and Production Public Company Limited  
**Sampling Date** : August 19, 2021  
**Work Request No.** : 531/21  
**Sample Received Date** : September 24, 2021  
**Report No.** : 1149/21  
**Reported Date** : October 28, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
240921/36	TMA-29A Cutting						
	SDF 6 $\frac{1}{2}$ "						
		Total Petroleum Hydrocarbon	Soxhlet Extraction, Gravimetric Method	October 27, 2021	85.812	mg/kg	-
					8.58	%	-

**Method** : Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23<sup>rd</sup> edition, 2017.  
**Remarks** : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.  
% Solids = 84.3%  
% Moisture = 15.7%

(Ms. Wlasinee Phiwpanya)

Chemist

October 28, 2021

(Mr. Kasidit Yongsongkram)

Laboratory Supervisor

October 28, 2021



## TEST REPORT

**Client** : PTT Exploration and Production Public Company Limited  
**Address** : 555/1 Vipavadi Rangsil Rd. Chatuchak Bangkok 10900 Thailand  
**Project Name** : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22&TMA-29A  
**Sample Type** : Cutting  
**Sampling By** : PTT Exploration and Production Public Company Limited  
**Sampling Date** : August 10, 2021  
**Work Request No.** : 531/21  
**Sample Received Date** : September 24, 2021  
**Report No.** : 1149/21  
**Reported Date** : October 28, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
240821/37	TMA-29A Cutting						
	Wet Cutting Unwash						
	8 $\frac{1}{2}$ "						
		Arsenic (TTLC)	Hydride Generation Atomic Absorption Spectrometric Method	September 28, 2021	2.86	mg/kg	-
		Barium (TTLC)	Direct Nitrous Oxide-Acetylene Flame Method	October 6, 2021	1,476	mg/kg	-
		Cadmium (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	<1.00	mg/kg	-
		Chromium (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	6.81	mg/kg	-
		Copper (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	14.18	mg/kg	-
		Iron (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	21,302	mg/kg	-
		Lead (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	<5.00	mg/kg	-
		Manganese (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	528.73	mg/kg	-
		Mercury (TTLC)	Cold-Vapor Atomic Absorption Spectrometric Method	October 21, 2021	<0.10	mg/kg	-
		Nickel (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	7.41	mg/kg	-
		Zinc (TTLC)	Direct Air-Acetylene Flame Method	October 6, 2021	41.55	mg/kg	-

**Method** : U.S. Environmental Protection Agency, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.  
**Remarks** : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Wlasinee Phiwpanya)

Chemist

October 28, 2021

(Mr. Kasidit Yongsongkram)

Laboratory Supervisor

October 28, 2021



## TEST REPORT

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsil Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22&TMA-29A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : August 10, 2021

Work Request No. : 531/21  
Sample Received Date : September 24, 2021  
Report No. : 1149/21  
Reported Date : October 28, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
240921/37	TMA-29A Cutting Wet Cutting Unwash 8 1/2"						
		Arsenic (STLC)	Hydride Generation Atomic Absorption Spectrometric Method	October 12, 2021	0.0371	mg/L	-
		Barium (STLC)	Direct Nitrous Oxide-Acetylene Flame Method	October 6, 2021	1.90	mg/L	-
		Cadmium (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	<0.02	mg/L	-
		Chromium (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	<0.05	mg/L	-
		Copper (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	0.05	mg/L	-
		Iron (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	328.14	mg/L	-
		Lead (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	0.26	mg/L	-
		Manganese (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	17.33	mg/L	-
		Mercury (STLC)	Cold-Vapor Atomic Absorption Spectrometric Method	October 22, 2021	0.0007	mg/L	-
		Nickel (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	0.25	mg/L	-
		Zinc (STLC)	Direct Air-Acetylene Flame Method	October 6, 2021	0.26	mg/L	-

Method : U.S. Environmental Protection Agency, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.  
Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.

(Ms. Wilasinee Phiwpanya)  
Chemist

October 28, 2021

(Mr. Kasidit Yesongkram)  
Laboratory Supervisor

October 28, 2021

## TEST REPORT

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsil Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22&TMA-29A  
Sample Type : Cutting  
Sampling By : PTT Exploration and Production Public Company Limited  
Sampling Date : August 10, 2021

Work Request No. : 531/21  
Sample Received Date : September 24, 2021  
Report No. : 1149/21  
Reported Date : October 28, 2021

ID.No.	Sample Name	Parameters	Analytical Methods	Analytical Date	Results	Units	Sample Description
240921/37	TMA-29A Cutting Wet Cutting Unwash 8 1/2"						
		Total Petroleum Hydrocarbon	Soxhlet Extraction, Gravimetric Method	October 27, 2021	120	mg/kg	-
					0.01	%	-

Method : Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23<sup>rd</sup> edition, 2017.  
Remarks : Reported results refer to submitted samples only. This analytical report will not be reproduced in part for such purposes.  
% Solids = 65.8%  
% Moisture = 34.2%

(Ms. Wilasinee Phiwpanya)  
Chemist

October 28, 2021

(Mr. Kasidit Yesongkram)  
Laboratory Supervisor

October 28, 2021

- End of Report -



## Total Metals Total Recoverable - Quality Control

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Viphevi Rd. Chatchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
Sample Type : Mud (TTLIC)  
Work Request No. : 574/21

Analyte	Result	LOQ	Unit	Spike Level	Source Result	% Recovery	% Recovery Limit	RPD	RPD Limit
<b>Blank</b>									
Arsenic (Batch 08-11-64)	ND	0.04	mg/kg	-	-	-	-	-	-
Barium (Batch 07-11-64)	ND	5.00	mg/kg	-	-	-	-	-	-
Cadmium (Batch 02-11-64)	ND	1.00	mg/kg	-	-	-	-	-	-
Chromium (Batch 02-11-64)	ND	2.50	mg/kg	-	-	-	-	-	-
Copper (Batch 02-11-64)	ND	1.50	mg/kg	-	-	-	-	-	-
Iron (Batch 02-11-64)	ND	2.50	mg/kg	-	-	-	-	-	-
Lead (Batch 02-11-64)	ND	5.00	mg/kg	-	-	-	-	-	-
Manganese (Batch 02-11-64)	ND	1.00	mg/kg	-	-	-	-	-	-
Mercury (Batch 05-11-64)	ND	0.10	mg/kg	-	-	-	-	-	-
Nickel (Batch 02-11-64)	ND	2.00	mg/kg	-	-	-	-	-	-
Zinc (Batch 02-11-64)	ND	0.50	mg/kg	-	-	-	-	-	-
<b>LCS</b>									
Arsenic (Batch 08-11-64)	0.98	0.04	mg/kg	1.00	-	98	80-120	-	-
Barium (Batch 07-11-64)	515.81	5.00	mg/kg	500.00	-	103	80-120	-	-
Cadmium (Batch 02-11-64)	50.04	1.00	mg/kg	50.00	-	100	80-120	-	-
Chromium (Batch 02-11-64)	40.85	2.50	mg/kg	40.00	-	102	80-120	-	-
Copper (Batch 02-11-64)	94.04	1.50	mg/kg	100.00	-	94	80-120	-	-
Iron (Batch 02-11-64)	81.87	2.50	mg/kg	100.00	-	82	80-120	-	-
Lead (Batch 02-11-64)	198.00	5.00	mg/kg	200.00	-	99	80-120	-	-
Manganese (Batch 02-11-64)	91.12	1.00	mg/kg	100.00	-	91	80-120	-	-
Mercury (Batch 05-11-64)	0.93	0.10	mg/kg	1.00	-	93	80-120	-	-
Nickel (Batch 02-11-64)	98.59	2.00	mg/kg	100.00	-	99	80-120	-	-
Zinc (Batch 02-11-64)	21.07	0.50	mg/kg	20.00	-	105	80-120	-	-

(Ms. Wilasinee Phiwanya)

Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 30, 2021

## Total Metals Total Recoverable - Quality Control

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Viphevi Rd. Chatchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
Sample Type : Mud (TTLIC)  
Work Request No. : 574/21

Analyte	Result	LOQ	Unit	Spike Level	Source Result	% Recovery	% Recovery Limit	RPD	RPD Limit
<b>Matrix Spike (011121/13)</b>									
Cadmium (Batch 02-11-64)	50.16	1.00	mg/kg	50.00	ND	100	80-120	-	-
Chromium (Batch 02-11-64)	49.88	2.50	mg/kg	40.00	8.55	103	80-120	-	-
Copper (Batch 02-11-64)	103.71	1.50	mg/kg	100.00	13.53	90	80-120	-	-
Lead (Batch 02-11-64)	218.19	5.00	mg/kg	200.00	11.09	104	80-120	-	-
Manganese (Batch 02-11-64)	1,181	1.00	mg/kg	100.00	1,075	116	80-120	-	-
Mercury (Batch 05-11-64)	1.10	0.10	mg/kg	1.00	0.10	100	80-120	-	-
Nickel (Batch 02-11-64)	105.08	2.00	mg/kg	100.00	10.13	95	80-120	-	-
<b>Duplicate (011121/13)</b>									
Arsenic (Batch 08-11-64)	1.68	0.04	mg/kg	-	1.76	-	-	4.7	≤ 20
Barium (Batch 07-11-64)	5,164	5.00	mg/kg	-	5,110	-	-	1.1	≤ 20
<b>(011121/13 LFM)</b>									
Cadmium (Batch 02-11-64)	49.97	1.00	mg/kg	-	50.36	-	-	0.8	≤ 20
Chromium (Batch 02-11-64)	49.92	2.50	mg/kg	-	49.85	-	-	0.1	≤ 20
Copper (Batch 02-11-64)	103.67	1.50	mg/kg	-	103.75	-	-	0.1	≤ 20
<b>(011121/13)</b>									
Iron (Batch 02-11-64)	26,100	2.50	mg/kg	-	26,062	-	-	0.1	≤ 20
<b>(011121/13 LFM)</b>									
Lead (Batch 02-11-64)	218.75	5.00	mg/kg	-	217.63	-	-	0.5	≤ 20
<b>(011121/13)</b>									
Manganese (Batch 02-11-64)	1,089	1.00	mg/kg	-	1,081	-	-	1.1	≤ 20
Mercury (Batch 05-11-64)	0.10	0.10	mg/kg	-	0.11	-	-	8.5	≤ 20
<b>(011121/13 LFM)</b>									
Nickel (Batch 02-11-64)	105.19	2.00	mg/kg	-	104.97	-	-	0.2	≤ 20
<b>(011121/13)</b>									
Zinc (Batch 02-11-64)	42.12	0.50	mg/kg	-	42.20	-	-	0.2	≤ 20

(Ms. Wilasinee Phiwanya)

Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 30, 2021



## Total Metals Total Recoverable - Quality Control

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
Sample Type : Mud (STLC)  
Work Request No. : 57421

Analyte	Result	LOQ	Unit	Spike Level	Source Result	% Recovery	% Recovery Limit	RPD	RPD Limit
<b>Blank</b>									
Arsenic (Batch 12-11-64)	ND	0.0002	mg/L	-	-	-	-	-	-
Barium (Batch 10-11-64)	ND	0.10	mg/L	-	-	-	-	-	-
Cadmium (Batch 10-11-64)	ND	0.02	mg/L	-	-	-	-	-	-
Chromium (Batch 10-11-64)	ND	0.05	mg/L	-	-	-	-	-	-
Copper (Batch 10-11-64)	ND	0.03	mg/L	-	-	-	-	-	-
Iron (Batch 10-11-64)	ND	0.05	mg/L	-	-	-	-	-	-
Lead (Batch 10-11-64)	ND	0.10	mg/L	-	-	-	-	-	-
Manganese (Batch 10-11-64)	ND	0.02	mg/L	-	-	-	-	-	-
Mercury (Batch 11-11-64)	ND	0.0003	mg/L	-	-	-	-	-	-
Nickel (Batch 10-11-64)	ND	0.0002	mg/L	-	-	-	-	-	-
Zinc (Batch 10-11-64)	ND	0.01	mg/L	-	-	-	-	-	-
<b>LCS</b>									
Arsenic (Batch 12-11-64)	0.0097	0.0002	mg/L	0.01	-	97	80-120	-	-
Barium (Batch 10-11-64)	5.1787	0.10	mg/L	5.00	-	104	80-120	-	-
Cadmium (Batch 10-11-64)	0.4927	0.02	mg/L	0.50	-	98	80-120	-	-
Chromium (Batch 10-11-64)	0.4910	0.05	mg/L	0.50	-	98	80-120	-	-
Copper (Batch 10-11-64)	0.9262	0.03	mg/L	1.00	-	93	80-120	-	-
Iron (Batch 10-11-64)	1.0804	0.05	mg/L	1.00	-	108	80-120	-	-
Lead (Batch 10-11-64)	1.9540	0.10	mg/L	2.00	-	98	80-120	-	-
Manganese (Batch 10-11-64)	0.9263	0.02	mg/L	1.00	-	93	80-120	-	-
Mercury (Batch 11-11-64)	0.0095	0.0003	mg/L	0.01	-	95	80-120	-	-
Nickel (Batch 10-11-64)	0.9817	0.04	mg/L	1.00	-	98	80-120	-	-
Zinc (Batch 10-11-64)	0.1940	0.01	mg/L	0.20	-	97	80-120	-	-

(Ms. Wilasinee Phiwpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 30, 2021

## Total Metals Total Recoverable - Quality Control

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non Hazardous or Hazardous Substance Classification of Drilling Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
Sample Type : Mud (STLC)  
Work Request No. : 57421

Analyte	Result	LOQ	Unit	Spike Level	Source Result	% Recovery	% Recovery Limit	RPD	RPD Limit
<b>Matrix Spike (011121/8)</b>									
Barium (Batch 10-11-64)	5.3801	0.10	mg/L	5.00	0.0445	107	80-120	-	-
Cadmium (Batch 10-11-64)	0.4918	0.02	mg/L	0.50	ND	98	80-120	-	-
Chromium (Batch 10-11-64)	0.4956	0.05	mg/L	0.50	ND	99	80-120	-	-
Copper (Batch 10-11-64)	1.0270	0.03	mg/L	1.00	0.0246	100	80-120	-	-
Iron (Batch 10-11-64)	1.1642	0.05	mg/L	1.00	0.1062	106	80-120	-	-
Lead (Batch 10-11-64)	1.9959	0.10	mg/L	2.00	0.0010	100	80-120	-	-
Manganese (Batch 10-11-64)	1.2000	0.02	mg/L	1.00	0.2776	92	80-120	-	-
<b>(011121/11)</b>									
Mercury (Batch 11-11-64)	0.0102	0.0003	mg/L	0.01	0.0004	98	80-120	-	-
<b>(011121/8)</b>									
Nickel (Batch 10-11-64)	1.0226	0.04	mg/L	1.00	ND	102	80-120	-	-
Zinc (Batch 10-11-64)	0.1977	0.01	mg/L	0.20	ND	99	80-120	-	-
<b>Duplicate (011121/8)</b>									
Arsenic (Batch 12-11-64)	0.0157	0.0002	mg/L	-	0.0145	-	-	7.9	≤ 20
<b>(011121/8 LFM)</b>									
Barium (Batch 10-11-64)	5.4145	0.10	mg/L	-	5.3457	-	-	1.3	≤ 20
Cadmium (Batch 10-11-64)	0.4903	0.02	mg/L	-	0.4932	-	-	0.6	≤ 20
Chromium (Batch 10-11-64)	0.4989	0.05	mg/L	-	0.4943	-	-	0.5	≤ 20
Copper (Batch 10-11-64)	1.0259	0.03	mg/L	-	1.0282	-	-	0.2	≤ 20
Iron (Batch 10-11-64)	1.1636	0.05	mg/L	-	1.1646	-	-	0.1	≤ 20
Lead (Batch 10-11-64)	2.0011	0.10	mg/L	-	1.9907	-	-	0.6	≤ 20
Manganese (Batch 10-11-64)	1.2046	0.02	mg/L	-	1.1955	-	-	0.8	≤ 20
<b>(011121/13)</b>									
Mercury (Batch 11-11-64)	0.0015	0.0003	mg/L	-	0.0015	-	-	0.0	≤ 20
<b>(011121/8 LFM)</b>									
Nickel (Batch 10-11-64)	1.0272	0.04	mg/L	-	1.0179	-	-	0.9	≤ 20
Zinc (Batch 10-11-64)	0.1984	0.01	mg/L	-	0.1970	-	-	0.7	≤ 20

(Ms. Wilasinee Phiwpanya)

Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 30, 2021



## Total Petroleum Hydrocarbon - Quality Control

Client : PTT Exploration and Production Public Company Limited  
Address : 555/1 Vipavadi Rangsit Rd. Chatuchak Bangkok 10900 Thailand  
Project Name : Metals, Heavy Metals and Total Petroleum Hydrocarbon (TPH) Analysis for Non-Hazardous or Hazardous Substance Classification of Drilling  
Sample Type : Mud and Drilled Cutting Samples for TMA-22A&TMA-40A  
Work Request No. : 574/21

Analyte	Result	LOQ	Unit	Spike Level	Source Result	% Recovery	% Recovery Limit	RPD	RPD Limit
Batch 08-11-84									
Blank									
Total Petroleum Hydrocarbon	ND	20.0	mg/kg	-	-	-	-	-	-
LCS									
Total Petroleum Hydrocarbon	514	20.0	mg/kg	496	-	104	80-120	-	-
Duplicate (011121/9)									
Total Petroleum Hydrocarbon	178,257	20.0	mg/kg	-	163,243	-	-	8.8	≤10
Blank 24-11-21									
Total Petroleum Hydrocarbon	ND	20.0	mg/kg	-	-	-	-	-	-
LCS									
Total Petroleum Hydrocarbon	488	20.0	mg/kg	499	-	94	80-120	-	-

(Ms. Wilasinee Phikranya)

Chemist

November 30, 2021

(Mr. Kasidit Yasongkram)

Laboratory Supervisor

November 30, 2021

