

ภาคผนวก ฎ  
ใบรายงานผลการวิเคราะห์

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# คุณภาพน้ำผิวดิน

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## ระยะดำเนินการขุดเจาะ

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## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHLOYTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecoohai.net  
**SAMPLING SOURCE** : NSE-F3-SW1 (BRN-SW15) (UTM WGS 84 ZONE 47P 737686E 1723149N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : JANUARY 30, 2023  
**SAMPLING TIME** : 12:00 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : MR KRIDSANAPONG NAMTHIP  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : JANUARY 30, 2023  
**ANALYTICAL DATE** : JANUARY 30 - FEBRUARY 7, 2023  
**REPORT NO.** : 2023-U009716  
**WORK NO.** : 2022-010428  
**ANALYSIS NO.** : T23AB573-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T23AB573-0001		
pH <sup>c</sup>	-	ELECTROMETRIC METHOD AT SITE (SM4500-H <sup>+</sup> B)	7.3 (23°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY <sup>c</sup>	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	719 (23°C)	-	0.1
SULPHATE <sup>c</sup>	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: 4500-SO <sub>4</sub> <sup>2-</sup> E)	4.1	-	0.3
TOTAL PETROLEUM HYDROCARBONS <sup>c</sup>	mg/L	SOXHLET EXTRACTION METHOD (SM: 5520 D AND 5520 F)	ND	-	3
METALS					
ARSENIC <sup>c</sup>	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	≤ 0.01	0.0003
CADMIUM <sup>c</sup>	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER <sup>c</sup>	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 0.1	0.002
IRON <sup>c</sup>	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	7.12	-	0.005
LEAD <sup>c</sup>	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.05	0.003
MANGANESE <sup>c</sup>	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.252	≤ 1.0	0.002
MERCURY <sup>b</sup>	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: 3112 B	< LOQ	≤ 0.002	0.0001
NICKEL <sup>c</sup>	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.1	0.005
TOTAL CHROMIUM <sup>c</sup>	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	-	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T23AB573-0001		
ZINC <sup>c</sup>	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 1.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
(1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
(2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>

≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>

ND : NON-DETECTABLE.

< LOQ : < LIMIT OF QUANTITATION (COPPER ≥ 0.002 AND < 0.025 mg/L, MERCURY ≥ 0.0001 AND < 0.0005 mg/L, ZINC ≥ 0.003 AND < 0.025 mg/L).

*Bhuchonk p.*

(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

FEBRUARY 14, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : BRN-7-SW1 (BRN-SW18) (UTM WGS 84 ZONE 47P 737104E 1725414N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : FEBRUARY 21, 2023  
**SAMPLING TIME** : 14:10 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR. PORAWORN BUNNAG  
**ANALYZED BY** : MISS PORNPIMOL WAENTHONG

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-7-SW1 (BRN-SW18) T23AD129-0001		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	8.2 (29°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	406 (29°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	6.1	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
METALS					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	1.01	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.110	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HBM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-7-SW1 (BRN-SW18) T23AD129-0001		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
(1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
(2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>

≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>

ND : NON-DETECTABLE.

*Benjawan V.*

(MISS BENJAWAN VIRIYOTHAI)  
LABORATORY SUPERVISOR

MARCH 10, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@eco-thai.net  
**SAMPLING SOURCE** : BRN-7-SW2 (BRN-SW19) (UTM WGS 84 ZONE 47P 735421E 1726710N)  
**SAMPLE TYPE** : SURFACE WATER **RECEIVED DATE** : FEBRUARY 22, 2023  
**SAMPLING DATE** : FEBRUARY 21, 2023 **ANALYTICAL DATE** : FEBRUARY 22 - MARCH 7, 2023  
**SAMPLING TIME** : 14:40 HOUR **REPORT NO.** : 2023-U016277  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE **WORK NO.** : 2022-010430  
**SAMPLING BY** : MR. KRIDSANAPONG NAMTHIP **ANALYSIS NO.** : T23AD129-0002  
**ANALYZED BY** : MISS PORNPIMOL WAENTHONG

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT BRN-7-SW2 (BRN-SW19) T23AD129-0002	REGULATORY STANDARD	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	8.4 (30°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	141 (30°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	2.0	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
METALS					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.768	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.145	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	< LOQ	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT BRN-7-SW2 (BRN-SW19) T23AD129-0002	REGULATORY STANDARD	DETECTION LIMIT
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
SAMPLE CONDITION WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.  
 SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
 (1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
 (2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>  
 ≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>  
 ND : NON-DETECTABLE.  
 < LOQ : < LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

*Benjawan V.*

(MISS BENJAWAN VIRIYOTHAI)  
 LABORATORY SUPERVISOR

MARCH 10, 2023



## ระยะดำเนินการผลิต

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## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@eco thai.net  
**SAMPLING SOURCE** : BRN-SW7 (UTM WGS 84 ZONE 47P 739965E 1730028N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 13:40 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR ACHITA SAENGJAN  
**ANALYZED BY** : MISS ARIYA THARAROM

**RECEIVED DATE** : MARCH 28, 2023  
**ANALYTICAL DATE** : MARCH 28 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027379  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF567-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT BRN-SW7 T23AF567-0001	REGULATORY STANDARD	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.9 (37°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	298 (37°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	23.1	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0008	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	2.18	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.592	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT BRN-SW7 T23AF567-0001	REGULATORY STANDARD	DETECTION LIMIT
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENCHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
(1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
(2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>

≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>

ND : NON-DETECTABLE.

*Bhuchonk p.*

(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 18, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : BRN-SW12 (UTM WGS 84 ZONE 47P 738757E 1728280N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 14:30 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS ARIYA THARAROM

**RECEIVED DATE** : MARCH 28, 2023  
**ANALYTICAL DATE** : MARCH 28 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027384  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF567-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW12 T23AF567-0004		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	8.0 (36°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	358 (36°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	15.9	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0006	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.578	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.661	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW12 T23AF567-0004		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID			YELLOW/CLEAR		
SEDIMENT			BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
(1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
(2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>

≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>

ND : NON-DETECTABLE.

*Bhuchonk P.*

(MR. BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 18, 2023





## ANALYSIS REPORT

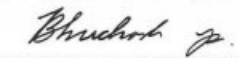
**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : BRN-SW13 (UTM WGS 84 ZONE 47P 738111E 1728416N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 14:40 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS ARIYA THARAROM

**RECEIVED DATE** : MARCH 28, 2023  
**ANALYTICAL DATE** : MARCH 28 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027385  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF567-0005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW13 T23AF567-0005		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.8 (36°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	388 (36°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	8.9	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0008	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.271	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.532	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW13 T23AF567-0005		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).  
CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
(1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
(2) AGRICULTURE  
≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>  
≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>  
ND : NON-DETECTABLE.

  
(MR. BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 18, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@eco thai.net  
**SAMPLING SOURCE** : BRN-SW15 (UTM WGS 84 ZONE 47P 737664E 1723160N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 16:00 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR. ACHITA SAENGJIAN  
**ANALYZED BY** : MISS ARIYA THARAROM

**RECEIVED DATE** : MARCH 28, 2023  
**ANALYTICAL DATE** : MARCH 28 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027386  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF567-0006

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW15 T23AF567-0006		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	8.8 (34°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	118 (34°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	ND	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0003	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	1.13	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.516	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW15 T23AF567-0006		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
 SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
 REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).  
 CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
 (1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
 (2) AGRICULTURE  
 ≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>  
 ≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>  
 ND : NON-DETECTABLE.

*Bhuchonk P.*  
 (MR. BHUCHONK PANICHLERTUMPI)  
 LABORATORY SUPERVISOR

APRIL 18, 2023





## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : BRN-SW16 (UTM WGS 84 ZONE 47P 736529E 1727573N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 15:00 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS ARIYA THARAROM

**RECEIVED DATE** : MARCH 28, 2023  
**ANALYTICAL DATE** : MARCH 28 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027387  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF567-0007

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW16 T23AF567-0007		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.5 (37°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	143 (37°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	1.6	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	3.05	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.464	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW16 T23AF567-0007		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.  
 SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
 (1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
 (2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>

≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>

ND : NON-DETECTABLE.

*Bhuchonk p.*

(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 18, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@eco thai.net  
**SAMPLING SOURCE** : BRN-SW17 (UTM WGS 84 ZONE 47P 735637E 1727878N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 15:20 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS ARIYA THARAROM

**RECEIVED DATE** : MARCH 28, 2023  
**ANALYTICAL DATE** : MARCH 28 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027388  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF567-0008

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW17 T23AF567-0008		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.7 (36°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	207 (36°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	ND	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.695	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.355	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-SW17 T23AF567-0008		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 1.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID			YELLOW/CLEAR		
SEDIMENT			BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
 SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
 (1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
 (2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>

≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>

ND : NON-DETECTABLE.

< LOQ : < LIMIT OF QUANTITATION (ZINC ≥ 0.003 AND < 0.025 mg/L).

*Bhuchonk p.*

(MR. BHUCHONK PANICHLERTUMPI)  
 LABORATORY SUPERVISOR

APRIL 18, 2023





## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : BRN-SW10 (UTM WGS 84 ZONE 47P 739867E 1729417N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 13:50 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS ARIYA THARAROM

**RECEIVED DATE** : MARCH 28, 2023  
**ANALYTICAL DATE** : MARCH 28 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027380  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF567-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT BRN-SW10 T23AF567-0002	REGULATORY STANDARD	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	8.1 (37°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	194 (37°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	1.9	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.940	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.097	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT BRN-SW10 T23AF567-0002	REGULATORY STANDARD	DETECTION LIMIT
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENCHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
(1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
(2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>

≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>

ND : NON-DETECTABLE.

*Bhuchonk p.*

(MR. BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 18, 2023





## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@eco thai.net  
**SAMPLING SOURCE** : BRN-SW11 (UTM WGS 84 ZONE 47P 738438E 1729776N)  
**SAMPLE TYPE** : SURFACE WATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 14:10 HOUR  
**SAMPLING METHOD** : GRAB, GRAB AND STERILE TECHNIQUE  
**SAMPLING BY** : MR ACHITA SAENGJAN  
**ANALYZED BY** : MISS ARIYA THARAROM

**RECEIVED DATE** : MARCH 28, 2023  
**ANALYTICAL DATE** : MARCH 28 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027383  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF567-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT BRN-SW11 T23AF567-0003	REGULATORY STANDARD	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.7 (37°C)	5.0-9.0	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	475 (37°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	49.2	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0016	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.005*, ≤ 0.05**	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	4.97	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.05	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	3.04	≤ 1.0	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.002	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.1	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT BRN-SW11 T23AF567-0003	REGULATORY STANDARD	DETECTION LIMIT
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.SW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 3, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD, NO.8, B.E. 2537 ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT, B.E. 2535, PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL. 111, PART 16, DATED FEBRUARY 24, B.E. 2537 (1994).

CLASS 3 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR  
 (1) CONSUMPTION, BUT PASSING THROUGH ON ORDINARY TREATMENT PROCESS BEFORE USING  
 (2) AGRICULTURE

≤ 0.005\* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO<sub>3</sub>

≤ 0.05\*\* : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO<sub>3</sub>

ND : NON-DETECTABLE.

*Bhuchonk p.*

(MR BHUCHONK PANICHLERTUMPI)  
 LABORATORY SUPERVISOR

APRIL 18, 2023



# คุณภาพน้ำใต้ดิน

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## ระยะดำเนินการขุดเจาะ

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## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : MWNSE-F3 (UP GRADIENT) (NSE-F3-MW3) (UTM WGS 84 ZONE 47P 738294E 1723128N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : JANUARY 30, 2023  
**SAMPLING TIME** : 09:50 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR KRIDSANAPONG NAMTHIP  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : JANUARY 30, 2023  
**ANALYTICAL DATE** : JANUARY 30 - FEBRUARY 7, 2023  
**REPORT NO.** : 2023-U009717  
**WORK NO.** : 2022-010428  
**ANALYSIS NO.** : T23AB573-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			GROUNDWATER T23AB573-0002		
pH <sup>c</sup>	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H <sup>+</sup> B)	6.8 (28°C)	-	-
ELECTRICAL CONDUCTIVITY <sup>c</sup>	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	109 (28°C)	-	0.1
SULPHATE <sup>c</sup>	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: 4500-SO <sub>4</sub> <sup>2-</sup> E)	4.8	-	0.3
TOTAL PETROLEUM HYDROCARBONS <sup>c</sup>	mg/L	SOXHLET EXTRACTION METHOD (SM: 5520 D AND 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC <sup>c</sup>	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	≤ 0.01	0.0003
CADMIUM <sup>c</sup>	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.003	0.002
CHROMIUM <sup>c</sup>	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	-	0.005
COPPER <sup>c</sup>	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 1.0	0.002
IRON <sup>c</sup>	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.869	-	0.005
LEAD <sup>c</sup>	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.01	0.003
MANGANESE <sup>c</sup>	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.170	≤ 0.5	0.002
MERCURY <sup>b</sup>	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: 3112 B	ND	≤ 0.001	0.0001
NICKEL <sup>c</sup>	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.02	0.005

\* PROHIBITED TO PARTIALLY COPY ANALYSIS REPORT PRIOR TO WRITTEN PERMISSION BY THE LABORATORY.

\* THIS ANALYSIS REPORT APPROVES ONLY FOR SUBMITTED SAMPLES.



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			GROUNDWATER T23AB573-0002		
ZINC <sup>c</sup>	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 5.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.

REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.

ND : NON-DETECTABLE.

*Bhuchonk P.*

(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

FEBRUARY 14, 2023

\* PROHIBITED TO PARTIALLY COPY ANALYSIS REPORT PRIOR TO WRITTEN PERMISSION BY THE LABORATORY.

\* THIS ANALYSIS REPORT APPROVES ONLY FOR SUBMITTED SAMPLES.



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : MWNSE-F3 (DOWN GRADIENT) (NSE-F3-MW2) (UTM WGS 84 ZONE 47P 738235E 1723144N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : JANUARY 30, 2023  
**SAMPLING TIME** : 11:30 HOUR  
**SAMPLING METHOD** : SUBMERSTIBLE PUMP  
**SAMPLING BY** : MR KRIDSANAPONG NAMTHIP  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : JANUARY 30, 2023  
**ANALYTICAL DATE** : JANUARY 30 - FEBRUARY 7, 2023  
**REPORT NO.** : 2023-U009718  
**WORK NO.** : 2022-010428  
**ANALYSIS NO.** : T23AB573-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			GROUNDWATER T23AB573-0003		
pH <sup>c</sup>	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H <sup>+</sup> B)	7.1 (29°C)	-	-
ELECTRICAL CONDUCTIVITY <sup>c</sup>	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM:2510 B)	431 (29°C)	-	0.1
SULPHATE <sup>c</sup>	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: 4500-SO <sub>4</sub> <sup>2-</sup> E)	13.0	-	0.3
TOTAL PETROLEUM HYDROCARBONS <sup>c</sup>	mg/L	SOXHLET EXTRACTION METHOD (SM: 5520 D AND 5520 F)	ND	-	3
METALS					
ARSENIC <sup>c</sup>	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	≤ 0.01	0.0003
CADMIUM <sup>c</sup>	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.003	0.002
CHROMIUM <sup>c</sup>	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	-	0.005
COPPER <sup>c</sup>	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 1.0	0.002
IRON <sup>c</sup>	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	11.4	-	0.005
LEAD <sup>c</sup>	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.166	≤ 0.01	0.003
MANGANESE <sup>c</sup>	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.377	≤ 0.5	0.002
MERCURY <sup>b</sup>	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: 3112 B	ND	≤ 0.001	0.0001
NICKEL <sup>c</sup>	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.02	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			GROUNDWATER T23AB573-0003		
ZINC <sup>a</sup>	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.025	≤ 5.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

<sup>a</sup> : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)  
<sup>b</sup> : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)  
<sup>c</sup> : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE  
< LOQ : < LIMIT OF QUANTITATION (COPPER ≥ 0.002 AND < 0.025 mg/L).

*Bhuchonk p.*

(MR. BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

FEBRUARY 14, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : MWBRN-7 (UP GRADIENT) (UTM WGS 84 ZONE 47P 735761E 1725333N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : FEBRUARY 21, 2023  
**SAMPLING TIME** : 13:10 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR. PORAWORN BUNNAG  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : FEBRUARY 22, 2023  
**ANALYTICAL DATE** : FEBRUARY 22 - MARCH 7, 2023  
**REPORT NO.** : 2023-U016233  
**WORK NO.** : 2022-010430  
**ANALYSIS NO.** : T23AD128-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBRN-7 (UP GRADIENT) T23AD128-0001		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	8.4 (30°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	227 (30°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	19	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
METALS					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.125	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.041	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBRN-7 (UP GRADIENT) T23AD128-0001		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 5.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			COLOURLESS/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.  
 SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.  
 REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
 ND : NON-DETECTABLE.  
 < LOQ : < LIMIT OF QUANTITATION (LEAD ≥ 0.003 AND < 0.100 mg/L).

*Bhuchonk p.*  
 (MR. BHUCHONK PANICHLERTUMPI)  
 LABORATORY SUPERVISOR

MARCH 10, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : MWBRN-7 (DOWN GRADIENT) (UTM WGS 84 ZONE 47P 735704E 1725452N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : FEBRUARY 21, 2023  
**SAMPLING TIME** : 13:50 HOUR  
**SAMPLING METHOD °** : SUBMERSIBLE PUMP  
**SAMPLING BY °** : MR PORAWORN BUNNAG  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBRN-7 (DOWN GRADIENT) T23AD128-0002		
pH °	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.9 (29°C)	-	-
ELECTRICAL CONDUCTIVITY °	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	345 (29°C)	-	0.1
SULPHATE °	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	2.0	-	0.3
TOTAL PETROLEUM HYDROCARBONS °	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC °	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0005	≤ 0.01	0.0003
CADMIUM °	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER °	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.002
IRON °	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.321	-	0.005
LEAD °	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.340	≤ 0.01	0.003
MANGANESE °	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 0.5	0.002
MERCURY °	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	< LOQ	≤ 0.001	0.0001
NICKEL °	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBRN-7 (DOWN GRADIENT) T23AD128-0002		
TOTAL CHROMIUM °	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC °	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 5.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			COLOURLESS/CLEAR BROWN		

° : ISO/IEC 17025 ACCREDITED BY THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

° : ISO/IEC 17025 ACCREDITED BY DEPARTMENT OF SCIENCE SERVICE (DSS)

° : VERIFIED BY OWN LABORATORY QUALITY SYSTEM, BUT STILL NOT ACCREDITED

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.

REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.

ND : NON-DETECTABLE.

< LOQ : < LIMIT OF QUANTITATION (MANGANESE ≥ 0.002 AND < 0.025 mg/L, MERCURY ≥ 0.0001 AND < 0.0005 mg/L).

*Benjawan V.*

(MISS BENJAWAN VIRIYOTHAI)  
LABORATORY SUPERVISOR

MARCH 10, 2023

## ระยะดำเนินการผลิต

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## ANALYSIS REPORT


**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@eco thai.net  
**SAMPLING SOURCE** : MWL44-V-1 (UTM WGS 84 ZONE 47P 736587E 1727353N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 28, 2023  
**SAMPLING TIME** : 15:00 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 29, 2023  
**ANALYTICAL DATE** : MARCH 29 - APRIL 17, 2023  
**REPORT NO.** : 2023-U027837  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF669-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT MWL44-V-1 T23AF669-0001	REGULATORY STANDARD	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.2 (34°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	1,829 (34°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	1.0	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0059	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	3.35	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.256	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT MWL44-V-1 T23AF669-0001	REGULATORY STANDARD	DETECTION LIMIT
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 5.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO 20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.

  
(MR. BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 19, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecoohai.net  
**SAMPLING SOURCE** : MWL44-V-2 (UTM WGS 84 ZONE 47P 736497E 1727364N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 28, 2023  
**SAMPLING TIME** : 14:20 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 29, 2023  
**ANALYTICAL DATE** : MARCH 29 - APRIL 17, 2023  
**REPORT NO.** : 2023-U027838  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF669-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT MWL44-V-2 T23AF669-0002	REGULATORY STANDARD	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.3 (33°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	1,707 (33°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	10.6	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
METALS					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	3.29	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.182	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT MWL44-V-2 T23AF669-0002	REGULATORY STANDARD	DETECTION LIMIT
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 5.0	0.003
SAMPLE CONDITION WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO 20 (B.E. 2543)  
ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.

*Bhuchonk P.*  
(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 19, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@eco thai.net  
**SAMPLING SOURCE** : MWBORANG-1 (1) (UTM WGS 84 ZONE 47P 737074E 1728595N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 29, 2023  
**SAMPLING TIME** : 08:30 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 30, 2023  
**ANALYTICAL DATE** : MARCH 30 - APRIL 17, 2023  
**REPORT NO.** : 2023-U027926  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF703-0005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBORANG-1 (1) T23AF703-0005		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.5 (30°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	2,040 (30°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	1.6	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
METALS					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0039	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 10	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	4.33	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.262	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBORANG-1 (1) T23AF703-0005		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.040	≤ 5.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			COLOURLESS/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.  
< LOQ : < LIMIT OF QUANTITATION (COPPER ≥ 0.002 AND < 0.025 mg/L, LEAD ≥ 0.003 AND < 0.100 mg/L).

*Bhuchonk p.*

(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 19, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : MWBORANG-1 (2) (UTM WGS 84 ZONE 47P 736974E 1728604N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 29, 2023  
**SAMPLING TIME** : 10:00 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 30, 2023  
**ANALYTICAL DATE** : MARCH 30 - APRIL 17, 2023  
**REPORT NO.** : 2023-U027927  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF703-0006

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBORANG-1 (2) T23AF703-0006		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.7 (30°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	1,296 (30°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	4.4	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0023	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	3.31	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	1.17	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBORANG-1 (2) T23AF703-0006		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 5.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID SEDIMENT			COLOURLESS/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO 20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.

*Bhuchonk p.*

(MR. BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 19, 2023





## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : MWL44W-A15-1 (UTM WGS 84 ZONE 47P 738112E 1728526N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 29, 2023  
**SAMPLING TIME** : 10:55 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 30, 2023  
**ANALYTICAL DATE** : MARCH 30 - APRIL 17, 2023  
**REPORT NO.** : 2023-U027924  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF703-0003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWL44W-A15-1 T23AF703-0003		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	8.1 (30°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	938 (30°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	5.0	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 1.0	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.128	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.064	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWL44W-A15-1 T23AF703-0003		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.181	≤ 5.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID			COLOURLESS/CLEAR		
SEDIMENT			YELLOW		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.  
< LOQ : < LIMIT OF QUANTITATION (COPPER ≥ 0.002 AND < 0.025 mg/L).

*Bhuchonk p.*  
(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 19, 2023





## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothal.net  
**SAMPLING SOURCE** : MWL44W-A15-2 (UTM WGS 84 ZONE 47P 738112E 1728526N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 29, 2023  
**SAMPLING TIME** : 11:40 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 30, 2023  
**ANALYTICAL DATE** : MARCH 30 - APRIL 17, 2023  
**REPORT NO.** : 2023-U027925  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF703-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWL44W-A15-2 T23AF703-0004		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	8.2 (30°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	802 (30°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	3.3	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0010	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	1.43	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWL44W-A15-2 T23AF703-0004		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.200	≤ 5.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID			COLOURLESS/CLEAR		
SEDIMENT			BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.  
< LOQ : < LIMIT OF QUANTITATION (MANGANESE ≥ 0.002 AND < 0.025 mg/L).

*Bhuchonk p.*

(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 19, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : MWBRN-5 (DOWN GRADIENT) (UTM WGS 84 ZONE 47P 736000E 1728040N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 29, 2023  
**SAMPLING TIME** : 12:50 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT MWBRN-5 (DOWN GRADIENT) T23AF703-0002	REGULATORY STANDARD	DETECTION LIMIT
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.9 (30°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	911 (30°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	ND	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	3.23	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.537	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	2.58	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	< LOQ	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT MWBRN-5 (DOWN GRADIENT) T23AF703-0002	REGULATORY STANDARD	DETECTION LIMIT
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 5.0	0.003
<b>SAMPLE CONDITION</b> WATER'S COLOUR/TURBID SEDIMENT			COLOURLESS/CLEAR		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.  
< LOQ : < LIMIT OF QUANTITATION (MERCURY ≥ 0.0001 AND < 0.0005 mg/L, ZINC ≥ 0.003 AND < 0.025 mg/L).

*Bhuchonk p.*  
(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 19, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@eco thai.net  
**SAMPLING SOURCE** : MWBRN-5 (UP GRADIENT) (UTM WGS 84 ZONE 47P 736142E 1728147N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 29, 2023  
**SAMPLING TIME** : 13:40 HOUR  
**SAMPLING METHOD** : SUBMERSIBLE PUMP  
**SAMPLING BY** : MR ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 30, 2023  
**ANALYTICAL DATE** : MARCH 30 - APRIL 17, 2023  
**REPORT NO.** : 2023-U027922  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF703-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBRN-5 (UP GRADIENT) T23AF703-0001		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.8 (29°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	1,192 (29°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	ND	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
METALS					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0007	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 1.0	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	8.23	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.280	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.784	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			MWBRN-5 (UP GRADIENT) T23AF703-0001		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 5.0	0.003
SAMPLE CONDITION					
WATER'S COLOUR/TURBID SEDIMENT			COLOURLESS/CLEAR BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>RD</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.  
< LOQ : < LIMIT OF QUANTITATION (ZINC ≥ 0.003 AND < 0.025 mg/L).

*Bhuchonk Panichlertumpi*  
(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 19, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecohtai.net  
**SAMPLING SOURCE** : BRN-5-GW4 (UTM WGS 84 ZONE 47P 737021E 1729133N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 15:10 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 29, 2023  
**ANALYTICAL DATE** : MARCH 29 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027381  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF597-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-5-GW4 T23AF597-0001		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.3 (30°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	300 (30°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	6.9	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	ND	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 10	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.660	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.116	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-5-GW4 T23AF597-0001		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 5.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID			COLOURLESS/CLEAR		
SEDIMENT			BROWN		

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO 20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.  
< LOQ : < LIMIT OF QUANTITATION (COPPER ≥ 0.002 AND < 0.025 mg/L, ZINC ≥ 0.003 AND < 0.025 mg/L).

*Bhuchonk*

(MR BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 18, 2023



## ANALYSIS REPORT

**CUSTOMER NAME** : ECO ORIENT RESOURCES (THAILAND) LTD.  
**ADDRESS** : 555 RASA TOWER II, 12TH FLOOR, UNIT 1203 PHAHOLYOTHIN ROAD CHATUCHAK CHATUCHAK BANGKOK 10900  
**CONTACT INFORMATION** : TEL : 0 2937 1124-9 e-mail : anucha@ecothai.net  
**SAMPLING SOURCE** : BRN-5-GW5 (UTM WGS 84 ZONE 47P 736803E 1729097N)  
**SAMPLE TYPE** : GROUNDWATER  
**SAMPLING DATE** : MARCH 27, 2023  
**SAMPLING TIME** : 15:20 HOUR  
**SAMPLING METHOD** : GRAB  
**SAMPLING BY** : MR. ACHITA SAENGJAN  
**ANALYZED BY** : MISS NADNAPA KAMOLBOON

**RECEIVED DATE** : MARCH 29, 2023  
**ANALYTICAL DATE** : MARCH 29 - APRIL 12, 2023  
**REPORT NO.** : 2023-U027382  
**WORK NO.** : 2023-001911  
**ANALYSIS NO.** : T23AF597-0002

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-5-GW5 T23AF597-0002		
pH	-	ELECTROMETRIC METHOD AT SITE (SM: PART 4500-H <sup>+</sup> B)	7.0 (36°C)	-	-
ELECTRICAL CONDUCTIVITY	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: PART 2510 B)	366 (36°C)	-	0.1
SULPHATE	mg/L SO <sub>4</sub> <sup>2-</sup>	TURBIDIMETRIC METHOD (SM: PART 4500-SO <sub>4</sub> <sup>2-</sup> E)	ND	-	0.3
TOTAL PETROLEUM HYDROCARBONS	mg/L	SOXHLET EXTRACTION METHOD (SM: PART 5520 D AND PART 5520 F)	ND	-	3
<b>METALS</b>					
ARSENIC	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: PART 3114 C)	0.0004	≤ 0.01	0.0003
CADMIUM	mg/L Cd	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.003	0.002
COPPER	mg/L Cu	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 10	0.002
IRON	mg/L Fe	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	-	0.005
LEAD	mg/L Pb	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.01	0.003
MANGANESE	mg/L Mn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	0.112	≤ 0.5	0.002
MERCURY	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: PART 3112 B	ND	≤ 0.001	0.0001
NICKEL	mg/L Ni	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	≤ 0.02	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			BRN-5-GW5 T23AF597-0002		
TOTAL CHROMIUM	mg/L Cr	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	ND	-	0.005
ZINC	mg/L Zn	IN-HOUSE METHOD: UAE.TP.GW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: PART 3030 E AND PART 3111 B	< LOQ	≤ 5.0	0.003
<b>SAMPLE CONDITION</b>					
WATER'S COLOUR/TURBID			COLOURLESS/CLEAR		
SEDIMENT					

IN-HOUSE : BASED ON STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23<sup>rd</sup> EDITION, 2017.  
REGULATORY STANDARD : GROUNDWATER QUALITY STANDARDS, NOTIFICATION OF THE NATIONAL ENVIRONMENT BOARD NO.20 (B.E. 2543) ISSUED UNDER THE ENHANCEMENT AND CONSERVATION OF NATIONAL ENVIRONMENTAL QUALITY ACT B.E. 2535.  
ND : NON-DETECTABLE.  
< LOQ : < LIMIT OF QUANTITATION (COPPER ≥ 0.002 AND < 0.025 mg/L, IRON ≥ 0.005 AND < 0.050 mg/L, ZINC ≥ 0.003 AND < 0.025 mg/L).

*Bhuchonk*

(MR. BHUCHONK PANICHLERTUMPI)  
LABORATORY SUPERVISOR

APRIL 18, 2023



# ภาคผนวก ฎ

## เอกสารสอบเทียบเครื่องมือ

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## List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	LAQUA-PH210 HA0F0026	Technology Promotion Association (Thailand-Japan)	23CH98	23 Jan 23	22 Jan 24	-
2	Conductivity Meter	Conductivity	YSI	Pro30 18K100976	Technology Promotion Association (Thailand-Japan)	22CH1729	21 Dec 22	22 Dec 23	-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert.No.: 23CH98  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** pH Meter  
**Manufacturer :** Horiba  
**Model :** LAQUA-PH210  
**Serial No. :** HA0F0026  
**ID No. :** UAE.EFM.068/2564(EFM.pH.01/64)  
**Condition As-Received:** Used Item  
**Received Date :** 20 January 2023  
**Calibration Date :** 23 January 2023  
**Reference :** 2301-0687WSC-1  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260  
**Ambient Temperature :** (25 ± 2.5) °C  
**Relative Humidity :** (50 ± 15) %  
**Calibration Procedure :** In - house method :  
- CP-CH5 by direct measurement with standard  
voltage calibrator and direct measurement with  
certified reference material (CRM)  
- CP-CH8 by comparison with standard thermometer

**Calibrated by :** Warakorn Lernagatrakul

**Approved by :**   
Approved Signatory

( ☒ ) Malee Butkruea  
( ☐ ) Saithip Meangmai  
( ☐ ) Warakorn Lernagatrakul

**Issue Date :** 25 January 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

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Cert.No.: 23CH98  
Page.: 2 of 3

### Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	22E2769	24 Aug 2023
2) Ref. Standard Thermometer	4982054	110RC044	22I1306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:-  
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,  
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	826588	09 July 2024
pH 6.987	CPA chem	826589	09 July 2023
pH 10.008	CPA chem	826590	09 July 2023

3. This certificate is valid only to the item calibrated on date and place of calibration.

### Calibration Results

**Function :** mV Measurement

**Performing standard curve by Fluke at pH (4.7)(7,10)**

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	( ±mV )	k
pH Meter S/N.: HA0F0026	4.00	177.48	177.5	4.01	0.058	2.00
	7.00	0.00	0.1	7.00	0.058	2.00
	7.00	0.00	0.1	7.00	0.058	2.00
	10.00	-177.48	-177.4	10.01	0.058	2.00

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Cert.No.: 23CH98

Page.: 3 of 3

#### Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading ( mV )	Uncertainty of pH measurement ( ± )	Coverage factor k
pH Electrode S/N.: 991L0035	4.008	4.02	161	0.0086	2.05
	6.987	7.00	-11	0.011	2.00
	6.987	7.00	-11	0.011	2.00
	10.008	10.01	-187	0.0096	2.00

Function : Temperature Measurement

( \* ) Without adjustment

This equipment was connected with Temperature Probe;

- Model : 9652

- Serial No. : 991L0035

Dimension of probe;

- Length : 112 mm.

- Diameter : 16 mm.

- Immersion Depth : 100 mm.

Calibration Point ( °C )	Standard Temperature ( °C )	UUC* Reading ( °C )	Error ( °C )	Uncertainty of measurement ( ± °C )	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.003	30.0	-0.003	0.13	2.00
35.0	35.002	35.0	-0.002	0.13	2.00

Remark : - UUC\* = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k$ , providing a level of confidence of approximately 95 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250


TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 22CH1729

Page.: 1 of 3

## Certificate of Calibration

Equipment : Conductivity Meter  
Manufacturer : YSI  
Model : Pro 30  
Serial No. : 18K100976  
ID No. : UAE.EFM.071/2562(ENV.SCT.01/62)  
Condition As-Received: Used Item  
Received Date : 20 December 2022  
Calibration Date : 21 December 2022  
Reference : 2212-0568WSC-2  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260  
Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
Calibration Procedure: In-house method ;  
- CP-CH6 by direct measurement  
with certified reference material (CRM)  
- CP-CH8 by comparison with standard thermometer  
Calibrated by : Warakorn Lerngagtrakul  
Approved by :   
Saitip Meangmai  
Approved Signatory  
( ) Malee Butkruea  
(✓) Saitip Meangmai  
( ) Warakorn Lerngagtrakul  
Issue Date : 26 December 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

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Cert.No.: 22CH1729

Page.: 2 of 3

Condition of this result of calibration

## 1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	1963878	130RC095	22I1140	12 Sep 2023
2) Ref. Std. Thermometer	4982054	110RC044	22I1306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:-

- Traceable to National Institute of Metrology (Thailand), NIMT

## 2. Certified Reference Materials :-

- Conductivity calibration solution, CPA chem Ltd., The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Conductivity Solution	Manufacturer	Lot No.	Exp. date
1413.0 mS/cm	CPA Chem	823328	20 June 2023
12.880 mS/cm	CPA Chem	823329	20 June 2023

- Control Conductivity calibration solution temperature by Water bath (25±0.1) °C

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration results

Function : Conductivity Measurement

( \* ) After Adjustment at 1413.0 µS/cm

Conductivity Electrode Serial No.: 18L100008

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement ( ± )	Coverage factor k
1413.0 mS/cm	1345 mS/cm	1414 mS/cm	9.2 mS/cm	2.00
12.880 mS/cm	11.87 mS/cm	12.61 mS/cm	0.086 mS/cm	2.00

Remark - UUC\* = Unit Under Calibration

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Cert.No.: 22CH1729

Page.: 3 of 3

Calibration Results

Function : Temperature Measurement

( \* ) Without adjustment

This equipment was connected with Temperature Probe;

- Model :	PRO30 COND-T
- Serial No. :	18L100008

Dimension of probe;

- Length :	7 mm.
- Diameter :	2.4 mm.
- Immersion Depth :	95 mm.

Calibration Point ( °C )	Standard Temperature ( °C )	UUC* Reading ( °C )	Error ( °C )	Uncertainty of Measurement ( ± °C )	Coverage factor k
25.0	25.001	25.0	-0.001	0.13	2.00
30.0	30.002	30.0	-0.002	0.13	2.00
35.0	35.002	35.0	-0.002	0.13	2.00

Remark : - UUC\* = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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ใบรับรองสอบเทียบเครื่องมือประจำห้องปฏิบัติการ สำหรับตรวจวัดคุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือประจำห้องปฏิบัติการวิเคราะห์ สำหรับวิเคราะห์คุณภาพน้ำใต้ดิน									
1	Inductively Coupled Plasma-Optical Emission Spectrometer (ICP-OES)	กลุ่มโลหะหนัก : ตะกั่ว (Pb), นิกเกิล (Ni),ปรอททั้งหมด (Total Hg), ปรอท (Hg)	Agilent Technologies	System ID:G8015A G8015AA / MY18030001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	30 Nov 22	29 Nov 23	-
2	Atomic Absorption Spectrometer (AAS)	ทองแดง (Cu),แมงกานีส (Mn),สังกะสี (Zn), เหล็ก (Fe), สารหนู (As), แคดเมียม (Cd),โครเมียมเฮกซะวาเลนท์ (Cr6+)	Agilent Technologies	System ID:G8432A AA240FS / MY13160001	Thailand Institute Of Science And Technological Research (TISTR)	MTC.ACL. No. 486/65	7 Mar 22	6 Mar 23	-
3	Conductivity Meter	การนำไฟฟ้า(EC)	SI Analytics	Lab955 / 16300356	SPC Calibration Center Co.,Ltd.	C24220084	22 Mar 22	21 Mar 23	-
4	pH Meter	ค่าความเป็นกรด-ด่าง (pH) อุณหภูมิ (Temperature)	Mettler-Toledo	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2201793-001-01	1 Mar 22	28 Feb 23	-
5	pH Meter		Hanna Instrument	HI2211 / 8165345	National Food Institute, Ministry of Industry, Thailand	2202097-001-01	16 Mar 22	15 Mar 23	-
6	Analytical Balance (Repeatability 0.1 mg)	ปิโตรเลียมไฮโดรคาร์บอนทั้งหมด (TPH)	Mettler-Toledo	AB-204S/FACT / 1129361010	National Food Institute, Ministry of Industry, Thailand	2203120-001-01	1 Jun 22	31 May 23	-
7	UV-VIS Spectrophotometer	ซัลเฟต (SO <sub>4</sub> <sup>2-</sup> )	Agilent Technologies	Cary60 G6860A / MY15410009	DQE Services Co.,Ltd.	SP22-016	31 May 22	30 May 23	-
8	UV-VIS Spectrophotometer		Hitachi	U-1900 / 2021-064	DQE Services Co.,Ltd.	SP23-007	6 Jan 23	5 Jan 24	-
9	UV-VIS Spectrophotometer		Hitachi	U-2900 / 21E22-009	DQE Services Co.,Ltd.	SP23-008	6 Jan 23	5 Jan 24	-

Due Date of Calibration\* : กำหนดตามแผนการสอบเทียบประจำปี อย่างน้อยปีละ 1 ครั้ง

**Agilent 5110 and 5100 ICP-OES  
Preventive Maintenance Checklist**

Agilent Preventive Maintenance provides factory recommended service for your analytical systems to assure reliable operation and the accuracy of your results. Delivered by highly-trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following URL <http://www.agilent.com/en-us/services/analytical-instrument-services>

### Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of additional or special procedures and/or parts for the instrument service, then these must be ordered separately and charged as a repair, which may incur additional

### Service Engineer's Responsibilities

- Only complete/printout pages that relate to the system being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

**Agilent 5110 and 5100 ICP-OES  
Preventive Maintenance Checklist**

### System Information

Instrument system name and ID		ICP 5110 VDV	
Instrument system site and location		UAE / 3rd Floor Laboratory	
List system component product numbers		List the serial numbers of each component	
1.	G 8015 A	1.	MY18030001
2.	G 8481 A	2.	1801-01988
3.		3.	
4.		4.	
5.		5.	
6.		6.	
7.		7.	
8.		8.	
9.		9.	
10.		10.	

ICP-OES Configuration table	Circle the type or write in the type if other
Nebulizer Type	SeaSpray (OneNeb) other
Spray Chamber	Cyclonic Single Pass   Cyclonic Double Pass   other
Torch	Radial (Dual View) other
Injector Diameter	2.4mm   1.8mm   1.4mm   0.8mm   other
Injector Material	Quartz (Ceramic)   other



**Agilent 5110 and 5100 ICP-OES  
Preventive Maintenance Checklist**
**General Preparation**

- ☒ Discuss any specific questions or issues with the customer prior to starting.
- ☒ Review the instrument logbook.
- ☒ Perform general external inspection of system for cleanliness.
- ☒ Check for proper installation of safety-related parts, assemblies, sensors etc.
- ☒ Check for required firmware/software updates and verify with customers if they would like it installed.
- ☒ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. *N/A*
- ☒ Run Instrument Performance test and record results in Instrument Performance Test Results Table - Pre PM.

**Inspect and clean the system**

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☒ Replace high capacity air inlet dust filter element if installed. *N/A*
- ☒ Remove and clean instrument water inlet filter.

**G8481A Cooling water system**

- ☐ **Section NOT Applicable**
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter.
- ☒ Re fill with Polyclear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser by compressed air or vacuum cleaner.

**Agilent 5110 and 5100 ICP-OES  
Preventive Maintenance Checklist**
**SPS 3 Auto Sampler**

- ☒ **Section NOT Applicable**
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

**SPS 4 Auto Sampler**

- ☒ **Section NOT Applicable**
- ☐ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☐ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner
- ☐ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☐ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☐ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles

**AVS 4, 6, 7**

- ☒ **Section NOT Applicable**
- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

**Instrument Adjustment**

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.
- ☒ Run Instrument Performance Test and record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above run the following Instrument tests and record the result in the Instrument Test Results Table
  - ☒ Subsystem Communications Test
  - ☒ Air Flow

**Agilent 5110 and 5100 ICP-OES  
Preventive Maintenance Checklist**

- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

**Instrument Performance Test Results Table**

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	4105.6	8364.0	4375.0	8400.8
Mn 257.610 nm SRBR	11064.7	31842.1	12801.7	30846.2
Al 396.152 nm SBR	7.5	14.9	9.9	16.8
K 766.491 nm SBR	5.1	36.8	6.4	39.7

\* Axial result is not applicable for G8016AA, G8012AA Radial View instruments.

**Instrument Test Results Table**

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	pass
Air Flow	pass
Water Flow	pass
Gas Flows	pass
RF Generator	pass
Camera Test	pass
Optics Test	pass
Nebulizer test	pass

**Agilent 5110 and 5100 ICP-OES  
Preventive Maintenance Checklist**
**ICP-OES Status Results Table**

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode		Plasma On	
Mains Voltage	224.540	VAC	227.973	VAC
Mains Current	0.204	A	0.104	A
Instrument Temperature	22.8	°C	22.7	°C
RF Air Flow (sensor speed)	15.0	Hz	19.0	Hz
Plasma Exhaust Temperature	No measurement		26.7	°C
Water Flow Oscillator	No measurement		1.64	L/min
Water Flow Detector	1.06	L/min	1.06	L/min
Water Inlet Temperature	18.0	°C	18.0	°C
Polychromator Temperature	35.0	°C	35.0	°C
CCD Temperature	-39.8	°C	-39.8	°C
Thermal Stabilizer	35.0	°C	35.0	°C
Argon Supply Pressure	671.94	kPa	627.33	kPa
Purge Gas Supply Pressure*1	674.90	kPa	643.40	kPa
Option Gas Supply Pressure*1	N/A	kPa	N/A	kPa
Nebulizer Flow	No measurement		0.70	L/min
Nebulizer Back Pressure	No measurement		164.63	kPa
Plasma Gas Flow	No measurement		11.92	L/min
Auxiliary Gas Flow	No measurement		1.00	L/min
RF Power	No measurement		1200	W
RF Supply Current	No measurement		8.663	A
RF Supply Voltage	No measurement		184.660	V

\*1 If option installed



**Agilent 5110 and 5100 ICP-OES  
Preventive Maintenance Checklist**
**ICP-OES Parts List Table**

Part description	Part Number	Product /Model # where used	Quantity Consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Polyclear Cooling Fluid	G3292-80010	G8481A	
Purge Gas Filter	G8010-60136	All	1
Air inlet filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	
Rotor seal for 6-7 port valve for AVS6/7	G8494-60002	G8494A/G8495	
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	
PVC waste tubing, 8mm od x 5mm id, 2m	G8410-80122	SPS 4	
<b>Additional Parts may be required from engineers stock:</b>			
X axis drive belt	5410047500	SPS 3	
Z axis drive belt	5410047400	SPS 3	
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	

**Restore system**

For HF applications, ask the customer to reinstall their sample introduction system.

Leave system in an idle state: on and purging.

Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

**Service Review**

- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section below if there are additional comments.

**Agilent 5110 and 5100 ICP-OES  
Preventive Maintenance Checklist**

- ☒ Review the service and any test results with the customer.
- ☒ If the Instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

**Service Engineer Comments (optional)**

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

**Other Important Customer Web Links**

How to get information on your product:

- ☒ Literature Library - <http://www.agilent.com/en-us/products/icp-oes/icp-oes-systems/5110-icp-oes#literature>
- ☒ Need to know more? - <http://www.agilent.com/crosslab/university/>
- ☒ Need technical support, FAQs? - <http://www.agilent.com/en-us/support/landing/icp-oes>
- ☒ Need supplies? - [www.agilent.com/chem/supplies](http://www.agilent.com/chem/supplies)

**Service Completion**

Service request number 6005625287 Date service completed 30 NOV 2022

Agilent signature Horavit T. Customer signature จิม

Document part number: G8014-90075



**Report Summary**

Instrument Model	Agilent 5100/5110 VDV ICP-OES
Instrument ID	G8011A/G8015A
Instrument Serial Number	MY18030001
Software Version	7.3.1.9507
Firmware Version	3442
Tested By	Test Before PM
Test Completed On	11/30/2022 9:35:32 AM

**Result Summary**

Subsystem Communications Test	Skipped
Air Flow Test	Skipped
Water Flow Test	Skipped
Gas Flows Test	Skipped
RF Generator Test	Skipped
Camera Test	Skipped
Optics Test	Skipped
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass

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**Resolution Test****Pass**

Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	6.62
As (188.980 nm)	≤ 8.20	6.20
C (193.027 nm)	≤ 11.50	8.35
Mo (202.032 nm)	≤ 8.20	6.41
Cr (206.158 nm)	≤ 13.40	9.04
Zn (213.857 nm)	≤ 8.70	6.62
Pb (220.353 nm)	≤ 9.50	7.13
Co (228.615 nm)	≤ 17.20	11.71
Ba (230.424 nm)	≤ 9.40	7.21
Mn (257.610 nm)	≤ 13.30	9.50
Mn (260.568 nm)	≤ 20.30	14.33
Cr (267.716 nm)	≤ 11.00	8.14
Cu (324.754 nm)	≤ 25.00	18.98
Cu (327.395 nm)	≤ 14.20	11.24
Sr (338.071 nm)	≤ 33.50	24.47
Ba (455.403 nm)	≤ 44.00	33.88
Sr (460.733 nm)	≤ 36.00	17.22
Ba (493.408 nm)	≤ 36.00	25.48
Ba (614.171 nm)	≤ 42.00	25.47
Ar (675.283 nm)	≤ 74.00	59.82
K (766.491 nm)	≤ 80.00	64.94

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## Sensitivity Test

Pass

## Radial

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 46.0	SRBR	147.7	1156.5	55.5
Se (196.026 nm)	≥ 41.0	SRBR	111.1	1195.3	97.7
Zn (213.857 nm)	≥ 1421.0	SRBR	4100.6	51959.5	159.6
Pb (220.353 nm)	≥ 46.0	SRBR	192.5	2808.6	185.7
Mn (257.610 nm)	≥ 3518.0	SRBR	11064.7	264165.0	567.6
Al (396.152 nm)	≥ 3.4	SBR	7.5	49047.9	5770.5
Ba (493.408 nm)	≥ 34.0	SBR	107.4	1887710.3	17407.5
K (766.491 nm)	≥ 1.8	SBR	5.1	100805.9	16626.4

## Axial

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	234.9	3056.4	152.9
Se (196.026 nm)	≥ 159.0	SRBR	218.1	3865.1	271.6
Zn (206.200 nm)	≥ 234.0	SRBR	1306.5	15850.4	144.5
Zn (213.857 nm)	≥ 1743.0	SRBR	8364.0	183037.8	476.4
Cd (214.439 nm)	≥ 4227.0	SRBR	7718.5	143240.2	342.8
Pb (220.353 nm)	≥ 320.0	SRBR	576.3	14465.2	580.4
Mn (257.610 nm)	≥ 10625.0	SRBR	31842.1	1411257.3	1958.9
Cr (267.716 nm)	≥ 1048.0	SRBR	4492.1	183110.6	1632.2
Cu (324.754 nm)	≥ 19.0	SBR	46.2	371487.5	7862.9
Al (396.152 nm)	≥ 6.0	SBR	14.9	278447.4	17552.6
Ba (493.408 nm)	≥ 60.0	SBR	190.6	10061527.3	52519.8
K (766.491 nm)	≥ 24.0	SBR	36.8	1922163.4	50858.1

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## Precision Test

Pass

## Radial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	0.82
Se (196.026 nm)	≤ 2.60	0.71
Zn (213.857 nm)	≤ 1.50	0.43
Pb (220.353 nm)	≤ 2.60	0.76
Mn (257.610 nm)	≤ 1.50	0.60
Al (396.152 nm)	≤ 1.50	0.48
Ba (493.408 nm)	≤ 1.50	0.89
K (766.491 nm)	≤ 1.50	0.42

## Axial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.57
Se (196.026 nm)	≤ 1.50	0.76
Zn (206.200 nm)	≤ 1.50	0.61
Zn (213.857 nm)	≤ 1.50	0.51
Cd (214.439 nm)	≤ 1.50	0.55
Pb (220.353 nm)	≤ 1.50	0.52
Mn (257.610 nm)	≤ 1.50	0.54
Cr (267.716 nm)	≤ 1.50	0.54
Cu (324.754 nm)	≤ 1.50	0.69
Al (396.152 nm)	≤ 1.50	0.91
Ba (493.408 nm)	≤ 1.50	0.85
K (766.491 nm)	≤ 1.50	1.22

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**Report Summary**

Instrument Model	Agilent 5100/5110 VDV ICP-OES
Instrument ID	G8011A/G8015A
Instrument Serial Number	MY18030001
Software Version	7.3.1.9507
Firmware Version	3442
Tested By	PM Functional test
Test Completed On	11/30/2022 11:43:36 AM

**Result Summary**

Subsystem Communications Test	Pass
Air Flow Test	Pass
Water Flow Test	Pass
Gas Flows Test	Pass
RF Generator Test	Pass
Camera Test	Pass
Optics Test	Skipped
Advanced Valve System Test	Skipped
Resolution Test	Skipped
Sensitivity Test	Skipped
Precision Test	Skipped

**Subsystem Communications Test** Pass

**Air Flow Test** Pass

30% Air Flow (relative speed)	75% Air Flow (relative speed)
14.00	19.00

**Water Flow Test** Pass

RF Water Flow(L/min)	Camera Water Flow (L/min)	Water Inlet Temperature (°C)
1.44	1.05	18.51

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**Gas Flows Test**

Pass

Nebulizer Target Flow	Actual Flow	Back Pressure	Auxiliary Target Flow	Actual Flow	Back Pressure
0.70	0.70	163.37	2.00	1.99	108.49

Makeup Target Flow	Actual Flow	Back Pressure	Plasma Target Flow	Actual Flow	Back Pressure
2.00	2.00	112.85	18.00	17.91	23.46

**RF Generator Test**

Pass

RF Power Supply Test	Passed
RF Power Supply (V)	147.437
RF Oscillator Test	Passed
RF Oscillator Frequency (MHz)	0.000
Work Coil Current (A)	45.069
RF Power Supply Current (A)	1.997

**Camera Test**

Pass

	Integration Time (ms)	Standard Deviation	Status
Electronic Offset Test	1000	5.305	Passed
Dark Current Test	6000	0.578	Passed
Array Test	5	0.024	Passed
Linearity Test		0.118	Passed

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**Report Summary**

Instrument Model	Agilent 5100/5110 VDV ICP-OES
Instrument ID	G8011A/G8015A
Instrument Serial Number	MY18030001
Software Version	7.3.1.9507
Firmware Version	3442
Tested By	PM Performance test
Test Completed On	11/30/2022 12:10:42 PM

**Result Summary**

Subsystem Communications Test	Skipped
Air Flow Test	Skipped
Water Flow Test	Skipped
Gas Flows Test	Skipped
RF Generator Test	Skipped
Camera Test	Skipped
Optics Test	Pass
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass

**Optics Test****Pass**

	Radial	Axial
Intensity	5674608	5823476
Wavelength	737.212	737.212

**เอกสารไม่ควบคุม****Resolution Test****Pass**

Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	6.79
As (188.980 nm)	≤ 8.20	6.09
C (193.027 nm)	≤ 11.50	8.29
Mo (202.032 nm)	≤ 8.20	6.30
Cr (206.158 nm)	≤ 13.40	9.05
Zn (213.857 nm)	≤ 8.70	6.77
Pb (220.353 nm)	≤ 9.50	7.02
Co (228.615 nm)	≤ 17.20	11.67
Ba (230.424 nm)	≤ 9.40	7.39
Mn (257.610 nm)	≤ 13.30	9.48
Mn (260.568 nm)	≤ 20.30	14.25
Cr (267.716 nm)	≤ 11.00	7.94
Cu (324.754 nm)	≤ 25.00	18.99
Cu (327.395 nm)	≤ 14.20	11.33
Sr (338.071 nm)	≤ 33.50	24.44
Ba (455.403 nm)	≤ 44.00	33.86
Sr (460.733 nm)	≤ 36.00	17.51
Ba (493.408 nm)	≤ 36.00	25.56
Ba (614.171 nm)	≤ 42.00	24.96
Ar (675.283 nm)	≤ 74.00	59.38
K (766.491 nm)	≤ 80.00	65.63

**เอกสารไม่ควบคุม**

Sensitivity Test			Pass		
Radial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 46.0	SRBR	147.8	1149.3	54.8
Se (196.026 nm)	≥ 41.0	SRBR	111.6	1222.8	101.0
Zn (213.857 nm)	≥ 1421.0	SRBR	4375.0	52592.3	143.7
Pb (220.353 nm)	≥ 46.0	SRBR	199.8	2744.4	166.5
Mn (257.610 nm)	≥ 3518.0	SRBR	12801.7	285591.3	496.0
Al (396.152 nm)	≥ 3.4	SBR	9.9	52888.6	4873.6
Ba (493.408 nm)	≥ 34.0	SBR	154.6	2287291.6	14698.1
K (766.491 nm)	≥ 1.8	SBR	6.4	106701.6	14350.9
Axial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	242.4	3170.1	154.8
Se (196.026 nm)	≥ 159.0	SRBR	226.1	4134.5	289.3
Zn (206.200 nm)	≥ 234.0	SRBR	1126.6	13782.0	146.5
Zn (213.857 nm)	≥ 1743.0	SRBR	8400.8	177166.3	442.5
Cd (214.439 nm)	≥ 4227.0	SRBR	7001.9	125884.2	321.6
Pb (220.353 nm)	≥ 320.0	SRBR	536.3	12909.3	532.6
Mn (257.610 nm)	≥ 10625.0	SRBR	30846.2	1287989.0	1738.8
Cr (267.716 nm)	≥ 1048.0	SRBR	4396.0	167335.6	1424.4
Cu (324.754 nm)	≥ 19.0	SBR	52.1	373690.7	7033.1
Al (396.152 nm)	≥ 6.0	SBR	16.8	268357.7	15112.4
Ba (493.408 nm)	≥ 60.0	SBR	225.2	10173441.5	44971.7
K (766.491 nm)	≥ 24.0	SBR	39.7	1874136.2	46055.7

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Precision Test		Pass
Radial		
Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	0.60
Se (196.026 nm)	≤ 2.60	0.84
Zn (213.857 nm)	≤ 1.50	0.29
Pb (220.353 nm)	≤ 2.60	0.59
Mn (257.610 nm)	≤ 1.50	0.28
Al (396.152 nm)	≤ 1.50	0.28
Ba (493.408 nm)	≤ 1.50	0.59
K (766.491 nm)	≤ 1.50	0.23
Axial		
Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.71
Se (196.026 nm)	≤ 1.50	0.43
Zn (206.200 nm)	≤ 1.50	0.46
Zn (213.857 nm)	≤ 1.50	0.37
Cd (214.439 nm)	≤ 1.50	0.48
Pb (220.353 nm)	≤ 1.50	0.48
Mn (257.610 nm)	≤ 1.50	0.74
Cr (267.716 nm)	≤ 1.50	0.26
Cu (324.754 nm)	≤ 1.50	0.51
Al (396.152 nm)	≤ 1.50	0.45
Ba (493.408 nm)	≤ 1.50	0.81
K (766.491 nm)	≤ 1.50	0.84

เอกสารไม่ควบคุม

## Calibration Certificate

**Certificate No.:** 2301846-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakanong, Bangkok 10260

Page 1 of 5

**Equipment:** pH Meter  
**Manufacturer:** Mettler Toledo  
**Model:** SevenEasy TM S20 pH  
**Serial No.:** 1231155210  
**ID No.:** UAE.WAT.010/2553  
**Order No.:** 2301846  
**Operation No.:** 2301846-001  
**Date of Receipt:** 17 February 2023  
**Date of Calibration:** 24 February 2023

**Calibrated by** Mr.Worapob Sooktong **Approved by** N. Niyomchait  
Scientist ( Mr.Nuttapol Niyomchait )  
Specialist, Division of Calibration Laboratory  
**Date of Issue:** 24 February 2023 **Responsible for the Technical Management Team**

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65



## Calibration Report

**Certificate No.:** 2301846-001-01  
**Equipment:** pH Meter  
**Resolution:** 0.01 pH ; 1 mV  
**Manufacturer:** Mettler Toledo  
**Model:** SevenEasy TM S20 pH  
**Serial No.:** 1231155210  
**Type:** Bench top  
**ID No.:** UAE.WAT.010/2553

**Date of Calibration:** 24 February 2023

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**Location:** Chemical Calibration Laboratory, National Food Institute  
**Environment Condition:** Ambient Temperature: ( 25.1 ± 1.5 ) °C Relative Humidity: ( 50 ± 5 ) %  
**Condition of Equipment:** Good Condition  
**Condition of this Results of Calibration**

1. Calibration Method In house method : W-CC-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)  
2. Reference Standards / Certified Reference Material

Instruments	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2709007	Fluke	22E1959	17 June 2023
2.2 Digital Thermometer	2709007	Fluke	CC 650577-01	30 October 2023
2.3 Thermo-Hygro Meter	NFI.BTH 007/18	PONPE 490	QR22-0886	26 April 2023
Certified Reference Material	Lot. No.	Manufacturer	Ref N	Expire Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	832606	CPAchem	PH216.L5	8 August 2024
2.5 pH buffer 6.865 (Primary pH buffer Solution)	832607	CPAchem	PH217.L5	8 August 2024
2.6 pH buffer 10.01 (Primary pH buffer Solution)	832609	CPAchem	PH220.L5	8 August 2023
2.7 pH buffer 7.00 (Standard pH buffer Solution)	832610	CPAchem	PH107.L5	8 August 2023

3. This certification is traceable to The International System of Unit (SI Unit)

3.1 Instruments No.2.1	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0008
3.2 Instruments No.2.2	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0292
3.4 Certified Reference Material No. 2.4 to 2.6	traceable to	Primary measurement method- Harned cell using calibrated thermometer, barometer, and nanovoltmeter.The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025
3.5 Certified Reference Material No.2.7	traceable to	BIM RefN HI-27 LotN 04.06.2021; BIM RefN HI-28 LotN 28.05.2021; BIM RefN HI-27 LotN 04.06.2021; BIM RefN HI-28 LotN 28.05.2021, the Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

F-CS-012 Revision: 01 Date: 20-04-65





## Calibration Report

**Certificate No.:** 2301846-001-01  
**Equipment:** pH Meter  
**Resolution:** 0.01 pH ; 1 mV  
**Manufacturer:** Mettler Toledo  
**Model:** SevenEasy TM S20 pH  
**Serial No.:** 1231155210  
**Type:** Bench top  
**ID No.:** UAE.WAT.010/2553

**Date of Calibration:** 24 February 2023

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### Calibration Results:

1. Calibration of pH Meter (Manual Temperature Compensation at 25 °C)

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (±mV)	Coverage Factor (k)
		mV	pH		
0	414.120	414	0.00	0.58	2.00
2	295.814	296	2.00	0.58	2.00
4	177.464	178	4.00	0.58	2.00
6	59.160	59	6.00	0.58	2.00
7	0.000	0	7.00	0.58	2.00
8	-59.158	-59	8.00	0.58	2.00
10	-177.460	-177	10.00	0.58	2.00
12	-295.811	-296	12.00	0.58	2.00
14	-414.117	-414	14.00	0.58	2.00

2. Calibration of pH Meter with Electrode (Manual Temperature Compensation at 25 °C)

**Equipment:** pH Electrode  
**Type:** Combined Electrode  
**Manufacturer:** Mettler Toledo  
**Model:** InLab Solids  
**Serial No.:** 9018311  
**ID.No.:** N/A

**Performance of Electrode system** (Three-Point Calibration at pH 4, pH 7 and pH 10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.01	186	-	0.0071	2.00
6.865	6.90	19	97.68	0.0075	2.00
10.008	10.01	-160	97.29	0.0095	2.00
6.985	6.99	15	-	0.0092	2.00

F-CS-012 Revision: 01 Date: 20-04-65

N. Nigudat



nfi.or.th

## Calibration Report

**Certificate No.:** 2301846-001-01  
**Equipment:** Digital Thermometer with RTD  
**Resolution:** 0.1 °C  
**Model:** SevenEasy TM S20 pH  
**Serial No.:** 1231155210  
**ID No.:** UAE.WAT.010/2553  
**Manufacturer:** Mettler Toledo

**Date of Calibration:** 24 February 2023

Page 4 of 5

**Location:** Chemical Calibration Laboratory, National Food Institute  
**Environment Condition:** Ambient Temperature 25 °C ± 1 °C  
 Relative Humidity 48 % ± 3 %

### Condition of this results of Calibration:

- Calibration Method : - In house method: W-TE-025 by comparison with standard thermometer.  
 - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.  
 - The temperature scale in use at this laboratory is the International Temperature scale of 1990 (ITS-90).

2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1523	2118154	PSL-T 0673/65	07-Jun-23	TISTR
Platinum Resistance Thermometer (PRT)	5627A	877332			

Support Equipment : - Low Temperature Bath (Micro Bath), Model: 7103, S/N: A39538,AN65 A85181.

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good
- Result of Calibration : ☒ Without adjustment ☐ After adjustment

F-CS-012 Revision: 01 Date: 20-04-65

N. Nigudat



nfi.or.th

## Calibration Report

**Certificate No.:** 2301846-001-01  
**Equipment:** Digital Thermometer with RTD  
Resolution: 0.1 °C Model: SevenEasy TM S20 pH  
Serial No.: 1231155210 ID No.: UAE.WAT.010/2553  
Manufacturer: Mettler Toledo  
**Date of Calibration:** 24 February 2023

Page 5 of 5

**Calibration point:** 15.0, 25.0 and 35.0 °C

### Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 120 mm.
- Description of probe, model : - S/N : -  
Dimension of probe : Diameter 9 mm., Length 120 mm.,  
Sheath material : Stainless Steel

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.015	- 0.1	0.11
25.0	25.014	0.0	0.11
35.1	35.016	- 0.1	0.11

### Note

- UUC\* : Unit Under Calibration

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k= 2, providing a level of confidence of approximately 95 %.

----- End -----

*N. Nipubant*

F-CS-012 Revision: 01 Date: 20-04-65

2008 ซอย 36 ถนนอรุณอมรินทร์ แขวงบางลำภูล่าง เขตบางพลัด กรุงเทพมหานคร

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand

Tel +66(0) 2422 8688 Fax +66(0) 2422 8558



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## Calibration Certificate

**Certificate No.:** 2202097-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 5

**Equipment:** pH Meter  
**Manufacturer:** HANNA INSTRUMENTS  
**Model:** HI 2211  
**Serial No.:** 08165345  
**ID No.:** UAE.WAT.004/2556  
**Order No.:** 2202097  
**Operation No.:** 2202097-001  
**Date of Receipt:** 11 March 2022  
**Date of Calibration:** 16 March 2022

**Calibrated by** Mr.Manas Somsak  
Specialist

**Approved by** *RH*  
( Mr.Pheraphat Tuanjit )  
Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team

**Date of Issue:** 21 March 2022

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม

## Calibration Report

Certificate No.: 2202097-001-01

Equipment: pH Meter Resolution: 0.01 pH ; 0.1/1 mV  
Manufacturer: HANNA INSTRUMENTS Model: HI 2111  
Serial No.: 08165345 Type: Bench top  
ID No.: UAE.WAT.004/2556

Date of Calibration: 16 March 2022

Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute.

Environment Condition: Ambient Temperature: ( 23.0 ± 1.5 ) °C Relative Humidity: ( 49.5 ± 5 ) %

Condition of Equipment: Good Condition

Condition of this Results of Calibration

1. Calibration Method In house method : W-CC-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material

Instruments	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2709007	Fluke	SCL-21F-0687	24 June 2022
2.2 Digital Thermometer	2709007	Fluke	CC-640599-01	30 October 2022
2.3 Thermo-Hygro Meter	ana.klu.BTH 005/58	PONPE	QR21-2787	15 November 2022

Certified Reference Material	Lot No.	Manufacturer	Ref N	Expire Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	780012	CPAchem	PH216.L5	21 November 2023
2.5 pH buffer 6.865 (Primary pH buffer Solution)	780013	CPAchem	PH217.L5	21 November 2023
2.6 pH buffer 10.01 (Primary pH buffer Solution)	780015	CPAchem	PH220.L5	21 November 2022
2.7 pH buffer 7.00 (Standard pH buffer Solution)	776840	CPAchem	PH107.L5	8 November 2022

3. This certification is traceable to The International System of Unit (SI Unit)

3.1 Instruments No.2.1	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0075
3.2 Instruments No.2.2	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0292
3.4 Certified Reference Material No. 2.4 to 2.6	traceable to	Primary measurement method- Harned cell using calibrated thermometer, barometer, and nanovoltmeter. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025
3.5 Certified Reference Material No. 2.7	traceable to	BIM RefN HI-7 LotN 30.04.2020; BIM RefN HI-9 LotN 28.05.2020; BIM RefN HI-8 LotN 30.04.2020; BIM RefN HI-10 LotN 28.05.2020. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

## Calibration Report

Certificate No.: 2202097-001-01

Equipment: pH Meter Resolution: 0.01 pH ; 0.1/1 mV  
Manufacturer: HANNA INSTRUMENTS Model: HI 2111  
Serial No.: 08165345 Type: Bench top  
ID No.: UAE.WAT.004/2556

Date of Calibration: 16 March 2022

Page 3 of 5

Calibration Results:

1. Calibration of pH Meter ( Manual Temperature Compensation at 25 °C )

Nominal pH	DC Voltage Standard ( mV )	Average Indicator Reading		Uncertainty ( ±mV )	Coverage Factor ( k )
		mV	pH		
0	414.117	414	0.00	0.58	2.00
2	295.811	295.7	2.00	0.063	2.00
4	177.462	177.4	4.00	0.063	2.00
6	59.159	59.2	6.00	0.063	2.00
7	-0.001	0.1	7.00	0.063	2.00
8	-59.159	-59.1	8.00	0.063	2.00
10	-177.463	-177.3	10.00	0.063	2.00
12	-295.812	-295.6	12.00	0.063	2.00
14	-414.119	-414	14.00	0.58	2.00

2. Calibration of pH Meter with Electrode ( Manual Temperature Compensation at 25 °C )

Equipment: pH Electrode Type: Combined Electrode  
Manufacturer: METTLER TOLEDO Model: LE420  
Serial No.: 1142602 ID.No. N/A

Performance of Electrode system (Three-Point Calibration at pH4, pH7 and pH10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty ( ± pH )	Coverage Factor ( k )
	pH	mV			
4.008	4.01	180.5	99.3	0.0071	2.00
6.866	6.87	12.5	-	0.0074	2.00
10.015	10.01	-171.5	99.1	0.0090	2.00
6.983	6.98	5.2	-	0.0092	2.00



## Calibration Report

**Certificate No.:** 2202097-001-01  
**Equipment:** Digital Thermometer with RTD (pH Meter)  
**Resolution:** 0.1 °C **Model:** HI 2211  
**Serial No.:** 08165345 **ID No.:** UAE.WAT.004/2556  
**Manufacturer:** HANNA INSTRUMENTS  
**Date of Calibration:** 16 March 2022

Page 4 of 5

**Location:** Chemical Calibration Laboratory, National Food Institute.  
**Environment Condition:** Ambient Temperature ( 23.0 ± 1.0 ) °C  
Relative Humidity ( 50 ± 4 ) %

### Condition of this results of Calibration:

- Calibration Method :
  - In house method: W-TE-025 by comparison with standard thermometer.
  - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
  - The temperature scale in use at this laboratory is the International Temperature scale of 1990 ( ITS-90 ).

### 2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1523	2118154	PSL-T 0851/64	24-Jun-22	TISTR
Platinum Resistance Thermometer (PRT)	5627A	877332			

Support Equipment : - Low Temperature Bath (ISOCAL-6), Model: Europa-6 Plus Basic, S/N: 341592/2

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.

6. Condition of Calibrated item : Good

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment



## Calibration Report

**Certificate No.:** 2202097-001-01  
**Equipment:** Digital Thermometer with RTD (pH Meter)  
**Resolution:** 0.1 °C **Model:** HI 2211  
**Serial No.:** 08165345 **ID No.:** UAE.WAT.004/2556  
**Manufacturer:** HANNA INSTRUMENTS  
**Date of Calibration:** 16 March 2022

Page 5 of 5

**Calibration point:** 15.0, 25.0 and 35.0 °C

### Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 100 mm.
- Description of probe, model : N/A S/N : N/A
- Dimension of probe : Diameter 3.5 mm., Length 100 mm.,
- Sheath material : Stainless Steel

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.0	15.001	0.0	0.099
25.0	25.002	0.0	0.099
35.0	35.002	0.0	0.099

Note - UUC\* : Unit Under Calibration

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor  $k = 2$ , providing a level of confidence of approximately 95 %.

----- End -----



## Calibration Certificate

**Certificate No.:** 2203120-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
 Bangchack, Prakanong, Bangkok 10260

Page 1 of 3

**Equipment:** Electronic Balance

**Manufacturer:** METTLER TOLEDO

**Model:** AB204-S/FACT

**Serial No.:** 1129361010

**ID No.:** UAE.WAS.002/2552


**Order No.:** 2203120

**Operation No.:** 2203120-001

**Date of Receipt:** 1 June 2022

**Date of Calibration:** 1 June 2022

**Calibrated by** Mr.Taveesak Seilee  
 Scientist

**Approved by**   
 ( Mr.Pheraphat Tuanjit )  
 Manager, Division of Calibration Laboratory  
 Responsible for the Technical Management Team

**Date of Issue:** 7 June 2022

### The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65

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## Calibration Report

**Certificate No.:** 2203120-001-01  
**Equipment:** Electronic Balance  
**Model:** AB204-S/FACT  
**Serial No.:** 1129361010  
**Capacity:** 220 g  
**Manufacturer:** METTLER TOLEDO  
**Resolution:** 0.0001 g  
**ID No.:** UAE.WAS.002/2552

**Date of Calibration:** 1 June 2022

Page 2 of 3

**Environment Condition:** Ambient Temperature: 19.9 ± 0.3 °C Relative Humidity: 45 ± 1.5 %

**Place of Calibration:** 108, Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

**Condition of Equipment:** Good Condition

### Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1-500mg	B308068554	TCS	M2201020S	6 January 2023
Standard Weight Class E2	1-500g	B308068128	TCS	M2201021S	6 January 2023
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	PONPE 490	NFI.BTH 010/18	Quality Reborn	QR22-0350	18 February 2023

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

### Calibration Results:

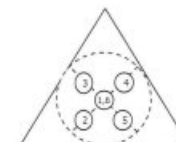
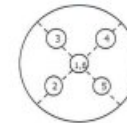
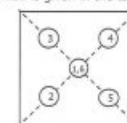
#### 1. Repeatability of Reading:

Nominal Value ( g )	Standard Deviation of Reading ( g )
100	0.000048
200	0.000052

#### 2. Off-Center Error:

A mass of 50 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.



1	2	3	4	5	6	(Maximum Difference)
( g )	( g )	( g )	( g )	( g )	( g )	( g )
49.9999	49.9998	49.9998	49.9999	49.9998	49.9998	0.0001

F-CS-012 Revision: 01 Date: 20-04-65

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## Calibration Report

**Certificate No.:** 2203120-001-01

**Equipment:**

Electronic Balance

**Model:** AB204-S/FACT

**Serial No.:** 1129361010

**Capacity:** 220 g

**Manufacturer:** METTLER TOLEDO

**Resolution:** 0.0001 g

**ID No.:** UAE.WAS.002/2552

**Date of Calibration:** 1 June 2022

Page 3 of 3

**Calibration Results:** (Continued)

**Calibration Range:** 0 - 200 g

**Calibration Adjustment:** Internal Calibration

**3. Departure from Nominal Value:**

Nominal Value ( g )	Standard Value ( g )	Average Reading ( g )	Correction ( g )	Uncertainty ( ± g )	Coverage Factor k
Unload	0.00000	0.0000	0.0000	0.000088	2.00
0.01	0.01000	0.0100	0.0000	0.000088	2.00
0.05	0.05000	0.0499	0.0001	0.000088	2.00
0.1	0.10000	0.1000	0.0000	0.000088	2.00
0.2	0.20000	0.2000	0.0000	0.000088	2.00
0.5	0.50000	0.5000	0.0000	0.000088	2.00
1	1.00000	0.9999	0.0001	0.000088	2.00
2	2.00000	1.9999	0.0001	0.000089	2.00
5	5.00000	5.0000	0.0000	0.000089	2.00
10	9.99998	9.9999	0.0001	0.000092	2.00
20	19.99999	19.9999	0.0001	0.000094	2.00
50	49.99990	49.9999	0.0000	0.00012	2.00
70	69.99989	69.9998	0.0001	0.00014	2.00
100	100.00001	99.9999	0.0001	0.00017	2.00
150	149.99991	149.9997	0.0002	0.00022	2.00
200	200.00007	199.9998	0.0003	0.00030	2.00

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k$ , providing a level of confidence of approximately 95 %.

----- End -----

F-C5-012 Revision: 01 Date: 20-04-65

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DQE Services Co.,Ltd.

**DQE Services**

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



## CERTIFICATE OF CALIBRATION

**Certificate No. :** SP23-021

Page 1 of 5

**Customer :** United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

**Address :** 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong,  
Bangkok 10260

**Location of calibration :** Laboratory 315

**Equipment :** UV-Vis Spectrophotometer

**Manufacturer :** Agilent Technologies

**Model :** Cary 60

**Serial No. :** MY15410009

**ID No. :** N/A

**Received Date :** 20 May 2023

**Calibration Date :** 20 May 2023

**Issue Date :** 23 May 2023

**Condition Instrument :** Good

**Calibrated by :**

**Approved by :**

( Mr.Tanawut Rittidach )

( Ms.Chonthicha Sangngern )

Technical Manager

Quality Manager


The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.


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FM-708-02 R01 1/11/2021





DQE Services Co.,Ltd.  
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Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



## REPORT OF CALIBRATION

Certificate No. : SP23-021
Page 2 of 5

Environment Condition : Ambient Temperature  $25 \pm 5$  °C

Relative humidity  $55 \pm 20$  %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95935	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

Traceability This certification is traceable to the International System of Unit maintained at National -  
Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 60 nm/min


Scan Interval of UUC : 0.15 nm.

Resolution of UUC : Photometric 0.0001 Abs.


Wavelength 0.1 nm.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021



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Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



## REPORT OF CALIBRATION

Certificate No. : SP23-021
Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000	0.0000	0.0000	0.0028	2.00
	0.5787	0.5742	0.0045	0.0031	2.00
	1.0490	1.0423	0.0067	0.0029	2.00
	2.1900	2.1847	0.0053	0.0075	2.00
440	0.0000	0.0000	0.0000	0.0028	2.00
	0.5607	0.5577	0.0030	0.0034	2.00
	1.0247	1.0234	0.0013	0.0035	2.00
	2.1229	2.1171	0.0058	0.0088	2.00
465	0.0000	0.0000	0.0000	0.0028	2.00
	0.5236	0.5184	0.0052	0.0029	2.00
	0.9634	0.9607	0.0027	0.0029	2.00
	1.9763	1.9715	0.0048	0.0081	2.00
546.1	0.0000	-0.0001	0.0001	0.0028	2.00
	0.5191	0.5159	0.0032	0.0031	2.00
	1.0003	0.9980	0.0023	0.0033	2.00
	1.9987	1.9917	0.0070	0.0087	2.00
590	0.0000	0.0000	0.0000	0.0028	2.00
	0.5523	0.5501	0.0022	0.0030	2.00
	1.0809	1.0808	0.0001	0.0030	2.00
	2.0391	2.0336	0.0055	0.0081	2.00
635	0.0000	0.0000	0.0000	0.0028	2.00
	0.5601	0.5585	0.0016	0.0031	2.00
	1.0512	1.0485	0.0027	0.0030	2.00
	1.9294	1.9317	-0.0023	0.0083	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

**REPORT OF CALIBRATION**

Certificate No. : SP23-021

Page 4 of 5

**Photometric Accuracy :**

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.0000	0.0000	0.0050	2.00
	0.7478	0.7436	0.0042	0.0058	2.00
257	0.0000	0.0000	0.0000	0.0050	2.00
	0.8686	0.8648	0.0038	0.0064	2.00
313	0.0000	0.0000	0.0000	0.0050	2.00
	0.2912	0.2908	0.0004	0.0052	2.00
350	0.0000	0.0000	0.0000	0.0050	2.00
	0.6448	0.6398	0.0050	0.0058	2.00

**REPORT OF CALIBRATION**

Certificate No. : SP23-021

Page 5 of 5

**Wavelength Accuracy :**

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.72	242.0	-0.28	0.18	2.00
279.45	279.5	-0.05	0.18	2.00
287.81	287.5	0.31	0.18	2.00
334.06	333.5	0.56	0.18	2.00
360.93	360.3	0.63	0.18	2.00
418.59	418.0	0.59	0.18	2.00
445.94	445.3	0.64	0.18	2.00
453.66	453.0	0.66	0.18	2.00
460.02	459.6	0.42	0.18	2.00
536.59	536.4	0.19	0.18	2.00
637.98	638.3	-0.32	0.18	2.00
431.38	431.0	0.38	0.18	2.00
472.50	472.5	0.00	0.18	2.00
513.47	513.5	-0.03	0.18	2.00
528.88	529.0	-0.12	0.18	2.00
573.17	573.0	0.17	0.18	2.00
585.35	585.0	0.35	0.20	2.00
684.40	684.5	-0.10	0.18	2.00
740.72	741.0	-0.28	0.20	2.00
748.55	748.5	0.05	0.18	2.00
807.03	807.0	0.03	0.18	2.00
879.28	879.5	-0.22	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement *U* is stated as the standard uncertainty of measurement multiplied by the coverage factor *k*,

which for a normal distribution corresponds to a coverage probability of approximately 95%

- \* Indicates non TISI accredited

- End of Certificate -

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FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

## CERTIFICATE OF CALIBRATION

Certificate No. : SP23-007

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-1900

Serial No. : 2021-064

ID No. : UAE.WAS.006/2552

Received Date : 6 January 2023

Calibration Date : 6 January 2023

Issue Date : 10 January 2023

Condition Instrument : Used

Calibrated by :

(Mr.Tanawut Rittidach)

Technical Manager

Approved by :

(Ms. Chonthicha Sangngern)

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

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## REPORT OF CALIBRATION

Certificate No. : SP23-007

Page 2 of 5

Environment Condition : Ambient Temperature  $25 \pm 5$  °CRelative humidity  $55 \pm 20$  %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95935	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

Traceability : This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 4.0 nm.

Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

เอกสารไม่ควบคุม



**REPORT OF CALIBRATION**

Certificate No. : SP23-007

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5787	0.575	0.0037	0.0031	2.00
	1.0490	1.044	0.0050	0.0029	2.00
	2.1900	2.181	0.0090	0.0080	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5607	0.558	0.0027	0.0034	2.00
	1.0247	1.021	0.0037	0.0035	2.00
	2.1229	2.115	0.0079	0.0081	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5236	0.520	0.0036	0.0030	2.00
	0.9634	0.961	0.0024	0.0029	2.00
	1.9763	1.968	0.0083	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5191	0.518	0.0011	0.0031	2.00
	1.0003	1.000	0.0003	0.0033	2.00
	1.9987	1.993	0.0057	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5523	0.552	0.0003	0.0030	2.00
	1.0809	1.082	-0.0011	0.0030	2.00
	2.0391	2.031	0.0081	0.0080	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5601	0.562	-0.0019	0.0032	2.00
	1.0512	1.052	-0.0008	0.0030	2.00
	1.9294	1.923	0.0064	0.0079	2.00

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**REPORT OF CALIBRATION**

Certificate No. : SP23-007

Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7478	0.743	0.0048	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8686	0.861	0.0076	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2912	0.291	0.0002	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6448	0.639	0.0058	0.0055	2.00

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## REPORT OF CALIBRATION

Certificate No. : SP23-007

Page 5 of 5

## Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.54	240.8	0.74	0.18	2.00
279.40	278.5	0.90	0.18	2.00
288.70	288.0	0.70	0.18	2.00
334.22	333.5	0.72	0.18	2.00
361.26	360.5	0.76	0.18	2.00
418.48	417.8	0.68	0.21	2.00
446.70	445.9	0.80	0.18	2.00
453.20	452.5	0.70	0.18	2.00
460.06	459.5	0.56	0.18	2.00
536.90	536.0	0.90	0.18	2.00
637.94	637.1	0.84	0.18	2.00
440.74	440.0	0.74	0.18	2.00
472.22	471.5	0.72	0.18	2.00
513.70	513.0	0.70	0.18	2.00
528.72	528.0	0.72	0.18	2.00
574.60	574.0	0.60	0.18	2.00
585.48	584.6	0.88	0.20	2.00
684.63	684.0	0.63	0.18	2.00
740.27	740.0	0.27	0.20	2.00
748.28	747.5	0.78	0.18	2.00
807.16	806.5	0.66	0.18	2.00
879.70	879.0	0.70	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement *U* is stated as the standard uncertainty of measurement multiplied by the coverage factor *k*,

which for a normal distribution corresponds to a coverage probability of approximately 95%

- \* Indicates non TISI accredited

- End of Certificate -

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## CERTIFICATE OF CALIBRATION

Certificate No. : SP23-008

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 213

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-2900

Serial No. : 21E22-009

ID No. : UAE.WAT.051/2564

Received Date : 6 January 2023

Calibration Date : 6 January 2023

Issue Date : 10 January 2023

Condition Instrument : Used

Calibrated by :

  
 ( Mr.Tanawut Rittidach )

Technical Manager

Approved by :

  
 ( Ms. Chonthicha Sangngern )

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

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**REPORT OF CALIBRATION**

Certificate No. : SP23-008

Page 2 of 5

Environment Condition : Ambient Temperature  $25 \pm 5$  °CRelative humidity  $55 \pm 20$  %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

**Certified Reference Materials :**

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95935	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

**Traceability** : This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Starna Scientific Limited

**Spectral Band Width of UUC** : 1.5 nm.**Scan Speed of UUC** : 200 nm/min**Scan Interval of UUC** : 0.1 nm.**Resolution of UUC** : Photometric 0.001 Abs.

Wavelength 0.1 nm.

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**REPORT OF CALIBRATION**

Certificate No. : SP23-008

Page 3 of 5

**Calibration Results** : Without adjustment**Photometric Accuracy :**

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5787	0.574	0.0047	0.0031	2.00
	1.0490	1.044	0.0050	0.0029	2.00
	2.1900	2.182	0.0080	0.0080	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5607	0.558	0.0027	0.0034	2.00
	1.0247	1.021	0.0037	0.0035	2.00
	2.1229	2.114	0.0089	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5236	0.520	0.0036	0.0030	2.00
	0.9634	0.960	0.0034	0.0029	2.00
	1.9763	1.969	0.0073	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5191	0.516	0.0031	0.0031	2.00
	1.0003	0.997	0.0033	0.0033	2.00
	1.9987	1.991	0.0077	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5523	0.550	0.0023	0.0030	2.00
	1.0809	1.078	0.0029	0.0030	2.00
	2.0391	2.032	0.0071	0.0080	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5601	0.558	0.0021	0.0031	2.00
	1.0512	1.049	0.0022	0.0030	2.00
	1.9294	1.922	0.0074	0.0079	2.00

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**REPORT OF CALIBRATION**

Certificate No. : SP23-008

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**Photometric Accuracy :**

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7478	0.744	0.0038	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8686	0.863	0.0056	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2912	0.290	0.0012	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6448	0.639	0.0058	0.0055	2.00

**REPORT OF CALIBRATION**

Certificate No. : SP23-008

Page 5 of 5

**Wavelength Accuracy :**

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.72	241.0	0.72	0.18	2.00
279.45	278.8	0.65	0.18	2.00
287.81	287.9	-0.09	0.18	2.00
334.06	333.5	0.56	0.18	2.00
360.93	360.5	0.43	0.18	2.00
418.59	418.0	0.59	0.18	2.00
445.94	445.8	0.14	0.18	2.00
453.66	453.0	0.66	0.18	2.00
460.02	459.5	0.52	0.18	2.00
536.59	536.5	0.09	0.18	2.00
637.98	638.0	-0.02	0.18	2.00
431.38	430.6	0.78	0.18	2.00
472.50	472.0	0.50	0.18	2.00
513.47	513.0	0.47	0.18	2.00
528.88	528.5	0.38	0.18	2.00
573.17	573.7	-0.53	0.18	2.00
585.35	585.0	0.35	0.20	2.00
684.40	684.0	0.40	0.18	2.00
740.72	740.5	0.22	0.20	2.00
748.55	748.5	0.05	0.18	2.00
807.03	807.0	0.03	0.18	2.00
879.28	879.5	-0.22	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement *U* is stated as the standard uncertainty of measurement multiplied by the coverage factor *k*,

which for a normal distribution corresponds to a coverage probability of approximately 95%

- \* Indicates non TISI accredited

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FM-708-02 R01 1/11/2021

**เอกสารไม่ควบคุม**

FM-708-02 R01 1/11/2021



Request No. 25-66 / 0323

MTC. ACL.No. 387 / 66

## CALIBRATION CERTIFICATE

NOMENCLATURE : 1. Atomic Absorption Spectrophotometer "Agilent Technologies"

Model AA240FS, Serial No. MY13160001

2. Working standard solution "Inorganic Ventures"

Multi Analyte Custom Grade Solution, Lot No. S2-MEB708640

SUBMITTED BY : United Analyst and Engineering Consultant Co., Ltd.

3 Soi Udomsuk41, Sukhumvit Road, Bangchak, Prakanong, Bangkok 10260

CALIBRATION PROCEDURE : 1. Performance Verification of Atomic Absorption Spectrophotometer  
(WI-500-02-30)

2. Estimation Uncertainty of Measurement in Analytical Chemistry (QP-513)

CALIBRATION RANGE: 0.02,0.10,0.30,0.50,0.70 mg/l at 228.8 nm.Cd, 0.10,0.20,0.30,0.50,0.70 mg/l at 357.9 nm.Cr,  
0.05,0.10,0.30,0.50,0.70 mg/l at 324.7 nm.Cu, 0.10,0.30,0.50,0.70,1.00 mg/l at 248.3 nm.Fe, 0.20,0.50,0.70,1.00,1.50 mg/l  
at 217.0 nm.Pb, 0.05,0.10,0.30,0.50,0.70 mg/l at 279.5 nm.Mn, 0.10,0.30,0.50,0.70,1.00 mg/l at 232.0 nm.Ni,  
0.05,0.10,0.30,0.50,0.70 mg/l at 213.9 nm.Zn

CALIBRATION DATE : 2 February 2023

REFERENCE MATERIAL : Traceable to NIST "Carlo Erba", "PanReac AppliChem"

Cadmium Lot No. 1152457, Chromium Lot No. 1793249, Copper Batch No. T117098A, Iron Batch No. T126087A,

Lead Lot No. 1227873, Manganese Batch No. T109228A, Nickel Batch No. T270178A, Zinc Batch No. T820140A

AMBIENT CONDITIONS : Temperature 22 °C Relative humidity 58 %

The Atomic Absorption Spectrophotometer has been calibrated against Reference  
Material traceable to National Institute of Standards and Technology ( NIST ) by The Analytical Chemistry  
Laboratory. The results are attached herewith.Calibrated by 1. Dani Srithongkum  
( Mr. Dana Srithongkum )2. Atipat  
( Mr. Atipat Ratana )Approved by Sumalee Deawtong  
( Miss Sumalee Deawtong )Senior Technical Officer  
Acting Director of Analytical Chemistry Laboratory

Ref. 2015266012600366001

Issued Date : 15 February 2023

The results relate only to the items tested/calibrated or value assigned.

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FM.BLMTC.002 Rev.4

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Amphoe Muang, Changwat Samutprakan 10280, Thailand  
Tel. (66) 0 2323 1672-80 ext. 115, 116  
Fax. (66) 0 2323 9165  
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E-mail : sumalee@tistr.or.th

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Request No. 25-66 / 0323

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MTC. ACL. No. 387 / 66

## CALIBRATION DATA

## 1. Noise Level

Element	Cd	Cr	Cu	Fe	Pb	Mn	Ni	Zn
Absorbance	0.0020	0.0000	0.0008	0.0000	-0.0009	0.0021	-0.0016	-0.0022
	0.0015	0.0006	0.0005	-0.0009	-0.0014	0.0018	0.0002	-0.0023
	0.0014	0.0006	0.0010	-0.0009	0.0015	0.0008	-0.0004	-0.0015
	0.0021	-0.0008	0.0013	-0.0010	0.0005	0.0005	-0.0008	-0.0004
	0.0020	-0.0012	0.0004	0.0003	-0.0004	0.0001	-0.0024	-0.001
	0.0021	-0.0011	0.0011	0.0003	0.0006	0.0009	-0.0002	-0.0013
	0.0017	-0.0009	0.0001	-0.0015	0.0010	0.0007	0.0001	-0.0016
	0.0024	-0.0012	0.0004	-0.0002	0.0008	-0.0005	-0.0012	-0.0019
	0.0011	-0.0002	0.0015	-0.0004	0.0004	0.0008	-0.0003	-0.0017
	0.0017	0.0000	0.0009	0.0004	0.0001	0.0015	-0.0009	-0.0024
	0.0019	-0.0004	0.0004	0.0000	0.0006	0.0010	-0.0005	-0.0016
	0.0016	-0.0025	0.0003	0.0005	0.0009	-0.0004	-0.0013	-0.0016
	0.0018	-0.0014	0.001	-0.0009	-0.0006	0.0010	-0.0004	-0.0017
	0.0019	-0.0006	0.0011	-0.0008	0.0011	0.0004	-0.0003	-0.0005
	0.0024	0.0003	0.0005	-0.0012	-0.0002	0.0012	-0.0006	-0.0011
	0.0023	-0.0012	0.0006	-0.0007	0.0002	0.0014	-0.0012	-0.0013
	0.0020	-0.0014	0.0009	-0.0018	0.0003	0.0012	-0.0012	-0.0013
	0.0010	-0.0015	0.0002	0.0004	0.0017	0.0011	-0.0018	-0.0013
	0.0016	-0.0011	0.0013	0.0003	0.0007	0.0026	-0.0006	-0.0006
	0.0001	-0.0007	0.0009	-0.0003	0.0008	0.0008	0.0000	-0.0001
Average Absorbance	0.002	-0.001	0.001	0.000	0.000	0.001	-0.001	-0.001

Continue 2 / 5

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E-mail : rumpai@tistr.or.th Website:www.tistr.or.thOffice/Laboratory  
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,  
Amphoe Muang, Changwat Samutprakan 10280, Thailand  
Tel. (66) 0 2323 1672-80 ext. 115, 116  
Fax. (66) 0 2323 9165  
E-mail : mtc@tistr.or.thOffice  
196 Phahonyothin Road, Chatuchak, Bangkok 10900,  
Thailand  
Tel. (66) 0 2577 9000  
Fax. (66) 0 2579 8592  
E-mail : sumalee@tistr.or.th

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Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cu	0.050	0.046	-0.004	8.00	± 0.003
	0.300	0.289	-0.011	3.67	± 0.009
	0.700	0.674	-0.026	3.71	± 0.020

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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Tel: (66) 0 2519 8592 Fax: (66) 0 2519 8592 5225, 5217  
**เอกสารไม่ควบบูม**  
E-mail : [sumalee@istr.or.th](mailto:sumalee@istr.or.th)

FM.BLMTC.002 Rev.4



Request No. 25-66 / 0323

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MTC. ACL. No. 387 / 66

### 3.4 Reading on wavelength- Iron (Fe) at 248.3 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Fe	0.100	0.095	-0.005	5.00	± 0.014
	0.500	0.474	-0.026	5.20	± 0.016
	1.000	0.950	-0.050	5.00	± 0.029

### 3.5 Reading on wavelength- Lead (Pb) at 217.0 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Pb	0.200	0.207	0.007	3.50	± 0.014
	0.700	0.673	-0.027	3.86	± 0.030
	1.500	1.417	-0.083	5.53	± 0.061

### 3.6 Reading on wavelength- Manganese (Mn) at 279.5 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Mn	0.04995	0.046	-0.004	7.91	± 0.005
	0.29970	0.294	-0.0057	1.90	± 0.007
	0.69930	0.694	-0.0053	0.76	± 0.014

Continue 5 / 5

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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Office/Laboratory  
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,  
Amphoe Muang, Changwat Samutprakan 10280, Thailand  
Tel. (66) 0 2323 1672-80 ext. 115, 116  
Fax. (66) 0 2323 9165  
E-mail : mtc@tistr.or.th

Office  
196 Phahonyothin Road, Chatuchak, Bangkok 10900,  
Thailand  
Tel. (66) 0 2577 9000  
Fax. (66) 0 2579 8592  
E-mail : sumalee@tistr.or.th

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5225, 5217

Request No. 25-66 / 0323

5 / 5

MTC. ACL. No. 387 / 66

### 3.7 Reading on wavelength- Nickel (Ni) at 232.0 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Ni	0.1001	0.103	0.003	2.90	± 0.013
	0.5005	0.501	0.001	0.10	± 0.018
	1.0010	0.987	-0.014	1.40	± 0.032

### 3.8 Reading on wavelength- Zinc (Zn) at 213.9 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Zn	0.050	0.046	-0.004	8.00	± 0.013
	0.300	0.311	0.011	3.67	± 0.013
	0.700	0.665	-0.035	5.00	± 0.019

Remark : The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 (k = 2)  
which gives a level of confidence of approximately 95%

Calibrated by 1. Dani Srithongkum

(Mr. Danai Srithongkum)

2. Atipat

(Mr. Atipat Ratana)

Approved by Suladda Deawtong

(Miss Suladda Deawtong)

Senior Technical Officer

Acting Director of

Analytical Chemistry Laboratory

Issued Date : 15 February 2023

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

End of Certificate

The results relate only to the items tested/calibrated or value assigned.

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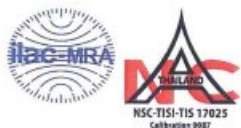
FM.BLMTC.002 Rev.4

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เอกสารไม่ควบคุม  
5225, 5217



## Certificate of Calibration

Certificate No.: C24220084

Page: 2 of 2

Equipment: CONDUCTIVITY METER Certificate No.: C24220084  
Model: Lab955 Issued Date: 22 March 2022  
Serial No. (or ID.): 16300356 Job No.: KSPR2203267  
Manufacturer: SI Analytics Page: 1 of 2  
Electrode Serial No. 16070067 Model: LF413T Brand: SI Analytics  
Condition: In Condition

Customer: United Analyst and Engineering Consultant Company Limited  
3 Soi Udomsuk 41 Sukhumvit Road,  
Bangchak, Prakanong, Bangkok 10260 Thailand

Environment Condition: Temperature 23 °C ± 2 °C  
Humidity 50 %RH ± 15 %RH

Calibration Place: Environment Laboratory, SPC RT Co., Ltd.  
1194 Soi Wachirathamsathit 57, Sukhumvit 101/1 Rd.,  
Bangchak, Prakanong, Bangkok 10260 Thailand

Calibration By: Mr. Wasan Nuchnabee  
Calibration Date: 22 March 2022  
The Method used: In house method, SPCC-WI-49, base on ASTM D 1125-14 and D 5391-14

Traceability: This certificate is traceable to the SI Units maintained by CRM of NIST(SRM) through  
CPA chem Co., Ltd. (ISO/IEC 17034) Certificate No. 794135, 794136, 772624

## Calibration Results:

## Before Adjustment

Standard	Unit Under Calibration	Correction	Coverage Factor	Uncertainty ( ± )
Conductivity Solution	Reading	( k )		
25.000 µS/cm	25.9 µS/cm	-0.900 µS/cm	2.00	0.22 µS/cm
1413.0 µS/cm	1444 µS/cm	-31.0 µS/cm	2.00	8.9 µS/cm
111.3 mS/cm	107.9 mS/cm	3.40 mS/cm	2.00	0.66 mS/cm

## After Adjustment ; at 1413 µS/cm

Standard	Unit Under Calibration	Correction	Coverage Factor	Uncertainty ( ± )
Conductivity Solution	Reading	( k )		
25.000 µS/cm	25.0 µS/cm	0.000 µS/cm	2.00	0.22 µS/cm
1413.0 µS/cm	1413 µS/cm	0.0 µS/cm	2.00	8.9 µS/cm
111.3 mS/cm	107.2 mS/cm	4.10 mS/cm	2.00	0.66 mS/cm

The End of Certificate

  
(Mr. Wasan Nuchnabee)

Person in charge

  
บริษัท เอสพีซี อาร์ที จำกัด  
SPC RT Co., Ltd.  
(Mr. Dumrong Boonsopon)

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SPC RT Co., Ltd.



## ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2203267

ชนิดเครื่องมือ: CONDUCTIVITY METER

รุ่น: Lab955

หมายเลขเครื่อง: 16300356

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
22 Mar 2022			22 Mar 2022		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด ( ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input type="checkbox"/>	<input type="checkbox"/>	
		pH Meter and Conductivity Meter			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด ( Electrode and Connection Cable )	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl )	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาจับอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
		Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่นเกิน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
		Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ : Electrode วัดอุณหภูมิได้ 24.9 °C โดย Control Waterbath ที่ 25.0  $\pm$  0.1 °C

Mr. Wasan Nuchabee

Service Engineer

**เอกสารไม่ควบคุม**

SPCC-FM-R31-02: 23 Nov 2020