

ANALYSIS REPORT

CUSTOMER NAME : TPI POLENE PUBLIC COMPANY LIMITED

ADDRESS : 299 MOO 5 MITRAPARP ROAD MITTRAPHAP THAP KWANG KAENG KHOI SARABURI 18260

CONTACT INFORMATION : TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com

SAMPLING SOURCE : TRIANGULAR POND AREA

SAMPLE TYPE : EFFLUENT

SAMPLING DATE : JANUARY 20, 2022

SAMPLING TIME : 13:30 HOUR

SAMPLING METHOD : GRAB, GRAB AND STERILE TECHNIQUE

SAMPLING BY : MR ACHITA SAENGJAN

ANALYZED BY : MISS CHOMTHANAN APHIPATPAPHA

RECEIVED DATE : JANUARY 20, 2022

ANALYTICAL DATE : JANUARY 20-28, 2022

REPORT NO. : 2022-U007881

WORK NO. : 2021-008990

ANALYSIS NO. : T22AB161-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AB161-0001		
pH ^a	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H ⁺ B)	7.8 (26°C)	5.5-9.0	-
TEMPERATURE ^c	°C	THERMOMETER AT SITE (SM: 2550 B)	26	≤ 40	-
ELECTRICAL CONDUCTIVITY ^c	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	1,543 (26°C)	-	0.1
DISSOLVED OXYGEN ^c	mg/L	MEMBRANE ELECTRODE METHOD AT SITE (SM: 4500-O G)	3.6	-	0.5
SALINITY ^c	ppt	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2520 B)	0.7	-	0.1
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: 2130 B)	15	-	0.1
BIOCHEMICAL OXYGEN DEMAND ^a	mg/L	MEMBRANE ELECTRODE METHOD (SM: 4500-O G AND 5210 B)	2.1	≤ 20	2.0
CHEMICAL OXYGEN DEMAND ^a	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM: 5220 D)	27.3	≤ 120	25.0
TOTAL SUSPENDED SOLIDS ^a	mg/L	TOTAL SUSPENDED SOLIDS DRIED AT 103-105 °C (SM: 2540 D)	14.8	≤ 50	5.0
TOTAL DISSOLVED SOLIDS ^b	mg/L	TOTAL DISSOLVED SOLIDS DRIED AT 180 °C (SM: 2540 C)	898	≤ 3,000	25
TOTAL HARDNESS ^c	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: 2340 C)	323	-	4.0
NITRATE-NITROGEN ^c	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: 4500 -NO ₃ ⁻ E)	0.65	-	0.02
PHOSPHATE ^c	mg/L PO ₄ ³⁻	ASCORBIC ACID METHOD (SM: 4500-P E)	0.43	-	0.03
RESIDUAL CHLORINE ^c	mg/L Cl ₂	MODIFIED DPD COLOURIMETRIC METHOD (AT SITE)	ND	-	0.1
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: 4500-SO ₄ ²⁻ E)	111	-	0.3
FAT, OIL AND GREASE ^a	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM: 5520 B)	ND	≤ 5	3
SODIUM ADSORPTION RATIO ^c	-	INDUCTIVELY COUPLED PLASMA (ICP) AND CALCULATION METHOD	2.32	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AB161-0001		
METALS					
ARSENIC °	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0026	≤ 0.25	0.0003
BARIUM °	mg/L Ba	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.114	≤ 1.0	0.005
CADMIUM °	mg/L Cd	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.03	0.002
HEXAVALENT CHROMIUM °	mg/L Cr ⁶⁺	COLOURIMETRIC METHOD (SM: 3500-Cr B)	ND	≤ 0.25	0.006
COPPER °	mg/L Cu	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 2.0	0.005
LEAD °	mg/L Pb	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.2	0.015
MANGANESE °	mg/L Mn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 5.0	0.004
MERCURY °	mg/L Hg	COLD VAPOUR AAS METHOD (SM: 3112 B)	ND	≤ 0.005	0.0005
NICKEL °	mg/L Ni	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 1.0	0.005
SELENIUM °	mg/L Se	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0010	≤ 0.02	0.0005
TITANIUM °	mg/L Ti	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	ND	-	0.010
TOTAL IRON °	mg/L Fe	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.144	-	0.005
ZINC °	mg/L Zn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 5.0	0.003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AB161-0001		
MICROBIOLOGY					
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 E)	4,900	-	1.8
COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 B)	7,900	-	1.8
SAMPLE CONDITION					
WATER'S COLOUR/TURBID			YELLOW/TURBID		
SEDIMENT			YELLOW		

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

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

^c : 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, 23rd EDITION, 2017.

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

REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2560,
PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL 134, PART 153 D, DATED JUNE 7, 2017.

ND : NON-DETECTABLE.

< LOQ : < LEVEL OF QUANTITATION (COPPER ≥ 0.005 AND < 0.050 mg/L, MANGANESE ≥ 0.004 AND < 0.050 mg/L,
ZINC ≥ 0.003 AND < 0.050 mg/L).

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

FEBRUARY 8, 2022

ANALYSIS REPORT

CUSTOMER NAME	: TPI POLENE PUBLIC COMPANY LIMITED	RECEIVED DATE	: FEBRUARY 18, 2022
ADDRESS	: 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260	ANALYTICAL DATE	: FEBRUARY 18-28, 2022
CONTACT INFORMATION	: TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com	REPORT NO.	: 2022-U015993
SAMPLING SOURCE	: TRIANGULAR POND AREA	WORK NO.	: 2021-008990
SAMPLE TYPE	: EFFLUENT	ANALYSIS NO.	: T22AC893-0006
SAMPLING DATE	: FEBRUARY 17, 2022		
SAMPLING TIME	: 09:45 HOUR		
SAMPLING METHOD °	: GRAB, GRAB AND STERILE TECHNIQUE		
SAMPLING BY °	: MR MANIT PANCHOT		
ANALYZED BY	: MISS CHOMTHANAN APHIPATPAPHA		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AC893-0006		
pH °	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H° B)	7.8 (30°C)	5.5-9.0	-
TEMPERATURE °	°C	THERMOMETER AT SITE (SM: 2550 B)	30	≤ 40	-
ELECTRICAL CONDUCTIVITY °	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	2,145 (30°C)	-	0.1
DISSOLVED OXYGEN °	mg/L	MEMBRANE ELECTRODE METHOD AT SITE (SM: 4500-O G)	4.1	-	0.5
ODOUR °	-	OBSERVATION METHOD	NONE	-	-
SALINITY °	ppt	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2520 B)	1.0	-	0.1
TURBIDITY °	NTU	NEPHELOMETRIC METHOD (SM: 2130 B)	2.5	-	0.1
COLOUR °	ADMI	ADMI WEIGHTED-ORDINATE SPECTROPHOTOMETRIC METHOD (SM: 2120 F)	20	≤ 300	10
COLOUR °	ADMI	ADMI WEIGHTED-ORDINATE SPECTROPHOTOMETRIC METHOD (SM: 2120 F)	22	≤ 300	10
BIOCHEMICAL OXYGEN DEMAND °	mg/L	MEMBRANE ELECTRODE METHOD (SM: 4500-O G AND 5210 B)	ND	≤ 20	2.0
CHEMICAL OXYGEN DEMAND °	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM: 5220 D)	44.0	≤ 120	25.0
TOTAL SUSPENDED SOLIDS °	mg/L	TOTAL SUSPENDED SOLIDS DRIED AT 103-105 °C (SM: 2540 D)	ND	≤ 50	5.0
TOTAL DISSOLVED SOLIDS °	mg/L	TOTAL DISSOLVED SOLIDS DRIED AT 180 °C (SM: 2540 C)	1,124	≤ 3,000	25
TOTAL KJELDAHL NITROGEN °	mg/L	IN-HOUSE METHOD: UAE.TP.WAS.001 (KJELDAHL METHOD); SM: 4500-Norg C	< LOQ	≤ 100	1.5
FAT, OIL AND GREASE °	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM: 5520 B)	ND	≤ 5	3
NITRATE-NITROGEN °	mg/L NO ₃ -N	CADMIUM REDUCTION METHOD (SM: 4500 -NO ₃ E)	0.48	-	0.02
SULPHIDE °	mg/L	IODOMETRIC METHOD (SM: 4500-S ²⁻ F)	ND	-	0.50
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: 4500-SO ₄ ²⁻ E)	103	-	0.3
PHOSPHATE °	mg/L PO ₄ ³⁻	ASCORBIC ACID METHOD (SM: 4500-P E)	0.55	-	0.03
CYANIDE °	mg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: 4500-CN ⁻ C AND 4500 -CN ⁻ E)	ND	-	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AC893-0006		
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: 5530 B AND 5530 D)	ND	≤ 1	0.1
FORMALDEHYDE °	mg/L	DISTILLATION AND COLOURIMETRIC METHOD	ND	≤ 1	0.05
RESIDUAL CHLORINE °	mg/L Cl ₂	MODIFIED DPD COLOURIMETRIC METHOD (AT SITE)	ND	-	0.1
TOTAL HARDNESS °	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: 2340 C)	578	-	4.0
FREE CHLORINE °	mg/L Cl ₂	MODIFIED DPD COLOURIMETRIC METHOD (AT SITE)	ND	≤ 1	0.1
SODIUM ADSORPTION RATIO °	-	INDUCTIVELY COUPLED PLASMA (ICP) AND CALCULATION METHOD	2.11	-	-
METALS					
ARSENIC °	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0034	≤ 0.25	0.0003
SELENIUM °	mg/L Se	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0008	≤ 0.02	0.0005
TRIVALENT CHROMIUM °	mg/L Cr ³⁺	NITRIC ACID DIGESTION, DIRECT AIR ACETYLENE FLAME, COLOURIMETRIC (SM: 3030 E, 3111 B AND 3500-Cr B) AND CALCULATION METHOD	ND	≤ 0.75	0.007
HEXAVALENT CHROMIUM °	mg/L Cr ⁶⁺	COLOURIMETRIC METHOD (SM: 3500-Cr B)	ND	≤ 0.25	0.006
CADMIUM °	mg/L Cd	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.03	0.002
TOTAL IRON °	mg/L Fe	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	-	0.005
COPPER °	mg/L Cu	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 2.0	0.005
LEAD °	mg/L Pb	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.2	0.015
MANGANESE °	mg/L Mn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 5.0	0.004
NICKEL °	mg/L Ni	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 1.0	0.005
ZINC °	mg/L Zn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 5.0	0.003
MERCURY °	mg/L Hg	COLD VAPOUR AAS METHOD (SM: 3112 B)	ND	≤ 0.005	0.0005
BARIUM °	mg/L Ba	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.193	≤ 1.0	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AC893-0006		
TITANIUM ^c	mg/L Ti	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	ND	-	0.010
MICROBIOLOGY					
COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 B)	54,000	-	1.8
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 E)	< 1.8	-	1.8
ORGANOCHLORINE PESTICIDES					
α-BHC ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
β-BHC ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
γ-BHC ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
δ-BHC ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
ALDRIN ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
DIELDRIN ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
ENDOSULFAN I ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
ENDOSULFAN II ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
ENDOSULFAN SULFATE ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
ENDRIN ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
ENDRIN ALDEHYDE ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
HEPTACHLOR ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
HEPTACHLOR EPOXIDE ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
p,p-DDD ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
p,p-DDE ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AC893-0006		
p,p-DDT ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
SAMPLE CONDITION WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR GREY		

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

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

^c : 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, 23rd EDITION, 2017.

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

REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2560,
PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL 134, PART 153 D, DATED JUNE 7, 2017.

ND : NON-DETECTABLE.

< LOQ : < LEVEL OF QUANTITATION (TOTAL KJELDAHL NITROGEN ≥ 1.5 AND < 5.0 mg/L, TOTAL IRON ≥ 0.005 AND < 0.100 mg/L).

Benjawan V.

(MISS BENJAWAN VIRIYOTHAJ)
LABORATORY SUPERVISOR

MARCH 9, 2022

ANALYSIS REPORT

CUSTOMER NAME : TPI POLENE PUBLIC COMPANY LIMITED
ADDRESS : 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260
CONTACT INFORMATION : TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com
SAMPLING SOURCE : TRIANGULAR POND AREA
SAMPLE TYPE : EFFLUENT
SAMPLING DATE : MARCH 22, 2022
SAMPLING TIME : 09:30 HOUR
SAMPLING METHOD : GRAB, GRAB AND STERILE TECHNIQUE
SAMPLING BY : MR MANIT PANCHOT
ANALYZED BY : MISS PORNPIMOL WAENTHONG

RECEIVED DATE : MARCH 22, 2022
ANALYTICAL DATE : MARCH 22-31, 2022
REPORT NO. : 2022-U024999
WORK NO. : 2021-008990
ANALYSIS NO. : T22AF525-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AF525-0001		
pH ^a	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H ⁺ B)	7.6 (32°C)	5.5-9.0	-
TEMPERATURE ^c	°C	THERMOMETER AT SITE (SM: 2550 B)	32	≤ 40	-
ELECTRICAL CONDUCTIVITY ^c	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	1,354 (32°C)	-	0.1
DISSOLVED OXYGEN ^c	mg/L	MEMBRANE ELECTRODE METHOD AT SITE (SM: 4500-O G)	4.0	-	0.5
SALINITY ^c	ppt	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2520 B)	0.6	-	0.1
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: 2130 B)	4.5	-	0.1
BIOCHEMICAL OXYGEN DEMAND ^a	mg/L	MEMBRANE ELECTRODE METHOD (SM: 4500-O G AND 5210 B)	3.4	≤ 20	2.0
CHEMICAL OXYGEN DEMAND ^a	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM: 5220 D)	ND	≤ 120	25.0
TOTAL SUSPENDED SOLIDS ^a	mg/L	TOTAL SUSPENDED SOLIDS DRIED AT 103-105 °C (SM: 2540 D)	13.1	≤ 50	5.0
TOTAL DISSOLVED SOLIDS ^b	mg/L	TOTAL DISSOLVED SOLIDS DRIED AT 180 °C (SM: 2540 C)	722	≤ 3,000	25
TOTAL HARDNESS ^c	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: 2340 C)	299	-	4.0
NITRATE-NITROGEN ^c	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: 4500 -NO ₃ ⁻ E)	1.58	-	0.02
PHOSPHATE ^c	mg/L PO ₄ ³⁻	ASCORBIC ACID METHOD (SM: 4500-P E)	0.52	-	0.03
RESIDUAL CHLORINE ^c	mg/L Cl ₂	MODIFIED DPD COLOURIMETRIC METHOD (AT SITE)	ND	-	0.1
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: 4500-SO ₄ ²⁻ E)	78.7	-	0.3
FAT, OIL AND GREASE ^a	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM: 5520 B)	ND	≤ 5	3
SODIUM ADSORPTION RATIO ^c	-	INDUCTIVELY COUPLED PLASMA (ICP) AND CALCULATION METHOD	1.86	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AF525-0001		
METALS					
ARSENIC °	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0023	≤ 0.25	0.0003
BARIUM °	mg/L Ba	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.084	≤ 1.0	0.005
CADMIUM °	mg/L Cd	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.03	0.002
HEXAVALENT CHROMIUM °	mg/L Cr ⁶⁺	COLOURIMETRIC METHOD (SM: 3500-Cr B)	ND	≤ 0.25	0.006
COPPER °	mg/L Cu	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 2.0	0.005
LEAD °	mg/L Pb	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.2	0.015
MANGANESE °	mg/L Mn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 5.0	0.004
MERCURY °	mg/L Hg	COLD VAPOUR AAS METHOD (SM: 3112 B)	ND	≤ 0.005	0.0005
NICKEL °	mg/L Ni	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 1.0	0.005
SELENIUM °	mg/L Se	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	≤ 0.02	0.0005
TITANIUM °	mg/L Ti	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	ND	-	0.010
TOTAL IRON °	mg/L Fe	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.169	-	0.005
ZINC °	mg/L Zn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 5.0	0.003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AF525-0001		
MICROBIOLOGY					
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 E)	3,300	-	1.8
COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 B)	3,300	-	1.8
SAMPLE CONDITION					
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/CLEAR BROWN		

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

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

^c : 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, 23rd EDITION, 2017.

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

REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2560,
PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL 134, PART 153 D, DATED JUNE 7, 2017.

ND : NON-DETECTABLE.

< LOQ : < LEVEL OF QUANTITATION (COPPER ≥ 0.005 AND < 0.050 mg/L, MANGANESE ≥ 0.004 AND < 0.050 mg/L)

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

APRIL 7, 2022

ANALYSIS REPORT

CUSTOMER NAME	: TPI POLENE PUBLIC COMPANY LIMITED	RECEIVED DATE	: APRIL 20, 2022
ADDRESS	: 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260	ANALYTICAL DATE	: APRIL 20-MAY 5, 2022
CONTACT INFORMATION	: TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com	REPORT NO.	: 2022-U033622
SAMPLING SOURCE	: TRIANGULAR POND AREA	WORK NO.	: 2021-008990
SAMPLE TYPE	: EFFLUENT	ANALYSIS NO.	: T22AH378-0001
SAMPLING DATE	: APRIL 20, 2022		
SAMPLING TIME	: 09:45 HOUR		
SAMPLING METHOD	: GRAB, GRAB AND STERILE TECHNIQUE		
SAMPLING BY	: MR MANIT PANCHOT		
ANALYZED BY	: MISS AMONRAT PUTTALEE		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AH378-0001		
pH ^a	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H ⁺ B)	7.7 (30°C)	5.5-9.0	-
TEMPERATURE ^c	°C	THERMOMETER AT SITE (SM: 2550 B)	30	≤ 40	-
ELECTRICAL CONDUCTIVITY ^c	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	1,173 (30°C)	-	0.1
DISSOLVED OXYGEN ^c	mg/L	MEMBRANE ELECTRODE METHOD AT SITE (SM: 4500-O G)	3.2	-	0.5
SALINITY ^c	ppt	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2520 B)	0.5	-	0.1
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: 2130 B)	21	-	0.1
BIOCHEMICAL OXYGEN DEMAND ^a	mg/L	MEMBRANE ELECTRODE METHOD (SM: 4500-O G AND 5210 B)	3.4	≤ 20	2.0
CHEMICAL OXYGEN DEMAND ^a	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM: 5220 D)	ND	≤ 120	25.0
TOTAL SUSPENDED SOLIDS ^a	mg/L	TOTAL SUSPENDED SOLIDS DRIED AT 103-105 °C (SM: 2540 D)	11.5	≤ 50	5.0
TOTAL DISSOLVED SOLIDS ^b	mg/L	TOTAL DISSOLVED SOLIDS DRIED AT 180 °C (SM: 2540 C)	618	≤ 3,000	25
TOTAL HARDNESS ^c	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: 2340 C)	241	-	4.0
NITRATE-NITROGEN ^c	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: 4500 -NO ₃ ⁻ E)	0.18	-	0.02
PHOSPHATE ^c	mg/L PO ₄ ³⁻	ASCORBIC ACID METHOD (SM: 4500-P E)	0.58	-	0.03
RESIDUAL CHLORINE ^c	mg/L Cl ₂	MODIFIED DPD COLOURIMETRIC METHOD (AT SITE)	ND	-	0.1
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: 4500-SO ₄ ²⁻ E)	66.4	-	0.3
FAT, OIL AND GREASE ^a	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM: 5520 B)	ND	≤ 5	3
SODIUM ADSORPTION RATIO ^c	-	INDUCTIVELY COUPLED PLASMA (ICP) AND CALCULATION METHOD	1.92	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AH378-0001		
METALS					
ARSENIC °	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0029	≤ 0.25	0.0003
BARIUM °	mg/L Ba	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.066	≤ 1.0	0.005
CADMIUM °	mg/L Cd	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.03	0.002
HEXAVALENT CHROMIUM °	mg/L Cr ⁶⁺	COLOURIMETRIC METHOD (SM: 3500-Cr B)	ND	≤ 0.25	0.006
COPPER °	mg/L Cu	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 2.0	0.005
LEAD °	mg/L Pb	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.2	0.015
MANGANESE °	mg/L Mn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 5.0	0.004
MERCURY °	mg/L Hg	COLD VAPOUR AAS METHOD (SM: 3112 B)	0.0006	≤ 0.005	0.0005
NICKEL °	mg/L Ni	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 1.0	0.005
SELENIUM °	mg/L Se	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	≤ 0.02	0.0005
TITANIUM °	mg/L Ti	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.015	-	0.010
TOTAL IRON °	mg/L Fe	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.157	-	0.005
ZINC °	mg/L Zn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 5.0	0.003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AH378-0001		
MICROBIOLOGY					
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 E)	>160,000	-	1.8
COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 B)	>160,000	-	1.8
SAMPLE CONDITION					
WATER'S COLOUR/TURBID			YELLOW/CLEAR		
SEDIMENT			YELLOW		

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

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

^c : 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, 23rd EDITION, 2017.

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

REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2560,
PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL 134, PART 153 D, DATED JUNE 7, 2017.

ND : NON-DETECTABLE.

< LOQ : < LEVEL OF QUANTITATION (MANGANESE ≥ 0.004 AND < 0.050 mg/L, ZINC ≥ 0.003 AND < 0.050 mg/L).

Bhuchonk p.

(MR BHUCHONK PANICHLERTUMPI)
LABORATORY SUPERVISOR

MAY 11, 2022

ANALYSIS REPORT

CUSTOMER NAME : TPI POLENE PUBLIC COMPANY LIMITED
ADDRESS : 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260
CONTACT INFORMATION : TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com
SAMPLING SOURCE : TRIANGULAR POND AREA
SAMPLE TYPE : EFFLUENT
SAMPLING DATE : MAY 20, 2022
SAMPLING TIME : 09:50 HOUR
SAMPLING METHOD : GRAB, GRAB AND STERILE TECHNIQUE
SAMPLING BY : MR MANIT PANCHOT
ANALYZED BY : MISS AMONRAT PUTTALEE

RECEIVED DATE : MAY 20, 2022
ANALYTICAL DATE : MAY 20-JUNE 2, 2022
REPORT NO. : 2022-U041894
WORK NO. : 2021-008990
ANALYSIS NO. : T22AJ569-0006

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AJ569-0006		
pH ^a	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H ⁺ B)	7.9 (32°C)	5.5-9.0	-
TEMPERATURE ^c	°C	THERMOMETER AT SITE (SM: 2550 B)	32	≤ 40	-
ELECTRICAL CONDUCTIVITY ^c	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	1,117 (32°C)	-	0.1
DISSOLVED OXYGEN ^c	mg/L	MEMBRANE ELECTRODE METHOD AT SITE (SM: 4500-O G)	2.2	-	0.5
ODOUR ^c	-	OBSERVATION METHOD	NONE	-	-
SALINITY ^c	ppt	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2520 B)	0.5	-	0.1
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: 2130 B)	8.0	-	0.1
COLOUR ^b	ADMI	ADMI WEIGHTED-ORDINATE SPECTROPHOTOMETRIC METHOD (SM: 2120 F)	11	≤ 300	10
COLOUR ^b	ADMI	ADMI WEIGHTED-ORDINATE SPECTROPHOTOMETRIC METHOD (SM: 2120 F)	11	≤ 300	10
BIOCHEMICAL OXYGEN DEMAND ^a	mg/L	MEMBRANE ELECTRODE METHOD (SM: 4500-O G AND 5210 B)	6.1	≤ 20	2.0
CHEMICAL OXYGEN DEMAND ^a	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM: 5220 D)	ND	≤ 120	25.0
TOTAL SUSPENDED SOLIDS ^a	mg/L	TOTAL SUSPENDED SOLIDS DRIED AT 103-105 °C (SM: 2540 D)	22.5	≤ 50	5.0
TOTAL DISSOLVED SOLIDS ^b	mg/L	TOTAL DISSOLVED SOLIDS DRIED AT 180 °C (SM: 2540 C)	564	≤ 3,000	25
TOTAL KJELDAHL NITROGEN ^b	mg/L	IN-HOUSE METHOD: UAE.TP.WAS.001 (KJELDAHL METHOD); SM: 4500-Norg C	< LOQ	≤ 100	1.5
FAT, OIL AND GREASE ^a	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM: 5520 B)	ND	≤ 5	3
NITRATE-NITROGEN ^c	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: 4500 -NO ₃ ⁻ E)	1.72	-	0.02
SULPHIDE ^c	mg/L	IODOMETRIC METHOD (SM: 4500-S ²⁻ F)	ND	≤ 1	0.50
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: 4500-SO ₄ ²⁻ E)	65.3	-	0.3
PHOSPHATE ^c	mg/L PO ₄ ³⁻	ASCORBIC ACID METHOD (SM: 4500-P E)	0.43	-	0.03
CYANIDE ^c	mg/L CN ⁻	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: 4500-CN ⁻ C AND 4500 -CN ⁻ E)	ND	≤ 0.2	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AJ569-0006		
PHENOLS °	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: 5530 B AND 5530 D)	ND	≤ 1	0.1
FORMALDEHYDE °	mg/L	DISTILLATION AND COLOURIMETRIC METHOD	ND	≤ 1	0.05
RESIDUAL CHLORINE °	mg/L Cl ₂	MODIFIED DPD COLOURIMETRIC METHOD (AT SITE)	ND	-	0.1
TOTAL HARDNESS °	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: 2340 C)	226	-	4.0
FREE CHLORINE °	mg/L Cl ₂	MODIFIED DPD COLOURIMETRIC METHOD (AT SITE)	ND	≤ 1	0.1
SODIUM ADSORPTION RATIO °	-	INDUCTIVELY COUPLED PLASMA (ICP) AND CALCULATION METHOD	1.59	-	-
METALS					
ARSENIC °	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0027	≤ 0.25	0.0003
SELENIUM °	mg/L Se	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	≤ 0.02	0.0005
TRIVALENT CHROMIUM °	mg/L Cr ³⁺	NITRIC ACID DIGESTION, DIRECT AIR ACETYLENE FLAME, COLOURIMETRIC (SM: 3030 E, 3111 B AND 3500-Cr B) AND CALCULATION METHOD	ND	≤ 0.75	0.007
HEXAVALENT CHROMIUM °	mg/L Cr ⁶⁺	COLOURIMETRIC METHOD (SM: 3500-Cr B)	ND	≤ 0.25	0.006
CADMIUM °	mg/L Cd	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.03	0.002
TOTAL IRON °	mg/L Fe	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.503	-	0.005
COPPER °	mg/L Cu	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 2.0	0.005
LEAD °	mg/L Pb	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.2	0.015
MANGANESE °	mg/L Mn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.068	≤ 5.0	0.004
NICKEL °	mg/L Ni	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 1.0	0.005
ZINC °	mg/L Zn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 5.0	0.003
MERCURY °	mg/L Hg	COLD VAPOUR AAS METHOD (SM: 3112 B)	ND	≤ 0.005	0.0005
BARIUM °	mg/L Ba	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.077	≤ 1.0	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AJ569-0006		
TITANIUM ^c	mg/L Ti	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.019	-	0.010
MICROBIOLOGY					
COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 B)	13,000	-	1.8
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 E)	4,900	-	1.8
ORGANOCHLORINE PESTICIDES					
α-BHC ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
β-BHC ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
γ-BHC ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
δ-BHC ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
ALDRIN ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
DIELDRIN ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
ENDOSULFAN I ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
ENDOSULFAN II ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
ENDOSULFAN SULFATE ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
ENDRIN ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
ENDRIN ALDEHYDE ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
HEPTACHLOR ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
HEPTACHLOR EPOXIDE ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.02
p,p-DDD ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
p,p-DDE ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22A1569-0006		
p,p-DDT ^c	µg/L	LIQUID-LIQUID EXTRACTION GAS CHROMATOGRAPHIC (ECD) METHOD (SM: 6630 C)	ND	NONE	0.04
SAMPLE CONDITION WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN		

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

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

^c : 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, 23rd EDITION, 2017.

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

REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2560,
PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL 134, PART 153 D, DATED JUNE 7, 2017.

ND : NON-DETECTABLE.

< LOQ : < LEVEL OF QUANTITATION (TOTAL KJELDAHL NITROGEN ≥ 1.5 AND < 5.0 mg/L, ZINC ≥ 0.003 AND < 0.050 mg/L).

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

JUNE 8, 2022

ANALYSIS REPORT

CUSTOMER NAME : TPI POLENE PUBLIC COMPANY LIMITED

ADDRESS : 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260

CONTACT INFORMATION : TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com

SAMPLING SOURCE : TRIANGULAR POND AREA

SAMPLE TYPE : EFFLUENT

SAMPLING DATE : JUNE 21, 2022

SAMPLING TIME : 09:30 HOUR

SAMPLING METHOD : GRAB, GRAB AND STERILE TECHNIQUE

SAMPLING BY : MR MANIT PANCHOT

ANALYZED BY : MISS PORNPIMOL WAENTHONG

RECEIVED DATE : JUNE 21, 2022

ANALYTICAL DATE : JUNE 21-30, 2022

REPORT NO. : 2022-U052238

WORK NO. : 2021-008990

ANALYSIS NO. : T22AM062-0001

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AM062-0001		
pH ^a	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H ⁺ B)	8.2 (30°C)	5.5-9.0	-
TEMPERATURE ^c	°C	THERMOMETER AT SITE (SM: 2550 B)	30	≤ 40	-
ELECTRICAL CONDUCTIVITY ^c	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	1,141 (30°C)	-	0.1
DISSOLVED OXYGEN ^c	mg/L	MEMBRANE ELECTRODE METHOD AT SITE (SM: 4500-O G)	4.3	-	0.5
SALINITY ^c	ppt	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2520 B)	0.5	-	0.1
TURBIDITY ^c	NTU	NEPHELOMETRIC METHOD (SM: 2130 B)	50	-	0.1
BIOCHEMICAL OXYGEN DEMAND ^a	mg/L	MEMBRANE ELECTRODE METHOD (SM: 4500-O G AND 5210 B)	3.7	≤ 20	2.0
CHEMICAL OXYGEN DEMAND ^a	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM: 5220 D)	ND	≤ 120	25.0
TOTAL SUSPENDED SOLIDS ^a	mg/L	TOTAL SUSPENDED SOLIDS DRIED AT 103-105 °C (SM: 2540 D)	22.4	≤ 50	5.0
TOTAL DISSOLVED SOLIDS ^b	mg/L	TOTAL DISSOLVED SOLIDS DRIED AT 180 °C (SM: 2540 C)	516	≤ 3,000	25
TOTAL HARDNESS ^c	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: 2340 C)	228	-	4.0
NITRATE-NITROGEN ^c	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: 4500 -NO ₃ ⁻ E)	2.36	-	0.02
PHOSPHATE ^c	mg/L PO ₄ ³⁻	ASCORBIC ACID METHOD (SM: 4500-P E)	0.52	-	0.03
RESIDUAL CHLORINE ^c	mg/L Cl ₂	MODIFIED DPD COLOURIMETRIC METHOD (AT SITE)	ND	-	0.1
SULPHATE ^c	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: 4500-SO ₄ ²⁻ E)	80.6	-	0.3
FAT, OIL AND GREASE ^a	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM: 5520 B)	ND	≤ 5	3
SODIUM ADSORPTION RATIO ^c	-	INDUCTIVELY COUPLED PLASMA (ICP) AND CALCULATION METHOD	2.00	-	-



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AM062-0001		
METALS					
ARSENIC °	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0025	≤ 0.25	0.0003
BARIUM °	mg/L Ba	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.071	≤ 1.0	0.005
CADMIUM °	mg/L Cd	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.03	0.002
HEXAVALENT CHROMIUM °	mg/L Cr ⁶⁺	COLOURIMETRIC METHOD (SM: 3500-Cr B)	ND	≤ 0.25	0.006
COPPER °	mg/L Cu	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 2.0	0.005
LEAD °	mg/L Pb	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 0.2	0.015
MANGANESE °	mg/L Mn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 5.0	0.004
MERCURY °	mg/L Hg	COLD VAPOUR AAS METHOD (SM: 3112 B)	ND	≤ 0.005	0.0005
NICKEL °	mg/L Ni	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	ND	≤ 1.0	0.005
SELENIUM °	mg/L Se	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	≤ 0.02	0.0005
TITANIUM °	mg/L Ti	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	ND	-	0.010
TOTAL IRON °	mg/L Fe	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	0.367	-	0.005
ZINC °	mg/L Zn	IN-HOUSE METHOD: UAE.TP.IW.01 (NITRIC ACID DIGESTION AND DIRECT AIR ACETYLENE FLAME METHOD); SM: 3030 E AND 3111 B	< LOQ	≤ 5.0	0.003

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			EFFLUENT T22AM062-0001		
MICROBIOLOGY					
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 E)	13,000	-	1.8
COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 B)	13,000	-	1.8
SAMPLE CONDITION					
WATER'S COLOUR/TURBID SEDIMENT			YELLOW/TURBID BROWN		

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

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

^c : 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, 23rd EDITION, 2017.

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

REGULATORY STANDARD : INDUSTRIAL EFFLUENT STANDARDS, NOTIFICATION OF THE MINISTRY OF INDUSTRY, B.E. 2560,
PUBLISHED IN THE ROYAL GOVERNMENT GAZETTE, VOL 134, PART 153 D, DATED JUNE 7, 2017.

ND : NON-DETECTABLE.

< LOQ : < LIMIT OF QUANTITATION (MANGANESE ≥ 0.004 AND < 0.050 mg/L, ZINC ≥ 0.003 AND < 0.050 mg/L)

Benjawan V.

(MISS BENJAWAN VIRIYOTHA)
LABORATORY SUPERVISOR

JULY 8, 2022

ANALYSIS REPORT

CUSTOMER NAME	: TPI POLENE PUBLIC COMPANY LIMITED	RECEIVED DATE	: FEBRUARY 18, 2022
ADDRESS	: 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260	ANALYTICAL DATE	: FEBRUARY 18 - MARCH 14, 2022
CONTACT INFORMATION	: TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com	REPORT NO.	: 2022-U015607
SAMPLING SOURCE	: POWER PLANT AREA	WORK NO.	: 2021-008991
SAMPLE TYPE	: SURFACE WATER	ANALYSIS NO.	: T22AC892-0003
SAMPLING DATE	: FEBRUARY 17, 2022		
SAMPLING TIME	: 09:30 HOUR		
SAMPLING METHOD	: GRAB		
SAMPLING BY	: MR MANIT PANCHOT		
ANALYZED BY	: MISS PORNPIMOL WAENTHONG		

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0003		
pH ^a	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H ⁺ B)	7.5 (28°C)	5.0-9.0	-
TEMPERATURE ^c	°C	THERMOMETER AT SITE (SM: 2550 B)	28	n'	-
ELECTRICAL CONDUCTIVITY ^c	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	997 (28°C)	-	0.1
ODOUR ^c	-	OBSERVATION METHOD	NONE	n	-
DISSOLVED OXYGEN ^c	mg/L	AZIDE MODIFICATION METHOD AT SITE (SM: 4500-O C)	2.9	≥ 2.0	0.5
COLOUR ^c	Pt-Co	VISUAL COMPARISON METHOD (SM: 2120 B)	10	n	5
BIOCHEMICAL OXYGEN DEMAND ^c	mg/L	AZIDE MODIFICATION METHOD (SM: 4500-O C AND 5210 B)	2.0	≤ 4.0	1.0
CHEMICAL OXYGEN DEMAND ^c	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM: 5220 D)	ND	-	25.0
TOTAL SUSPENDED SOLIDS ^a	mg/L	TOTAL SUSPENDED SOLIDS DRIED AT 103-105 °C (SM: 2540 D)	8.7	-	5.0
TOTAL DISSOLVED SOLIDS ^b	mg/L	TOTAL DISSOLVED SOLIDS DRIED AT 180 °C (SM: 2540 C)	510	-	25
PHENOLS ^c	mg/L	DISTILLATION, 4-AMINOANTIPYRINE METHOD (SM: 5530 B AND 5530 C)	ND	≤ 0.005	0.005
TOTAL KJELDAHL NITROGEN ^c	mg/L	IN-HOUSE METHOD: UAE.TP.WAS.001 (KJELDAHL METHOD); SM: 4500-Norg C	< LOQ	-	1.5
CYANIDE AS HCN ^c	mg/L HCN	DISTILLATION, PYRIDINE-BARBITURIC ACID METHOD (SM: 4500-CN ⁻ C AND 4500 -CN ⁻ E)	0.002	-	0.001
FAT, OIL AND GREASE ^c	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM: 5520 B)	ND	-	3
HYDROGEN SULPHIDE ^c	mg/L H ₂ S	METHYLENE BLUE METHOD(SM: 4500-S ²⁻ D)	ND	-	0.02
TOTAL HARDNESS ^a	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: 2340 C)	243	-	4.0
FORMALDEHYDE ^c	mg/L	DISTILLATION AND COLOURIMETRIC METHOD	ND	-	0.05
PHOSPHATE ^c	mg/L PO ₄ ³⁻	ASCORBIC ACID METHOD (SM: 4500-P E)	0.24	-	0.03
FREE CHLORINE ^c	mg/L Cl ₂	DPD FERROUS TITRIMETRIC METHOD (SM: 4500-Cl F)	ND	-	0.1
RESIDUAL CHLORINE ^c	mg/L Cl ₂	DPD FERROUS TITRIMETRIC METHOD (SM: 4500-Cl F)	ND	-	0.1



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0003		
METALS					
ARSENIC [°]	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0023	≤ 0.01	0.0003
HEXAVALENT CHROMIUM [°]	mg/L Cr ⁶⁺	EXTRACTION AND AIR-ACETYLENE FLAME METHOD (SM: 3111 C)	ND	≤ 0.05	0.001
MERCURY ^b	mg/L Hg	IN-HOUSE METHOD: UAE.TP.HEM.002 (COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRIC METHOD); SM: 3112 B	< LOQ	≤ 0.002	0.0001
CADMIUM [°]	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 [°]	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
LEAD [°]	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 [°]	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	< LOQ	≤ 1.0	0.002
NICKEL [°]	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
ZINC [°]	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
BARIUM [°]	mg/L Ba	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.063	-	0.003
TRIVALENT CHROMIUM [°]	mg/L Cr ³⁺	NITRIC ACID DIGESTION, DIRECT AIR ACETYLENE FLAME, COLOURIMETRIC (SM: 3030 E, 3111 B AND 3500-Cr B) AND CALCULATION METHOD	ND	-	0.005

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0003		
SELENIUM ^c	mg/L Se	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	-	0.0005
SAMPLE CONDITION					
WATER'S COLOUR/TURBID			YELLOW/CLEAR		
SEDIMENT			BROWN		

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

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

^c : 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, 23rd EDITION, 2017.

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

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 4, 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 4 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR
(1) CONSUMPTION, BUT PASSING THROUGH AN ORDINARY TREATMENT PROCESS BEFORE USING
(2) INDUSTRY

n : NATURALLY

n' : THE TEMPERATURE OF THE WATER MUST NOT BE HIGHER THAN THE NATURAL TEMPERATURE EXCEEDING 3 DEGREES CELSIUS

≤ 0.005* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO₃

≤ 0.05** : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO₃

ND : NON-DETECTABLE.

< LOQ : < LEVEL OF QUANTITATION (TOTAL KJELDAHL NITROGEN ≥ 1.5 AND < 5.0 mg/L, MERCURY ≥ 0.0001 AND < 0.0005 mg/L, COPPER ≥ 0.002 AND < 0.025 mg/L, MANGANESE ≥ 0.002 AND < 0.025 mg/L, ZINC ≥ 0.003 AND < 0.025 mg/L).

Benjawan V.

(MISS BENJAWAN VIRIYOTHAJ)
LABORATORY SUPERVISOR

MARCH 15, 2022

ANALYSIS REPORT

CUSTOMER NAME : TPI POLENE PUBLIC COMPANY LIMITED
ADDRESS : 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260
CONTACT INFORMATION : TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com
SAMPLING SOURCE : POWER PLANT AREA
SAMPLE TYPE : SURFACE WATER
SAMPLING DATE : FEBRUARY 17, 2022
SAMPLING TIME : 09:30 HOUR
SAMPLING METHOD ° : GRAB, GRAB AND STERILE TECHNIQUE
SAMPLING BY ° : MR MANIT PANCHOT
ANALYZED BY : MISS ITSARIYAPORN BUATIB

RECEIVED DATE : FEBRUARY 18, 2022
ANALYTICAL DATE : FEBRUARY 18-25, 2022
REPORT NO. : 2022-U015608
WORK NO. : 2021-008991
ANALYSIS NO. : T22AC892-0004

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0004		
TURBIDITY °	NTU	NEPHELOMETRIC METHOD (SM: 2130 B)	15	-	0.1
SALINITY °	ppt	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2520 B)	0.5	-	0.1
SODIUM ADSORPTION RATIO °	-	INDUCTIVELY COUPLED PLASMA (ICP) AND CALCULATION METHOD	1.44	-	-
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: 4500-SO ₄ ²⁻ E)	70.2	-	0.3
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: 4500 -NO ₃ ⁻ E)	0.56	≤ 5.0	0.02
METALS					
IRON °	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	0.159	-	0.005
TITANIUM °	mg/L Ti	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	ND	-	0.005



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0004		
MICROBIOLOGY					
COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 B)	110	-	1.8
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 E)	23	-	1.8
SAMPLE CONDITION					
WATER'S COLOUR/TURBID			YELLOW/CLEAR		
SEDIMENT			BROWN		

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

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

^c : 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, 23rd EDITION, 2017.

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

REGULATORY STANDARD : SURFACE WATER QUALITY STANDARDS CLASS 4, 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 4 : MEDIUM CLEAN FRESH SURFACE WATER RESOURCES USED FOR
(1) CONSUMPTION, BUT PASSING THROUGH AN ORDINARY TREATMENT PROCESS BEFORE USING
(2) INDUSTRY

ND : NON-DETECTABLE.

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

MARCH 9, 2022

ANALYSIS REPORT

CUSTOMER NAME : TPI POLENE PUBLIC COMPANY LIMITED

ADDRESS : 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260

CONTACT INFORMATION : TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com

SAMPLING SOURCE : ห้วยชันบนอน (บริเวณวัดชันบนอน)

SAMPLE TYPE : SURFACE WATER

SAMPLING DATE : FEBRUARY 17, 2022

SAMPLING TIME : 12:40 HOUR

SAMPLING METHOD : GRAB

SAMPLING BY : MR MANIT PANCHOT

ANALYZED BY : MISS PORNPIMOL WAENTHONG

RECEIVED DATE : FEBRUARY 18, 2022

ANALYTICAL DATE : FEBRUARY 18-24, 2022

REPORT NO. : 2022-U015610

WORK NO. : 2021-008991

ANALYSIS NO. : T22AC892-0006

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0006		
pH ^a	-	ELECTROMETRIC METHOD AT SITE (SM:4500-H ⁺ B)	7.6 (33°C)	5.0-9.0	-
TEMPERATURE ^c	°C	THERMOMETER AT SITE (SM: 2550 B)	33	n ⁱ	-
ELECTRICAL CONDUCTIVITY ^c	µmhos/cm	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2510 B)	1,118 (33°C)	-	0.1
DISSOLVED OXYGEN ^c	mg/L	AZIDE MODIFICATION METHOD AT SITE (SM: 4500-O C)	4.5	≥ 4.0	0.5
BIOCHEMICAL OXYGEN DEMAND ^c	mg/L	AZIDE MODIFICATION METHOD (SM: 4500-O C AND 5210 B)	1.4	≤ 2.0	1.0
CHEMICAL OXYGEN DEMAND ^c	mg/L	CLOSED REFLUX, COLOURIMETRIC METHOD (SM: 5220 D)	ND	-	25.0
TOTAL SUSPENDED SOLIDS ^a	mg/L	TOTAL SUSPENDED SOLIDS DRIED AT 103- 105 °C (SM: 2540 D)	29.8	-	5.0
TOTAL DISSOLVED SOLIDS ^b	mg/L	TOTAL DISSOLVED SOLIDS DRIED AT 180 °C (SM: 2540 C)	486	-	25
PHOSPHATE ^c	mg/L PO ₄ ³⁻	ASCORBIC ACID METHOD (SM: 4500-P E)	23.5	-	0.03



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0006		
RESIDUAL CHLORINE °	mg/L Cl ₂	DPD FERROUS TITRIMETRIC METHOD (SM: 4500-Cl F)	ND	-	0.1
SAMPLE CONDITION					
WATER'S COLOUR/TURBID			YELLOW/CLEAR		
SEDIMENT			BROWN		

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

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

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

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23rd 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 AN ORDINARY TREATMENT PROCESS BEFORE USING
(2) AGRICULTURE

n' : THE TEMPERATURE OF THE WATER MUST NOT BE HIGHER THAN THE NATURAL TEMPERATURE EXCEEDING 3 DEGREES CELSIUS

ND : NON-DETECTABLE.

Benjawan V.

(MISS BENJAWAN VIRIYOTHAJ)
LABORATORY SUPERVISOR

MARCH 9, 2022

ANALYSIS REPORT

CUSTOMER NAME : TPI POLENE PUBLIC COMPANY LIMITED
ADDRESS : 299 MOO 5 MITRAPARP ROAD MITTRAPHAP TABKWANG KAENGKOI SARABURI 18260
CONTACT INFORMATION : TEL : 0 3633 9111 EXT. 1743 e-mail : chod.padmuk@gmail.com
SAMPLING SOURCE : ห้วยขี้มนอน (บริเวณวัดขี้มนอน)
SAMPLE TYPE : SURFACE WATER
SAMPLING DATE : FEBRUARY 17, 2022
SAMPLING TIME : 12:40 HOUR
SAMPLING METHOD ° : GRAB, GRAB AND STERILE TECHNIQUE
SAMPLING BY ° : MR MANIT PANCHOT
ANALYZED BY : MISS NADNAPA KAMOLBOON

RECEIVED DATE : FEBRUARY 18, 2022
ANALYTICAL DATE : FEBRUARY 18-28, 2022
REPORT NO. : 2022-U015611
WORK NO. : 2021-008991
ANALYSIS NO. : T22AC892-0007

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0007		
SALINITY °	ppt	ELECTRICAL CONDUCTIVITY METHOD AT SITE (SM: 2520 B)	0.5	-	0.1
TURBIDITY °	NTU	NEPHELOMETRIC METHOD (SM: 2130 B)	34	-	0.1
FAT, OIL AND GREASE °	mg/L	LIQUID-LIQUID, PARTITION-GRAVIMETRIC METHOD (SM: 5520 B)	ND	-	3
TOTAL HARDNESS °	mg/L as CaCO ₃	EDTA TITRIMETRIC METHOD (SM: 2340 C)	311	-	4.0
NITRATE-NITROGEN °	mg/L NO ₃ ⁻ -N	CADMIUM REDUCTION METHOD (SM: 4500 -NO ₃ ⁻ -E)	0.47	≤ 5.0	0.02
SULPHATE °	mg/L SO ₄ ²⁻	TURBIDIMETRIC METHOD (SM: 4500-SO ₄ ²⁻ -E)	73.6	-	0.3
SODIUM ADSORPTION RATIO °	-	INDUCTIVELY COUPLED PLASMA (ICP) AND CALCULATION METHOD	1.04	-	-
METALS					
ARSENIC °	mg/L As	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	0.0016	≤ 0.01	0.0003
BARIUM °	mg/L Ba	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.090	-	0.003
CADMIUM °	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
HEXAVALENT CHROMIUM °	mg/L Cr ⁶⁺	EXTRACTION AND AIR-ACETYLENE FLAME METHOD (SM: 3111 C)	ND	≤ 0.05	0.001
COPPER °	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 °	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	0.289	-	0.005
LEAD °	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



PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0007		
MANGANESE ^c	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	0.061	≤ 1.0	0.002
MERCURY ^b	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 ^c	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
SELENIUM ^c	mg/L Se	HYDRIDE GENERATION AAS METHOD (SM: 3114 C)	ND	-	0.0005
TITANIUM ^c	mg/L Ti	NITRIC ACID-HYDROCHLORIC ACID DIGESTION AND INDUCTIVELY COUPLED PLASMA (ICP) METHOD (SM: 3030 F AND 3120 B)	0.008	-	0.005
ZINC ^c	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

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT	REGULATORY STANDARD	DETECTION LIMIT
			SURFACE WATER T22AC892-0007		
MICROBIOLOGY					
COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 B)	330	≤ 20,000	1.8
FAECAL COLIFORM BACTERIA ^b	MPN/100 mL	MULTIPLE-TUBE FERMENTATION TECHNIQUE (SM: 9221 E)	13	≤ 4,000	1.8
SAMPLE CONDITION					
WATER'S COLOUR/TURBID			YELLOW/CLEAR		
SEDIMENT			BROWN		

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

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

^c : 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, 23rd EDITION, 2017.

SM : STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, APHA, AWWA, WEF, 23rd 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 AN ORDINARY TREATMENT PROCESS BEFORE USING
(2) AGRICULTURE

≤0.005* : WHEN WATER HARDNESS NOT MORE THAN 100 mg/L AS CaCO₃

≤0.05** : WHEN WATER HARDNESS MORE THAN 100 mg/L AS CaCO₃

ND : NON-DETECTABLE.

< LOQ : < LEVEL 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).

Benjawan V.

(MISS BENJAWAN VIRIYOTHAI)
LABORATORY SUPERVISOR

MARCH 9, 2022