บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง

ผลการตรวจวัดคุณภาพสิ่งแวดล้อม

บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง.1

คุณภาพดิน

envi research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

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Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Soil Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : บ่อชั่วคราวกักเก็บเศษหินจากการเจาะในช่วงบน (Top Hole Cuttings Pit)**
GPS. Coordinate : UTM (WGS84) 47Q 0581836 E, 1839484 N
Sampling Date : July 17, 2024
Sampling Time : 13:03
Sampling Method : Shovel
Sampling By : Mr.Romsea Kateh
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : -

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-001
Received Date : July 19, 2024
Analytical Date : July 19-August 8, 2024
Report No. : 2024-RAAP097
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis	MRL	Result	Standard[1/]	
					Habitat	Commerce, Agriculture and Other Purposes
Arsenic	mg/kg	Digestion, Inductively Coupled Plasma (ICP-OES)	1.0	8.8	6	25
Lead	mg/kg	Digestion, Inductively Coupled Plasma (ICP-OES)	1.0	12	400	800
Conductivity	µs/cm	Electrochemical Sensor (1:5)	0.1	241	-	-

Remark : [1/] Notification of the National Environmental Board issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.138, Part 54D, dated March 11, B.E.2564 (2021).

[redacted]

(Ms.Raiwin Posit)
Laboratory Reviewer

[redacted]

(Ms.Ramita Taengthai)
Laboratory Supervisor

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บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม
โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ
และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง.2

คุณภาพน้ำใต้ดิน

ระยะเจาะหลุมปิโตรเลียม

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ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

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E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิตทิศทางท้ายน้ำ (Down Gradient)**
GPS. Coordinate : UTM (WGS84) 47Q 0683188 E, 1843190 N
Sampling Date : July 17, 2024
Sampling Time : 12:00
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Yellow, Sediment, Odor
Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-004
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP100
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.046	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.276	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	1.0	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.026	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.08	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0023	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0006	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	27	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.44	-	-	-
Temperature	°C	Certified Thermometer	-	29.0	-	-	-
pH	-	Electrometric	-	7.9	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	452	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	268	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	1,116	-	-	-
Turbidity	NTU	Nephelometric	0.02	1,670	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิตทิศทางท้ายน้ำ (Down Gradient)**
GPS. Coordinate : UTM (WGS84) 47Q 0683188 E, 1843190 N
Sampling Date : July 17, 2024
Sampling Time : 12:00
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Yellow, Sediment, Odor
Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-004
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP100
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	0.025	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	0.033	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.24, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannarukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : ปล่องเกดการณ์ที่ติดตั้งภายในฐานหลุมผลิตในทิศทางเหนือน้ำ (Up Gradient)**
GPS. Coordinate : UTM (WGS84) 47Q 0583194 E, 1843024 N
Sampling Date : July 17, 2024
Sampling Time : 12:21
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-005
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP101
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.021	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.275	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.04	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0025	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	1.5	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.15	-	-	-
Temperature	°C	Certified Thermometer	-	28.0	-	-	-
pH	-	Electrometric	-	7.8	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	197	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	256	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	16	-	-	-
Turbidity	NTU	Nephelometric	0.02	16	-	5	20

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : ปล่องเกดการณ์ที่ติดตั้งภายในฐานหลุมผลิตในทิศทางเหนือน้ำ (Up Gradient)**
GPS. Coordinate : UTM (WGS84) 47Q 0583194 E, 1843024 N
Sampling Date : July 17, 2024
Sampling Time : 12:21
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-005
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP101
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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(Ms.Yuwadee Na Ranong)
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Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : GW6 : ระบบประปาหมู่บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582117 E, 1843955 N
Sampling Date : July 17, 2024
Sampling Time : 15:12
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, Sediment, Odorless

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-006
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP102
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.168	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	<0.01	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0025	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.4	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.12	-	-	-
Temperature	°C	Certified Thermometer	-	29.0	-	-	-
pH	-	Electrometric	-	7.6	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	159	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	202	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	14	-	-	-
Turbidity	NTU	Nephelometric	0.02	4.0	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : GW6 : ระบบประปาหมู่บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582117 E, 1843955 N
Sampling Date : July 17, 2024
Sampling Time : 15:12
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, Sediment, Odorless

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-006
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP102
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.24, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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www.envireserach.co.th
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : GW7 : ระบบประปาหมู่บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0581645 E, 1841652 N
Sampling Date : July 17, 2024
Sampling Time : 16:10
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-007
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP103
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.441	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	<0.01	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0050	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.8	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.25	-	-	-
Temperature	°C	Certified Thermometer	-	29.5	-	-	-
pH	-	Electrometric	-	6.9	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	201	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	234	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	7.6	-	-	-
Turbidity	NTU	Nephelometric	0.02	4.7	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : GW7 : ระบบประปาหมู่บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0581645 E, 1841652 N
Sampling Date : July 17, 2024
Sampling Time : 16:10
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-007
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP103
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.24, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : GW8 : ระบบประปาวัดใหม่สามัคคีธรรม บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586500 E, 1844175 N
Sampling Date : July 17, 2024
Sampling Time : 15:45
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odor

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-008
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP104
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.254	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	<0.01	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0041	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.2	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.18	-	-	-
Temperature	°C	Certified Thermometer	-	37.5	-	-	-
pH	-	Electrometric	-	7.7	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	198	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	222	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	2.7	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : GW8 : ระบบประปาวัดใหม่สามัคคีธรรม บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586500 E, 1844175 N
Sampling Date : July 17, 2024
Sampling Time : 15:45
Sampling Method : Mr.Romsea Kateh
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odor

Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-008
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP104
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ระยะผลิตปิโตรเลียม
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : GW5 : บ้านเลขที่ 210 บ้านนิคมพัฒนา (2) หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0584748 E, 1846767 N
Sampling Date : August 22, 2024
Sampling Time : 14:40
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-001
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR413
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.010	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.028	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.04	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0002	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.3	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.03	-	-	-
Temperature	°C	Certified Thermometer	-	30.1	-	-	-
pH	-	Electrometric	-	7.7	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	66	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	622	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	8.5	-	-	-
Turbidity	NTU	Nephelometric	0.02	9.0	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : GW5 : บ้านเลขที่ 210 บ้านนิคมพัฒนา (2) หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0584748 E, 1846767 N
Sampling Date : August 22, 2024
Sampling Time : 14:40
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-001
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR413
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 15D, dated May 21, B.E.2551 (2008).

[redacted] (Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted] (Mr.Virat Hemvannanukul)
Laboratory Supervisor

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Page 1/2
F-RP-024 Rev. 04, September 28, 2020

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E-mail : envi@enviresearch.co.th
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : GW6 : ระบบประปาหมู่บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582117 E, 1843955 N
Sampling Date : August 22, 2024
Sampling Time : 16:05
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-002
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR414
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.017	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.116	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0014	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.3	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.12	-	-	-
Temperature	°C	Certified Thermometer	-	32.7	-	-	-
pH	-	Electrometric	-	8.0	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	133	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	188	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	3.6	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : GW6 : ระบบประปาหมู่บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582117 E, 1843955 N
Sampling Date : August 22, 2024
Sampling Time : 16:05
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-002
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR414
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{21})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{31})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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Laboratory Reviewer

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(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : GW4 : ระบบประปาหมู่บ้านนิคมพัฒนา หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0583407 E, 1846508 N
Sampling Date : August 22, 2024
Sampling Time : 15:20
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-003
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR415
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.008	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.032	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.73	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0019	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	1.2	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.10	-	-	-
Temperature	°C	Certified Thermometer	-	33.6	-	-	-
pH	-	Electrometric	-	7.6	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	173	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	226	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	8.4	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : GW4 : ระบบประปาหมู่บ้านนิคมพัฒนา หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0583407 E, 1846508 N
Sampling Date : August 22, 2024
Sampling Time : 15:20
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-003
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR415
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{24})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{25}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

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(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : GW9 : ระบบประปาหมู่บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583256 E, 1840996 N
Sampling Date : August 22, 2024
Sampling Time : 17:00
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-004
Received Date : August 23, 2024
Analytical Date : August 23-September 16, 2024
Report No. : 2024-RAAR416
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.015	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.703	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.06	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0031	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.9	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.28	-	-	-
Temperature	°C	Certified Thermometer	-	32.7	-	-	-
pH	-	Electrometric	-	7.5	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	170	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	245	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	12	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : GW9 : ระบบประปาหมู่บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583256 E, 1840996 N
Sampling Date : August 22, 2024
Sampling Time : 17:00
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-004
Received Date : August 23, 2024
Analytical Date : August 23-September 16, 2024
Report No. : 2024-RAAR416
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{35})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]

(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : GW11 : ระบบประปาหมู่บ้านหนองหลวง หมู่ที่ 5 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0585938 E, 1839424 N
Sampling Date : August 22, 2024
Sampling Time : 18:02
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-005
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR417
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.002	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.391	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0032	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.4	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.40	-	-	-
Temperature	°C	Certified Thermometer	-	30.6	-	-	-
pH	-	Electrometric	-	7.5	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	150	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	213	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	1.2	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : GW11 : ระบบประปาหมู่บ้านหนองหลวง หมู่ที่ 5 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0585938 E, 1839424 N
Sampling Date : August 22, 2024
Sampling Time : 18:02
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-005
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR417
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20 B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3, BM6 : GW7 : ระบบประปาหมู่บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0581645 E, 1841652 N
Sampling Date : August 22, 2024
Sampling Time : 16:33
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-006
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR418
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.257	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.13	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0023	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.3	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.20	-	-	-
Temperature	°C	Certified Thermometer	-	31.7	-	-	-
pH	-	Electrometric	-	7.6	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	120	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	178	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	1.7	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3, BM6 : GW7 : ระบบประปาหมู่บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0581645 E, 1841652 N
Sampling Date : August 22, 2024
Sampling Time : 16:33
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-006
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR418
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20 B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

[redacted] (Ms.Yuwadee Na Ranorg)
Laboratory Reviewer

[redacted] (Mr.Virat Hemvannanukul)
Laboratory Supervisor

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Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@envisearch.co.th
www.envisearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3, BM6 : GW8 : ระบบประปาวัดใหม่สามัคคี บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586494 E, 1844186 N
Sampling Date : August 22, 2024
Sampling Time : 17:29
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-007
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR419
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.010	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.006	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.263	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0036	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.6	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.19	-	-	-
Temperature	°C	Certified Thermometer	-	31.3	-	-	-
pH	-	Electrometric	-	7.9	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	180	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	208	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	1.7	-	5	20

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3, BM6 : GW8 : ระบบประปาวัดใหม่สามัคคี บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586494 E, 1844186 N
Sampling Date : August 22, 2024
Sampling Time : 17:29
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-007
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR419
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{34})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]

(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BY1-2**
GPS. Coordinate : UTM (WGS84) 47Q 0583522 E, 1845355 N
Sampling Date : August 23, 2024
Sampling Time : 12:02
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-001
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS617
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.012	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	1.3	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	<0.01	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	1.7	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.03	-	-	-
Temperature	°C	Certified Thermometer	-	34.9	-	-	-
pH	-	Electrometric	-	7.6	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	302	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	458	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.2	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	8.6	-	-	-
Turbidity	NTU	Nephelometric	0.02	6.8	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BY1-2**
GPS. Coordinate : UTM (WGS84) 47Q 0583522 E, 1845355 N
Sampling Date : August 23, 2024
Sampling Time : 12:02
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-001
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS617
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20 B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

[redacted] [redacted]

(Ms.Yuwadee Na Ranorg)
Laboratory Reviewer

(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BY1-20**
GPS. Coordinate : UTM (WGS84) 47Q 0584086 E, 1846791 N
Sampling Date : August 23, 2024
Sampling Time : 11:26
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-002
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS618
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.216	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.04	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0009	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.1	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.37	-	-	-
Temperature	°C	Certified Thermometer	-	31.6	-	-	-
pH	-	Electrometric	-	7.8	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	260	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	350	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.2	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	1.2	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BY1-20**
GPS. Coordinate : UTM (WGS84) 47Q 0584086 E, 1846791 N
Sampling Date : August 23, 2024
Sampling Time : 11:26
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-002
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS618
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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Laboratory Reviewer

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Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BMS2 สถานีที่ 1**
GPS. Coordinate : UTM (WGS84) 47Q 0583966 E, 1840391 N
Sampling Date : August 23, 2024
Sampling Time : 16:30
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-003
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS619
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.124	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.880	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0051	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0006	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	23	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.47	-	-	-
Temperature	°C	Certified Thermometer	-	33.3	-	-	-
pH	-	Electrometric	-	7.6	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	137	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	152	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	56	-	-	-
Turbidity	NTU	Nephelometric	0.02	77	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BMS2 สถานีที่ 1**
GPS. Coordinate : UTM (WGS84) 47Q 0583966 E, 1840391 N
Sampling Date : August 23, 2024
Sampling Time : 16:30
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-003
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS619
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

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(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BMS2 สถานีที่ 2**
GPS. Coordinate : UTM (WGS84) 47Q 0583833 E, 1840428 N
Sampling Date : August 23, 2024
Sampling Time : 15:57
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-004
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS620
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.009	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.070	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.548	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.05	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0016	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0007	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	8.2	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.38	-	-	-
Temperature	°C	Certified Thermometer	-	33.0	-	-	-
pH	-	Electrometric	-	7.6	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	124	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	245	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	50	-	-	-
Turbidity	NTU	Nephelometric	0.02	17	-	5	20

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BMS2 สถานีที่ 2**
GPS. Coordinate : UTM (WGS84) 47Q 0583833 E, 1840428 N
Sampling Date : August 23, 2024
Sampling Time : 15:57
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-004
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS620
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{24})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{34})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20 B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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Laboratory Reviewer

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Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BM3 สถานีที่ 1**
GPS. Coordinate : UTM (WGS84) 47Q 0584480 E, 1843610 N
Sampling Date : August 23, 2024
Sampling Time : 13:49
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-005
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS621
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	1.3	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0036	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0006	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	4.5	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.18	-	-	-
Temperature	°C	Certified Thermometer	-	31.2	-	-	-
pH	-	Electrometric	-	7.6	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	190	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	273	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	30	-	-	-
Turbidity	NTU	Nephelometric	0.02	21	-	5	20

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BM3 สถานีที่ 1**
GPS. Coordinate : UTM (WGS84) 47Q 0584480 E, 1843610 N
Sampling Date : August 23, 2024
Sampling Time : 13:49
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-005
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS621
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{34})	mg/L	Liquid-Liquic Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20 B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BM3 สถานีที่ 2**
GPS. Coordinate : UTM (WGS84) 47Q 0584450 E, 1843642 N
Sampling Date : August 23, 2024
Sampling Time : 13:16
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Colorless, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-006
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS622
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.678	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.173	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.773	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	<0.01	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0002	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0006	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.3	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.26	-	-	-
Temperature	°C	Certified Thermometer	-	29.0	-	-	-
pH	-	Electrometric	-	7.5	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	206	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	324	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.2	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	12	-	-	-
Turbidity	NTU	Nephelometric	0.02	5.6	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BM3 สถานีที่ 2**
GPS. Coordinate : UTM (WGS84) 47Q 0584450 E, 1843642 N
Sampling Date : August 23, 2024
Sampling Time : 13:16
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Colorless, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-006
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS622
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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Page 1/2
F-RP-024 Rev. 04, September 28, 2020

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BM6 สถานีที่ 2**
GPS. Coordinate : UTM (WGS84) 47Q 0583188 E, 1843190 N
Sampling Date : August 23, 2024
Sampling Time : 14:22
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-007
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS623
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.023	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.068	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.584	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.05	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0026	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	1.2	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.31	-	-	-
Temperature	°C	Certified Thermometer	-	33.7	-	-	-
pH	-	Electrometric	-	7.3	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	196	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	274	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	17	-	-	-
Turbidity	NTU	Nephelometric	0.02	14	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BM6 สถานีที่ 2**
GPS. Coordinate : UTM (WGS84) 47Q 0583188 E, 1843190 N
Sampling Date : August 23, 2024
Sampling Time : 14:22
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-007
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS623
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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Laboratory Reviewer

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Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BM6 สถานีที่ 1**
GPS. Coordinate : UTM (WGS84) 47Q 0583194 E, 1843024 N
Sampling Date : August 23, 2024
Sampling Time : 14:55
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-008
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS624
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.021	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.01	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0022	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.4	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.09	-	-	-
Temperature	°C	Certified Thermometer	-	34.4	-	-	-
pH	-	Electrometric	-	7.9	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	205	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	250	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	2.5	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : บ่อสังเกตการณ์ที่ติดตั้งภายในฐานหลุมผลิต BM6 สถานีที่ 1**
GPS. Coordinate : UTM (WGS84) 47Q 0583194 E, 1843024 N
Sampling Date : August 23, 2024
Sampling Time : 14:55
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE214-008
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAS624
Report Date : September 24, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : GW5 : บ้านนิคมพัฒนา (2) หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0584748 E, 1846767 N
Sampling Date : August 22, 2024
Sampling Time : 14:40
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-008
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR420
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.010	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.028	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.04	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0002	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.3	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.03	-	-	-
Temperature	°C	Certified Thermometer	-	30.1	-	-	-
pH	-	Electrometric	-	7.7	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	66	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	622	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	8.5	-	-	-
Turbidity	NTU	Nephelometric	0.02	9.0	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : GW5 : บ้านนิคมพัฒนา (2) หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0584748 E, 1846767 N
Sampling Date : August 22, 2024
Sampling Time : 14:40
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-008
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR420
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[3] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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(Mr.Virat Hemvannanukul)
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3, BM6 : GW6 : ระบบประปาหมู่บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582117 E, 1843955 N
Sampling Date : August 22, 2024
Sampling Time : 16:05
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-009
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR421
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	5	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	700	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	1,000	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	10,000	-	-
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.003	None	0.01
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	-	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.017	1.0	≤1.0	1.5
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.01	None	0.05
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.116	0.5	≤0.3	0.5
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.02	-	-
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	5.0	≤5.0	15
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0014	0.01	None	0.05
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	0.01	None	0.01
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.001	None	0.001
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.3	-	≤0.5	1.0
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.12	-	-	-
Temperature	°C	Certified Thermometer	-	32.7	-	-	-
pH	-	Electrometric	-	8.0	-	7.0-8.5	6.5-9.2
Total Dissolved Solids	mg/L	Dried at 180°C	50	133	-	≤600	1,200
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	188	-	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-	-
Turbidity	NTU	Nephelometric	0.02	3.6	-	5	20

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ground Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3, BM6 : GW6 : ระบบประปาหมู่บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582117 E, 1843955 N
Sampling Date : August 22, 2024
Sampling Time : 16:05
Sampling Method : Mr.Nitad Sirichad
Sampling By : Grab
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Clear, Colorless, No Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE167-009
Received Date : August 23, 2024
Analytical Date : August 23-September 12, 2024
Report No. : 2024-RAAR421
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	Standard[3]	
						Suitable Allowance	Maximum Allowable
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.20, B.E.2543 (2000), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.117 Part 94D, dated September 15, B.E.2543 (2000).
[3] Notification of the Ministry of Natural Resources and Environment B.E.2551 (2008), published in the Royal Government Gazette, Vol.125, Part 85D, dated May 21, B.E.2551 (2008).

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(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

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(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม
โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ
และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง.3

คุณภาพอากาศ

ระยะเจาะหลุมปิโตรเลียม

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ambient Air Quality
Sampling Point : **ฐานหลุมผลิต BM6 : A6 : บ้านเลขที่ 17/2 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583275 E, 1845086 N
Sampling Date : June 9-12, 2024
Sampling Time : 07:43
Sampling Method : U.S. EPA 40 CFR Part 50, 53
Sampling By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.

Quotation No. : AR2024-00465
Analysis No. : 2024-AC919
Received Date : June 17, 2024
Analytical Date : June 17-20, 2024
Report No. : 2024-RAAM268
Report Date : June 21, 2024

Parameter	Unit	Method of Analysis	Result			Standard[1]	Standard[2]
			Jun 9-10, 24	Jun 10-11, 24	Jun 11-12, 24		
Total Suspended Particulate (TSP) 24 Hours Average	mg/m³	High-Volume, Gravimetric	0.058	0.047	0.028	0.330	-
Particulate Size Less Than 10 Micron (PM10) 24 Hours Average	mg/m³	PM10 Size Selective, High-Volume, Gravimetric	0.028	0.021	0.012	0.120	-
Particulate Size Less Than 2.5 Micron (PM2.5) 24 Hours Average	µg/m³	PM2.5 Size Selective, Low-Volume Air Sampler, Gravimetric Method	10.2	7.2	4.9	-	37.5

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2] Notification of National Environmental Board, B.E.2565 (2022), published in the Royal Government Gazette No.139 Special Part 163D dated July 8, B.E.2565 (2022) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Natnicha Sermmativong) (Ms.Ramita Taengthai)
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ambient Air Quality
Sampling Point : **ฐานหลุมผลิต BM6 : A7 : บ้านเลขที่ 5/1 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582386 E, 1843578 N
Sampling Date : June 9-12, 2024
Sampling Time : 07:55
Sampling Method : U.S. EPA 40 CFR Part 50, 53
Sampling By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.

Quotation No. : AR2024-00465
Analysis No. : 2024-AC919
Received Date : June 17, 2024
Analytical Date : June 17-20, 2024
Report No. : 2024-RAAM271
Report Date : June 20, 2024

Parameter	Unit	Method of Analysis	Result			Standard[1]	Standard[2]
			Jun 9-10, 24	Jun 10-11, 24	Jun 11-12, 24		
Total Suspended Particulate (TSP) 24 Hours Average	mg/m³	High-Volume, Gravimetric	0.037	0.031	0.026	0.330	-
Particulate Size Less Than 10 Micron (PM10) 24 Hours Average	mg/m³	PM10 Size Selective, High-Volume, Gravimetric	0.017	0.015	0.011	0.120	-
Particulate Size Less Than 2.5 Micron (PM2.5) 24 Hours Average	µg/m³	PM2.5 Size Selective, Low-Volume Air Sampler, Gravimetric Method	8.5	7.3	4.6	-	37.5

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2] Notification of National Environmental Board, B.E.2565 (2022), published in the Royal Government Gazette No.139 Special Part 163D dated July 8, B.E.2565 (2022) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

[redacted] [redacted]
(Ms.Natnicha Sermmativong) (Ms.Ramita Taengthai)
Laboratory Reviewer Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A6 : บ้านเลขที่ 17/2 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583275 E, 1845086 N : **Quotation No.** : AR2024-00465
Measured Date : June 9-12, 2024 **Analysis No.** : 2024-AC919-001
Measured By : Mr.Nitad Sirichad **Report No.** : 2024-RAAM672
Analyzed By : Environment Research & Technology Co., Ltd. **Report Date** : July 6, 2024
Measured Instrument : NOx Chemiluminescence Analyzer Horiba Model APNA-370 Serial Number NKDVYFRX

Interval Time	Result NO_2 (ppm)			Standard[1]
	Jun 9-10, 24	Jun 10-11, 24	Jun 11-12, 24	
08:00-09:00	0.0063	0.0071	0.0061	
09:00-10:00	0.0053	0.0078	0.0067	
10:00-11:00	0.0049	0.0066	0.0059	
11:00-12:00	0.0047	0.0060	0.0055	
12:00-13:00	0.0048	0.0058	0.0054	
13:00-14:00	0.0057	0.0054	0.0053	
14:00-15:00	0.0060	0.0062	0.0052	
15:00-16:00	0.0056	0.0064	0.0056	
16:00-17:00	0.0056	0.0070	0.0061	
17:00-18:00	0.0058	0.0069	0.0060	
18:00-19:00	0.0062	0.0066	0.0055	
19:00-20:00	0.0065	0.0071	0.0058	
20:00-21:00	0.0074	0.0070	0.0061	
21:00-22:00	0.0075	0.0059	0.0065	
22:00-23:00	0.0075	0.0062	0.0061	
23:00-00:00	0.0066	0.0055	0.0058	
00:00-01:00	0.0066	0.0058	0.0058	
01:00-02:00	0.0065	0.0060	0.0057	
02:00-03:00	0.0067	0.0067	0.0058	
03:00-04:00	0.0064	0.0057	0.0056	
04:00-05:00	0.0070	0.0056	0.0057	
05:00-06:00	0.0072	0.0063	0.0058	
06:00-07:00	0.0070	0.0068	0.0057	
07:00-08:00	0.0068	0.0062	0.0057	
24 Hours Average	**0.0063**	**0.0064**	**0.0058**	-
1 Hour Maximum	**0.0075**	**0.0078**	**0.0067**	**0.17**

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), Notification No.28, B.E.2550 (2007), published in the Royal Government Gazette No.124 Special Part 58D dated May 14, B.E.2550 (2007) and Notification No.33, B.E.2552 (2009), published in the Royal Government Gazette No.126 Special Part 114D dated August 14, B.E.2552 (2009), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

[redacted] [redacted]

(Ms.Piyatida Pradangkho) Laboratory Reviewer
(Ms.Panicha Promchai) Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A6 : บ้านเลขที่ 17/2 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583275 E, 1845086 N **Quotation No.** : AR2024-00465
Measured Date : June 9-12, 2024 **Analysis No.** : 2024-AC919-001
Measured By : Mr.Nitad Sirichad **Report No.** : 2024-RAAM673
Analyzed By : Environment Research & Technology Co., Ltd. **Report Date** : July 6, 2024
Measured Instrument : SO_2 UV-Fluorescence Analyzer Thermo Model 43i Serial Number CM14430003

Interval Time	Result SO_2 (ppm)			Standard
	Jun 9-10, 24	Jun 10-11, 24	Jun 11-12, 24	
08:00-09:00	0.0017	0.0016	0.0018	
09:00-10:00	0.0017	0.0017	0.0016	
10:00-11:00	0.0016	0.0017	0.0017	
11:00-12:00	0.0018	0.0016	0.0016	
12:00-13:00	0.0016	0.0016	0.0016	
13:00-14:00	0.0018	0.0015	0.0017	
14:00-15:00	0.0018	0.0017	0.0017	
15:00-16:00	0.0019	0.0017	0.0017	
16:00-17:00	0.0018	0.0017	0.0016	
17:00-18:00	0.0017	0.0018	0.0017	
18:00-19:00	0.0018	0.0016	0.0016	
19:00-20:00	0.0017	0.0016	0.0016	
20:00-21:00	0.0015	0.0017	0.0018	
21:00-22:00	0.0021	0.0016	0.0016	
22:00-23:00	0.0017	0.0016	0.0017	
23:00-00:00	0.0018	0.0017	0.0017	
00:00-01:00	0.0016	0.0017	0.0016	
01:00-02:00	0.0017	0.0017	0.0016	
02:00-03:00	0.0016	0.0016	0.0016	
03:00-04:00	0.0016	0.0017	0.0016	
04:00-05:00	0.0016	0.0017	0.0016	
05:00-06:00	0.0016	0.0017	0.0016	
06:00-07:00	0.0016	0.0018	0.0017	
07:00-08:00	0.0016	0.0017	0.0017	
24 Hours Average	**0.0017**	**0.0017**	**0.0017**	**0.12[1]**
1 Hour Maximum	**0.0021**	**0.0018**	**0.0018**	**0.30[1]**

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2] Notification of National Environmental Board, No.12, B.E.2538 (1995), published in the Royal Government Gazette No.112 Special Part 27D dated July 13, B.E.2538 (1995) and Notification No.21, B.E.2544 (2001), published in the Royal Government Gazette No.118 Special Part 39D dated April 30, B.E.2544 (2001), under the Enhancement and Conservation of National [redacted] (1992).

[redacted] [redacted]

(Ms.Piyatida Pradangkho) Laboratory Reviewer
(Ms.Panicha Promchai) Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A6 : บ้านเลขที่ 17/2 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583275 E, 1845086 N
Quotation No. : AR2024-00465
Measured Date : June 9-12, 2024
Analysis No. : 2024-AC919-001
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAM674
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : July 6, 2024
Measured Instrument : CO NDIR Analyzer Horiba Model APMA-360CE Serial Number 576876075

Interval Time	Result CO (ppm)						Standard[1/]
	Jun 9-10, 24		Jun 10-11, 24		Jun 11-12, 24		
	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	
08:00-09:00	0.4	-	0.3	0.3	0.4	0.4	
09:00-10:00	0.4	-	0.4	0.3	0.4	0.4	
10:00-11:00	0.4	-	0.4	0.3	0.4	0.4	
11:00-12:00	0.4	-	0.4	0.3	0.4	0.4	
12:00-13:00	0.4	-	0.4	0.4	0.5	0.4	
13:00-14:00	0.5	-	0.4	0.4	0.4	0.4	
14:00-15:00	0.5	-	0.5	0.4	0.4	0.4	
15:00-16:00	0.4	0.4	0.5	0.4	0.4	0.4	
16:00-17:00	0.4	0.4	0.5	0.4	0.4	0.4	
17:00-18:00	0.3	0.4	0.5	0.4	0.4	0.4	
18:00-19:00	0.4	0.4	0.4	0.4	0.4	0.4	
19:00-20:00	0.4	0.4	0.4	0.4	0.4	0.4	
20:00-21:00	0.4	0.4	0.4	0.4	0.4	0.4	
21:00-22:00	0.4	0.4	0.4	0.4	0.4	0.4	
22:00-23:00	0.5	0.4	0.5	0.4	0.4	0.4	
23:00-00:00	0.4	0.4	0.5	0.4	0.4	0.4	
00:00-01:00	0.5	0.4	0.3	0.4	0.4	0.4	
01:00-02:00	0.3	0.4	0.3	0.4	0.4	0.4	
02:00-03:00	0.4	0.4	0.4	0.4	0.4	0.4	
03:00-04:00	0.3	0.4	0.4	0.4	0.4	0.4	
04:00-05:00	0.3	0.4	0.4	0.4	0.4	0.4	
05:00-06:00	0.3	0.4	0.4	0.4	0.4	0.4	
06:00-07:00	0.3	0.4	0.4	0.4	0.4	0.4	
07:00-08:00	0.3	0.3	0.4	0.4	0.4	0.4	
24 Hours Average	**0.4**	**-**	**0.4**	**-**	**0.4**	**-**	**-**
1 Hour Maximum	**0.5**	**-**	**0.5**	**-**	**0.5**	**-**	**30**
8 Hours Maximum	**-**	**0.4**	**-**	**0.4**	**-**	**0.4**	**9**

Remark : 1/ Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), under the Enhancement and [redacted] ity Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A7 : บ้านเลขที่ 5/1 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582386 E, 1843578 N
Quotation No. : AR2024-00465
Measured Date : June 9-12, 2024
Analysis No. : 2024-AC919-004
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAM675
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : July 6, 2024
Measured Instrument : NOx Chemiluminescence Analyzer Horiba Model APNA-370 Serial Number PA6WVAJ9

Interval Time	Result NO_2 (ppm)			Standard[1/]
	Jun 9-10, 24	Jun 10-11, 24	Jun 11-12, 24	
08:00-09:00	0.0063	0.0104	0.0072	
09:00-10:00	0.0074	0.0159	0.0097	
10:00-11:00	0.0053	0.0108	0.0071	
11:00-12:00	0.0051	0.0101	0.0056	
12:00-13:00	0.0063	0.0063	0.0049	
13:00-14:00	0.0054	0.0056	0.0051	
14:00-15:00	0.0049	0.0080	0.0049	
15:00-16:00	0.0056	0.0063	0.0049	
16:00-17:00	0.0065	0.0054	0.0047	
17:00-18:00	0.0048	0.0053	0.0050	
18:00-19:00	0.0049	0.0049	0.0046	
19:00-20:00	0.0060	0.0050	0.0052	
20:00-21:00	0.0064	0.0054	0.0049	
21:00-22:00	0.0061	0.0050	0.0055	
22:00-23:00	0.0064	0.0048	0.0058	
23:00-00:00	0.0065	0.0049	0.0054	
00:00-01:00	0.0064	0.0070	0.0056	
01:00-02:00	0.0065	0.0060	0.0055	
02:00-03:00	0.0065	0.0134	0.0057	
03:00-04:00	0.0100	0.0062	0.0055	
04:00-05:00	0.0086	0.0058	0.0054	
05:00-06:00	0.0089	0.0086	0.0054	
06:00-07:00	0.0072	0.0090	0.0053	
07:00-08:00	0.0083	0.0085	0.0058	
24 Hours Average	**0.0065**	**0.0074**	**0.0056**	**-**
1 Hour Maximum	**0.0100**	**0.0159**	**0.0097**	**0.17**

Remark : 1/ Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), Notification No.28, B.E.2550 (2007), published in the Royal Government Gazette No.124 Special Part 58D dated May 14, B.E.2550 (2007) and Notification No.33, B.E.2552 (2009), published in the Royal Government Gazette No.126 Special Part 114D dated August 14, B.E.2552 (2009), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/54 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A7 : บ้านเลขที่ 5/1 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582386 E, 1843578 N
Measured Date : June 9-12, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : SO_2 UV-Fluorescence Analyzer Thermo Model 43i Serial Number CM14430005

Quotation No. : AR2024-00465
Analysis No. : 2024-AC919-004
Report No. : 2024-RAAM676
Report Date : July 6, 2024

Interval Time	Result SO_2 (ppm)			Standard
	Jun 9-10, 24	Jun 10-11, 24	Jun 11-12, 24	
08:00-09:00	0.0014	0.0019	0.0016	
09:00-10:00	0.0011	0.0016	0.0017	
10:00-11:00	0.0012	0.0015	0.0015	
11:00-12:00	0.0012	0.0014	0.0011	
12:00-13:00	0.0010	0.0014	0.0013	
13:00-14:00	0.0012	0.0013	0.0012	
14:00-15:00	0.0013	0.0018	0.0014	
15:00-16:00	0.0009	0.0014	0.0014	
16:00-17:00	0.0007	0.0015	0.0013	
17:00-18:00	0.0006	0.0013	0.0012	
18:00-19:00	0.0014	0.0013	0.0017	
19:00-20:00	0.0014	0.0012	0.0015	
20:00-21:00	0.0019	0.0015	0.0017	
21:00-22:00	0.0017	0.0017	0.0016	
22:00-23:00	0.0016	0.0018	0.0018	
23:00-00:00	0.0018	0.0021	0.0019	
00:00-01:00	0.0018	0.0019	0.0017	
01:00-02:00	0.0019	0.0022	0.0016	
02:00-03:00	0.0020	0.0020	0.0019	
03:00-04:00	0.0014	0.0020	0.0020	
04:00-05:00	0.0016	0.0016	0.0016	
05:00-06:00	0.0018	0.0016	0.0019	
06:00-07:00	0.0020	0.0019	0.0018	
07:00-08:00	0.0021	0.0018	0.0020	
24 Hours Average	**0.0015**	**0.0017**	**0.0016**	**0.12[1/]**
1 Hour Maximum	**0.0021**	**0.0022**	**0.0020**	**0.30[2/]**

Remark : [1/] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2/] Notification of National Environmental Board, No.12, B.E.2538 (1995), published in the Royal Government Gazette No.112 Special Part 27D dated July 13, B.E.2538 (1995) and Notification No.21, B.E.2544 (2001), published in the Royal Government Gazette No.118 Special Part 39D dated April 30, B.E.2544 (2001), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

[redacted] (Ms.Panicha Promchai)
Laboratory Reviewer — Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A7 : บ้านเลขที่ 5/1 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582386 E, 1843578 N
Measured Date : June 9-12, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : CO NDIR Analyzer Horiba Model APMA-370 Serial Number 3VJ73T6X

Quotation No. : AR2024-00465
Analysis No. : 2024-AC919-004
Report No. : 2024-RAAM677
Report Date : July 6, 2024

Interval Time	Result CO (ppm)						Standard[1/]
	Jun 9-10, 24		Jun 10-11, 24		Jun 11-12, 24		
	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	
08:00-09:00	0.4	-	0.4	0.4	0.4	0.5	
09:00-10:00	0.5	-	0.5	0.5	0.3	0.5	
10:00-11:00	0.5	-	0.5	0.5	0.4	0.5	
11:00-12:00	0.4	-	0.4	0.5	0.5	0.5	
12:00-13:00	0.4	-	0.5	0.5	0.4	0.5	
13:00-14:00	0.4	-	0.4	0.5	0.4	0.4	
14:00-15:00	0.4	-	0.4	0.4	0.4	0.4	
15:00-16:00	0.4	0.4	0.4	0.4	0.4	0.4	
16:00-17:00	0.5	0.4	0.4	0.4	0.5	0.4	
17:00-18:00	0.5	0.4	0.7	0.5	0.2	0.4	
18:00-19:00	0.4	0.4	0.4	0.4	0.5	0.4	
19:00-20:00	0.3	0.4	0.4	0.4	0.4	0.4	
20:00-21:00	0.3	0.4	0.5	0.4	0.4	0.4	
21:00-22:00	0.4	0.4	0.5	0.5	0.4	0.4	
22:00-23:00	0.3	0.4	0.4	0.5	0.4	0.4	
23:00-00:00	0.3	0.4	0.4	0.5	0.4	0.4	
00:00-01:00	0.4	0.4	0.5	0.5	0.5	0.4	
01:00-02:00	0.4	0.4	0.4	0.4	0.5	0.4	
02:00-03:00	0.4	0.4	0.5	0.4	0.5	0.4	
03:00-04:00	0.5	0.4	0.5	0.5	0.5	0.4	
04:00-05:00	0.5	0.4	0.5	0.5	0.5	0.5	
05:00-06:00	0.4	0.4	0.5	0.5	0.5	0.5	
06:00-07:00	0.5	0.4	0.6	0.5	0.6	0.5	
07:00-08:00	0.5	0.4	0.6	0.5	0.6	0.5	
24 Hours Average	**0.4**	**-**	**0.5**	**-**	**0.4**	**-**	**-**
1 Hour Maximum	**0.5**	**-**	**0.7**	**-**	**0.6**	**-**	**30**
8 Hours Maximum	**-**	**0.4**	**-**	**0.5**	**-**	**0.5**	**9**

Remark : [1/] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

[redacted] (Ms.Panicha Promchai)
Laboratory Reviewer — Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A6 : บ้านเลขที่ 17/2 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583275 E, 1845086 N
Quotation No. : AR2024-00465
Measured Date : June 9-12, 2024
Analysis No. : 2024-AC919-001
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAM669
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : July 6, 2024

Date/Time	Jun 9-10, 24		Jun 10-11, 24		Jun 11-12, 24	
	WS	WD	WS	WD	WS	WD
08:00-09:00	0.4	SSW	0.4	ESE	0.4	SE
09:00-10:00	1.8	SW	0.9	ESE	0.9	S
10:00-11:00	0.9	SSW	0.9	ESE	2.2	SSW
11:00-12:00	0.4	WSW	0.9	ESE	1.3	S
12:00-13:00	0.4	ESE	0.9	ESE	1.3	S
13:00-14:00	0.9	ESE	1.3	ESE	1.3	SE
14:00-15:00	0.9	SW	1.3	ESE	1.3	ESE
15:00-16:00	0.9	SSW	1.3	ESE	1.3	S
16:00-17:00	0.9	SSW	1.8	WSW	1.8	SSW
17:00-18:00	0.9	S	2.2	WNW	1.3	WNW
18:00-19:00	0.9	SSW	1.8	W	1.3	SW
19:00-20:00	<0.4	Calm	0.4	SSW	0.4	ESE
20:00-21:00	<0.4	Calm	0.9	SSW	<0.4	Calm
21:00-22:00	<0.4	Calm	0.4	SSW	<0.4	Calm
22:00-23:00	0.4	S	0.9	SSW	0.4	E
23:00-00:00	<0.4	Calm	<0.4	Calm	0.4	E
00:00-01:00	<0.4	Calm	<0.4	Calm	<0.4	Calm
01:00-02:00	<0.4	Calm	0.4	SE	0.4	E
02:00-03:00	<0.4	Calm	0.4	ESE	<0.4	Calm
03:00-04:00	<0.4	Calm	0.4	ESE	<0.4	Calm
04:00-05:00	<0.4	Calm	<0.4	Calm	<0.4	Calm
05:00-06:00	<0.4	Calm	<0.4	Calm	0.4	ESE
06:00-07:00	<0.4	Calm	<0.4	Calm	<0.4	Calm
07:00-08:00	0.4	SE	<0.4	Calm	<0.4	Calm

Remark : WS = Wind Speed (m/s)
WD = Wind Direction
Height of wind vane and anemometer above ground 10 meters.

[redacted]
(Ms.Piyatida Pradangkho)
Laboratory Reviewer

[redacted]
(Ms.Panicha Promchai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co, Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A6 : บ้านเลขที่ 17/2 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583275 E, 1845086 N
Quotation No. : AR2024-00465
Measured Date : June 9-12, 2024
Analysis No. : 2024-AC919-001
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAM669
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : July 6, 2024

Wind Direction	Percentage frequency of wind in each speed and direction					
	0.4-1.1	1.1-2.1	2.1-3.1	3.1-4.1	≥4.1	Total
N	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
NNE	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
NE	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
ENE	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
E	4.16667	0.00000	0.00000	0.00000	0.00000	**4.16667**
ESE	15.27780	5.55556	0.00000	0.00000	0.00000	**20.83336**
SE	4.16667	1.38889	0.00000	0.00000	0.00000	**5.55556**
SSE	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
S	4.16667	4.16667	0.00000	0.00000	0.00000	**8.33334**
SSW	12.50000	1.38889	1.38889	0.00000	0.00000	**15.27778**
SW	1.38889	2.77778	0.00000	0.00000	0.00000	**4.16667**
WSW	1.38889	1.38889	0.00000	0.00000	0.00000	**2.77778**
W	0.00000	1.38889	0.00000	0.00000	0.00000	**1.38889**
WNW	0.00000	1.38889	1.38889	0.00000	0.00000	**2.77778**
NW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
NNW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
Calm	**34.72220**					

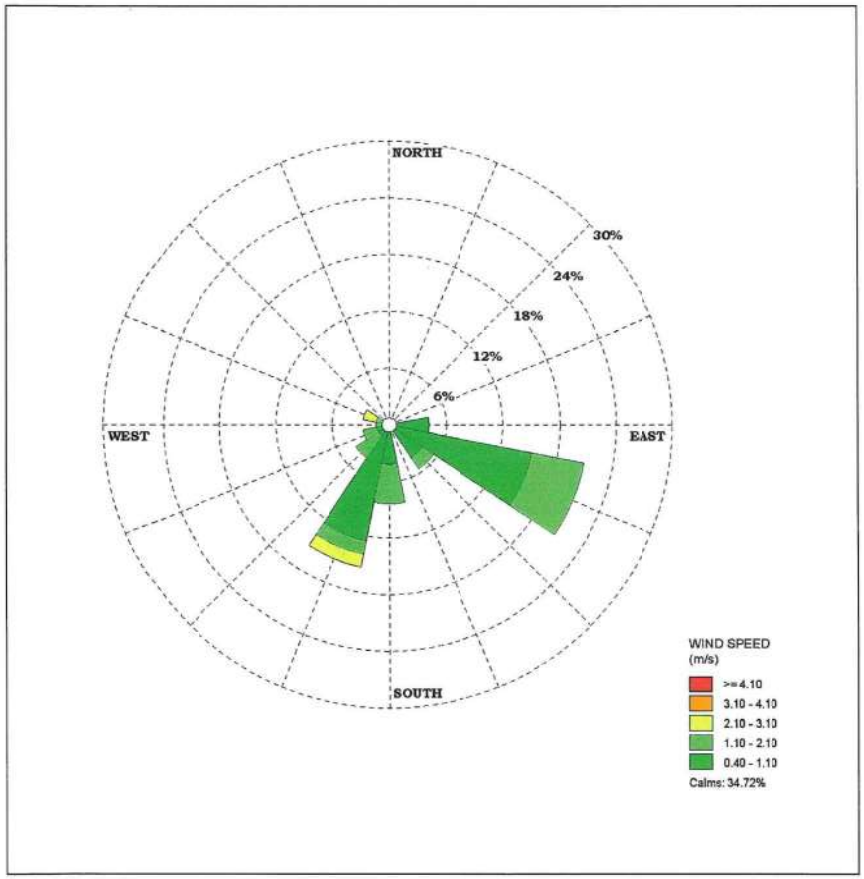
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Measured Point : **ฐานหลุมผลิต BM6 : A6 : บ้านเลขที่ 17/2 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
Measured Date : June 9-12, 2024
Report No. : 2024-RAAM669



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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A7 : บ้านเลขที่ 5/1 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582386 E, 1843578 N
Quotation No. : AR2024-00465
Measured Date : June 9-12, 2024
Analysis No. : 2024-AC919-004
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAM671
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : July 6, 2024

Date/Time	Jun 9-10, 24		Jun 10-11, 24		Jun 11-12, 24	
	WS	WD	WS	WD	WS	WD
08:00-09:00	0.4	SSE	1.3	E	1.3	SE
09:00-10:00	0.4	W	1.3	E	2.7	SSE
10:00-11:00	0.4	W	1.3	E	3.1	SSE
11:00-12:00	0.4	SE	1.3	E	2.2	SSE
12:00-13:00	0.9	ESE	1.3	E	2.2	SE
13:00-14:00	0.4	E	2.2	E	2.2	SSE
14:00-15:00	0.4	SSE	2.2	ESE	2.2	SE
15:00-16:00	0.9	SSE	2.7	SE	1.8	SSE
16:00-17:00	0.9	S	0.9	W	2.2	SSE
17:00-18:00	1.3	SSE	3.1	WNW	1.3	W
18:00-19:00	0.4	SSE	2.7	W	0.9	ESE
19:00-20:00	0.4	SE	0.9	SSE	0.4	NNE
20:00-21:00	<0.4	Calm	0.4	S	0.4	N
21:00-22:00	<0.4	Calm	0.4	SSE	0.4	N
22:00-23:00	<0.4	Calm	0.9	SSE	0.9	NNE
23:00-00:00	<0.4	Calm	<0.4	Calm	0.9	N
00:00-01:00	<0.4	Calm	<0.4	Calm	<0.4	Calm
01:00-02:00	<0.4	Calm	0.4	E	0.4	ESE
02:00-03:00	<0.4	Calm	0.9	ESE	<0.4	Calm
03:00-04:00	0.4	ESE	0.4	E	<0.4	Calm
04:00-05:00	0.4	ESE	0.4	E	<0.4	Calm
05:00-06:00	<0.4	Calm	0.4	ESE	<0.4	Calm
06:00-07:00	<0.4	Calm	0.4	ESE	<0.4	Calm
07:00-08:00	0.4	ESE	<0.4	Calm	<0.4	Calm

Remark : WS = Wind Speed (m/s)
WD = Wind Direction
Height of wind vane and anemometer above ground 10 meters.

[redacted]
(Ms.Piyatida Pradangkho)
Laboratory Reviewer

[redacted]
(Ms.Panicha Promchai)
Laboratory Supervisor

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Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM6 : A7 : บ้านเลขที่ 5/1 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582386 E, 1843578 N
Quotation No. : AR2024-00465
Measured Date : June 9-12, 2024
Analysis No. : 2024-AC919-004
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAM671
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : July 6, 2024

Wind Direction	Percentage frequency of wind in each speed and direction					
	0.4-1.1	1.1-2.1	2.1-3.1	3.1-4.1	≥4.1	Total
N	4.16667	0.00000	0.00000	0.00000	0.00000	**4.16667**
NNE	2.77778	0.00000	0.00000	0.00000	0.00000	**2.77778**
NE	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
ENE	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
E	5.55556	6.94444	1.38889	0.00000	0.00000	**13.88889**
ESE	12.50000	0.00000	1.38889	0.00000	0.00000	**13.88889**
SE	2.77778	1.38889	4.16667	0.00000	0.00000	**8.33334**
SSE	9.72222	2.77778	5.55556	1.38889	0.00000	**19.44445**
S	2.77778	0.00000	0.00000	0.00000	0.00000	**2.77778**
SSW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
SW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
WSW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
W	4.16667	1.38889	1.38889	0.00000	0.00000	**6.94445**
WNW	0.00000	0.00000	0.00000	1.38889	0.00000	**1.38889**
NW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
NNW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
Calm	**26.38890**					

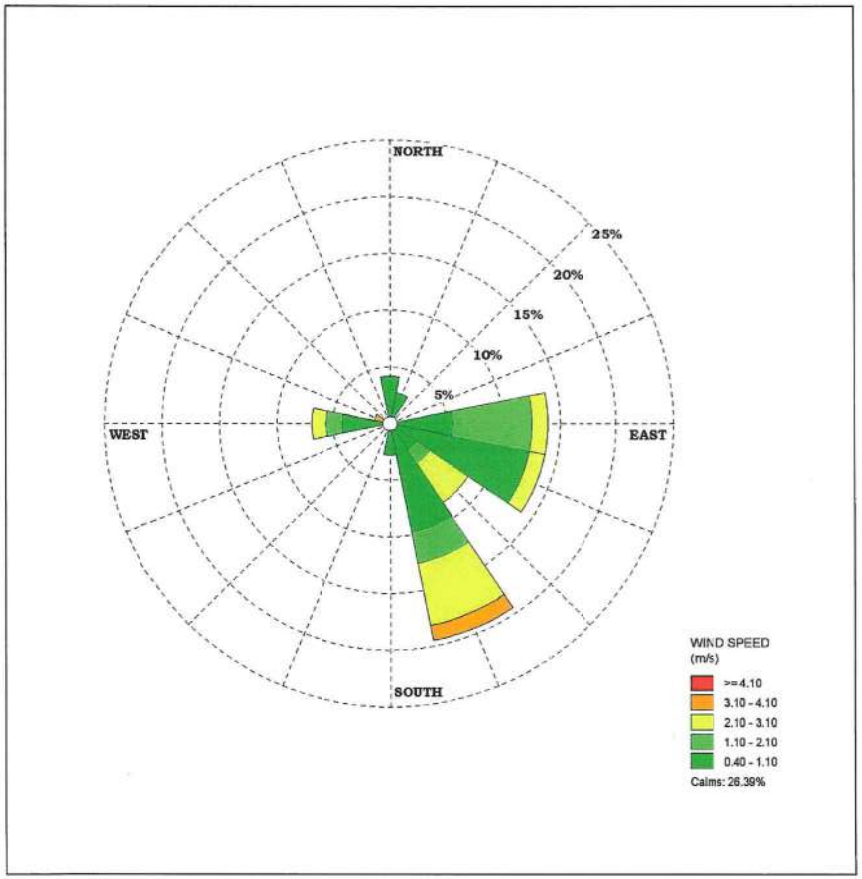
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Measured Point : **ฐานหลุมผลิต BM6 : A7 : บ้านเลขที่ 5/1 บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
Measured Date : June 9-12, 2024
Report No. : 2024-RAAM671



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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ambient Air Quality
Sampling Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A10 : บ้านเลขที่ 55/3 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584253 E, 1840548 N
Sampling Date : August 22-25, 2024
Sampling Time : 10:27
Sampling Method : U.S. EPA 40 CFR Part 50, 53
Sampling By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209
Received Date : August 27, 2024
Analytical Date : August 27-September 2, 2024
Report No. : 2024-RAAR729
Report Date : September 3, 2024

Parameter	Unit	Method of Analysis	Result			Standard[1]	Standard[2]
			Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24		
Total Suspended Particulate (TSF) 24 Hours Average	mg/m³	High-Volume, Gravimetric	0.030	0.040	0.032	0.330	-
Particulate Size Less Than 10 Micron (PM10) 24 Hours Average	mg/m³	PM10 Size Selective, High-Volume, Gravimetric	0.015	0.019	0.015	0.120	-
Particulate Size Less Than 2.5 Micron (PM2.5) 24 Hours Average	µg/m³	PM2.5 Size Selective, Low-Volume Air Sampler, Gravimetric Method	7.2	7.8	8.8	-	37.5

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547(2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2] Notification of National Environmental Board, B.E.2565 (2022), published in the Roya Government Gazette No.139 Special Part 163D dated July 8, B.E.2565 (2022) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Natnicha Sermmatiwong)
Laboratory Reviewer

(Ms.Ramita Taengthai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ambient Air Quality
Sampling Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A11 : บ้านเลขที่ 74 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582540 E, 1839038 N
Sampling Date : August 22-25, 2024
Sampling Time : 09:08
Sampling Method : U.S. EPA 40 CFR Part 50, 53
Sampling By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209
Received Date : August 27, 2024
Analytical Date : August 27-September 2, 2024
Report No. : 2024-RAAR734
Report Date : September 3, 2024

Parameter	Unit	Method of Analysis	Result			Standard[1]	Standard[2]
			Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24		
Total Suspended Particulate (TSP) 24 Hours Average	mg/m³	High-Volume, Gravimetric	0.039	0.037	0.032	0.330	-
Particulate Size Less Than 10 Micron (PM10) 24 Hours Average	mg/m³	PM10 Size Selective, High-Volume, Gravimetric	0.022	0.020	0.018	0.120	-
Particulate Size Less Than 2.5 Micron (PM2.5) 24 Hours Average	µg/m³	PM2.5 Size Selective, Low-Volume Air Sampler, Gravimetric Method	11.5	9.5	9.6	-	37.5

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2] Notification of National Environmental Board, B.E.2565 (2022), published in the Royal Government Gazette No.139 Special Part 163D dated July 8, B.E.2565 (2022) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Natnicha Sermmatiwong)
Laboratory Reviewer

(Ms.Ramita Taengthai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ambient Air Quality
Sampling Point : **ฐานหลุมผลิต BM3 : A8 : บ้านเลขที่ 99/1 บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586101 E, 1844171 N
Sampling Date : August 22-25, 2024
Sampling Time : 09:33
Sampling Method : U.S. EPA 40 CFR Part 50, 53
Sampling By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209
Received Date : August 27, 2024
Analytical Date : August 27-September 2, 2024
Report No. : 2024-RAAR735
Report Date : September 3, 2024

Parameter	Unit	Method of Analysis	Result			Standard[1]	Standard[2]
			Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24		
Total Suspended Particulate (TSP) 24 Hours Average	mg/m³	High-Volume, Gravimetric	0.033	0.044	0.026	0.330	-
Particulate Size Less Than 10 Micron (PM10) 24 Hours Average	mg/m³	PM10 Size Selective, High-Volume, Gravimetric	0.018	0.024	0.014	0.120	-
Particulate Size Less Than 2.5 Micron (PM2.5) 24 Hours Average	µg/m³	PM2.5 Size Selective, Low-Volume Air Sampler, Gravimetric Method	5.7	8.7	5.3	-	37.5

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547(2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2] Notification of National Environmental Board, B.E.2565 (2022), published in the Roya Government Gazette No.139 Special Part 163D dated July 8, B.E.2565 (2022) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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Laboratory Reviewer Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Ambient Air Quality
Sampling Point : **ฐานหลุมผลิต BM3 : A9 : โรงเรียนบ้านบึงมาลย์ ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583912 E, 1842790 N
Sampling Date : August 22-25, 2024
Sampling Time : 09:05
Sampling Method : U.S. EPA 40 CFR Part 50, 53
Sampling By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209
Received Date : August 27, 2024
Analytical Date : August 27-September 2, 2024
Report No. : 2024-RAAR736
Report Date : September 3, 2024

Parameter	Unit	Method of Analysis	Result			Standard[1]	Standard[2]
			Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24		
Total Suspended Particulate (TSP) 24 Hours Average	mg/m³	High-Volume, Gravimetric	0.044	0.051	0.031	0.330	-
Particulate Size Less Than 10 Micron (PM10) 24 Hours Average	mg/m³	PM10 Size Selective, High-Volume, Gravimetric	0.019	0.026	0.017	0.120	-
Particulate Size Less Than 2.5 Micron (PM2.5) 24 Hours Average	µg/m³	PM2.5 Size Selective, Low-Volume Air Sampler, Gravimetric Method	3.9	8.0	6.2	-	37.5

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A10 : บ้านเลขที่ 55/3 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584253 E, 1840548 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd
Measured Instrument : NOx Chemiluminescence Analyzer Horiba Model APNA-370 Serial Number S581UWS0

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-001
Report No. : 2024-RAAS417
Report Date : September 19, 2024

Interval Time	Result NO_2 (ppm)			Standard[1/]
	Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24	
10:00-11:00	0.0052	0.0066	0.0055	
11:00-12:00	0.0054	0.0085	0.0054	
12:00-13:00	0.0052	0.0076	0.0051	
13:00-14:00	0.0052	0.0060	0.0045	
14:00-15:00	0.0051	0.0054	0.0047	
15:00-16:00	0.0059	0.0058	0.0046	
16:00-17:00	0.0056	0.0058	0.0045	
17:00-18:00	0.0060	0.0070	0.0050	
18:00-19:00	0.0063	0.0060	0.0069	
19:00-20:00	0.0070	0.0066	0.0071	
20:00-21:00	0.0075	0.0078	0.0083	
21:00-22:00	0.0065	0.0074	0.0068	
22:00-23:00	0.0057	0.0066	0.0045	
23:00-00:00	0.0053	0.0064	0.0044	
00:00-01:00	0.0054	0.0061	0.0045	
01:00-02:00	0.0048	0.0060	0.0043	
02:00-03:00	0.0048	0.0056	0.0044	
03:00-04:00	0.0047	0.0047	0.0045	
04:00-05:00	0.0045	0.0046	0.0050	
05:00-06:00	0.0054	0.0080	0.0052	
06:00-07:00	0.0068	0.0094	0.0064	
07:00-08:00	0.0069	0.0057	0.0062	
08:00-09:00	0.0072	0.0052	0.0063	
09:00-10:00	0.0067	0.0057	0.0056	
24 Hours Average	**0.0058**	**0.0064**	**0.0054**	-
1 Hour Maximum	**0.0075**	**0.0094**	**0.0083**	**0.17**

Remark : [1/] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), Notification No.28, B.E.2550 (2007), published in the Royal Government Gazette No.124 Special Part 58D dated May 14, B.E.2550 (2007) and Notification No.33, B.E.2552 (2009), published in the Royal Government Gazette No.126 Special Part 114D dated August 14, B.E.2552 (2009), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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E-mail : envi@enviresearch.co.th
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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A10 : บ้านเลขที่ 55/3 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584253 E, 1840548 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : SO_2 UV-Fluorescence Analyzer Thermo Model 43C Serial Number 0611116460

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-001
Report No. : 2024-RAAS418
Report Date : September 19, 2024

Interval Time	Result SO_2 (ppm)			Standard
	Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24	
10:00-11:00	0.0014	0.0015	0.0018	
11:00-12:00	0.0014	0.0017	0.0017	
12:00-13:00	0.0015	0.0016	0.0017	
13:00-14:00	0.0016	0.0016	0.0016	
14:00-15:00	0.0017	0.0017	0.0017	
15:00-16:00	0.0017	0.0018	0.0018	
16:00-17:00	0.0017	0.0016	0.0017	
17:00-18:00	0.0017	0.0017	0.0018	
18:00-19:00	0.0016	0.0016	0.0018	
19:00-20:00	0.0015	0.0016	0.0017	
20:00-21:00	0.0016	0.0016	0.0017	
21:00-22:00	0.0015	0.0016	0.0018	
22:00-23:00	0.0017	0.0016	0.0017	
23:00-00:00	0.0015	0.0016	0.0016	
00:00-01:00	0.0017	0.0017	0.0018	
01:00-02:00	0.0016	0.0016	0.0017	
02:00-03:00	0.0016	0.0016	0.0018	
03:00-04:00	0.0016	0.0016	0.0017	
04:00-05:00	0.0016	0.0016	0.0017	
05:00-06:00	0.0015	0.0018	0.0017	
06:00-07:00	0.0015	0.0019	0.0016	
07:00-08:00	0.0016	0.0019	0.0017	
08:00-09:00	0.0015	0.0018	0.0017	
09:00-10:00	0.0016	0.0019	0.0017	
24 Hours Average	**0.0016**	**0.0017**	**0.0017**	**0.12[1/]**
1 Hour Maximum	**0.0017**	**0.0019**	**0.0018**	**0.30[2/]**

Remark : [1/] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2/] Notification of National Environmental Board, No.12, B.E.2538 (1995), published in the Royal Government Gazette No.112 Special Part 27D dated July 13, B.E.2538 (1995) and Notification No.21, B.E.2544 (2001), published in the Royal Government Gazette No.118 Special Part 39D dated April 30, B.E.2544 (2001), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A10 : บ้านเลขที่ 55/3 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584253 E, 1840548 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : CO NDIR Analyzer Horiba Model APMA-370 Serial Number XRP3Y7LA

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-001
Report No. : 2024-RAAS419
Report Date : September 19, 2024

Interval Time	Result CO (ppm)						Standard[1/]
	Aug 22-23, 24		Aug 23-24, 24		Aug 24-25, 24		
	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	
10:00-11:00	0.3	-	0.6	0.5	0.4	0.4	
11:00-12:00	0.3	-	0.6	0.5	0.5	0.5	
12:00-13:00	0.4	-	0.5	0.6	0.6	0.5	
13:00-14:00	0.4	-	0.5	0.6	0.6	0.5	
14:00-15:00	0.3	-	0.5	0.6	0.6	0.5	
15:00-16:00	0.4	-	0.5	0.5	0.4	0.5	
16:00-17:00	0.4	-	0.5	0.5	0.4	0.5	
17:00-18:00	0.4	0.4	0.5	0.5	0.4	0.5	
18:00-19:00	0.4	0.4	0.5	0.5	0.5	0.5	
19:00-20:00	0.5	0.4	0.5	0.5	0.5	0.5	
20:00-21:00	0.5	0.4	0.5	0.5	0.6	0.5	
21:00-22:00	0.4	0.4	0.4	0.5	0.4	0.5	
22:00-23:00	0.5	0.4	0.4	0.5	0.4	0.4	
23:00-00:00	0.5	0.4	0.5	0.5	0.4	0.4	
00:00-01:00	0.5	0.5	0.4	0.5	0.4	0.4	
01:00-02:00	0.5	0.5	0.4	0.4	0.4	0.4	
02:00-03:00	0.5	0.5	0.4	0.4	0.4	0.4	
03:00-04:00	0.4	0.5	0.3	0.4	0.5	0.4	
04:00-05:00	0.4	0.5	0.3	0.4	0.5	0.4	
05:00-06:00	0.5	0.5	0.4	0.4	0.5	0.4	
06:00-07:00	0.5	0.5	0.5	0.4	0.5	0.4	
07:00-08:00	0.6	0.5	0.5	0.4	0.5	0.5	
08:00-09:00	0.6	0.5	0.6	0.4	0.4	0.5	
09:00-10:00	0.5	0.5	0.5	0.4	0.5	0.5	
24 Hours Average	**0.4**	**-**	**0.5**	**-**	**0.5**	**-**	**-**
1 Hour Maximum	**0.6**	**-**	**0.6**	**-**	**0.6**	**-**	**30**
8 Hours Maximum	**-**	**0.5**	**-**	**0.6**	**-**	**0.5**	**9**

Remark : [1/] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A11 : บ้านเลขที่ 74 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582540 E, 1839038 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : NOx Chemiluminescence Analyzer Horiba Model APNA-370 Serial Number 4VWFEBUK

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-004
Report No. : 2024-RAAS420
Report Date : September 19, 2024

Interval Time	Result NO_2 (ppm)			Standard[1/]
	Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24	
09:00-10:00	0.0126	0.0138	0.0113	
10:00-11:00	0.0126	0.0117	0.0124	
11:00-12:00	0.0115	0.0134	0.0112	
12:00-13:00	0.0108	0.0102	0.0097	
13:00-14:00	0.0112	0.0100	0.0094	
14:00-15:00	0.0107	0.0117	0.0085	
15:00-16:00	0.0115	0.0099	0.0087	
16:00-17:00	0.0121	0.0107	0.0084	
17:00-18:00	0.0106	0.0101	0.0108	
18:00-19:00	0.0119	0.0105	0.0117	
19:00-20:00	0.0119	0.0094	0.0111	
20:00-21:00	0.0135	0.0094	0.0122	
21:00-22:00	0.0131	0.0101	0.0107	
22:00-23:00	0.0099	0.0118	0.0081	
23:00-00:00	0.0103	0.0112	0.0086	
00:00-01:00	0.0090	0.0108	0.0086	
01:00-02:00	0.0092	0.0102	0.0083	
02:00-03:00	0.0096	0.0103	0.0083	
03:00-04:00	0.0091	0.0090	0.0083	
04:00-05:00	0.0087	0.0083	0.0087	
05:00-06:00	0.0091	0.0094	0.0095	
06:00-07:00	0.0096	0.0101	0.0092	
07:00-08:00	0.0115	0.0095	0.0116	
08:00-09:00	0.0124	0.0105	0.0109	
24 Hours Average	**0.0109**	**0.0105**	**0.0098**	**-**
1 Hour Maximum	**0.0135**	**0.0138**	**0.0124**	**0.17**

Remark : [1/] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), Notification No.28, B.E.2550 (2007), published in the Royal Government Gazette No.124 Special Part 58D dated May 14, B.E.2550 (2007) and Notification No.33, B.E.2552 (2009), published in the Royal Government Gazette No.126 Special Part 114D dated August 14, B.E.2552 (2009), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho)
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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A11 : บ้านเลขที่ 74 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582540 E, 1839038 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : SO_2 UV-Fluorescence Analyzer Thermo Model 43i Serial Number CM14430002

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-004
Report No. : 2024-RAAS421
Report Date : September 19, 2024

Interval Time	Result SO_2 (ppm)			Standard
	Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24	
09:00-10:00	0.0023	0.0017	0.0017	
10:00-11:00	0.0021	0.0017	0.0019	
11:00-12:00	0.0020	0.0016	0.0016	
12:00-13:00	0.0018	0.0016	0.0011	
13:00-14:00	0.0018	0.0016	0.0012	
14:00-15:00	0.0019	0.0016	0.0012	
15:00-16:00	0.0021	0.0016	0.0014	
16:00-17:00	0.0019	0.0016	0.0014	
17:00-18:00	0.0018	0.0016	0.0012	
18:00-19:00	0.0019	0.0017	0.0013	
19:00-20:00	0.0018	0.0017	0.0014	
20:00-21:00	0.0017	0.0017	0.0016	
21:00-22:00	0.0018	0.0016	0.0016	
22:00-23:00	0.0017	0.0014	0.0016	
23:00-00:00	0.0018	0.0015	0.0015	
00:00-01:00	0.0019	0.0015	0.0015	
01:00-02:00	0.0019	0.0016	0.0016	
02:00-03:00	0.0018	0.0016	0.0017	
03:00-04:00	0.0019	0.0015	0.0016	
04:00-05:00	0.0019	0.0016	0.0015	
05:00-06:00	0.0020	0.0017	0.0017	
06:00-07:00	0.0017	0.0016	0.0017	
07:00-08:00	0.0017	0.0017	0.0015	
08:00-09:00	0.0017	0.0015	0.0014	
24 Hours Average	**0.0019**	**0.0016**	**0.0015**	**0.12[1]**
1 Hour Maximum	**0.0023**	**0.0017**	**0.0019**	**0.30[2]**

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2] Notification of National Environmental Board, No.12, B.E.2538 (1995), published in the Royal Government Gazette No.112 Special Part 27D dated July 13, B.E.2538 (1995) and Notification No.21, B.E.2544 (2001), published in the Royal Government Gazette No.118 Special Part 39D dated April 30, B.E.2544 (2001), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A11 : บ้านเลขที่ 74 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582540 E, 1839038 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : CO NDIR Analyzer Horba Model APMA-360CE Serial Number 41345760054

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-004
Report No. : 2024-RAAS422
Report Date : September 19, 2024

Interval Time	Result CO (ppm)						Standard[1]
	Aug 22-23, 24		Aug 23-24, 24		Aug 24-25, 24		
	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	
09:00-10:00	0.5	-	0.5	0.5	0.6	0.5	
10:00-11:00	0.5	-	0.5	0.5	0.6	0.5	
11:00-12:00	0.5	-	0.5	0.5	0.5	0.5	
12:00-13:00	0.5	-	0.5	0.5	0.5	0.5	
13:00-14:00	0.5	-	0.6	0.6	0.5	0.5	
14:00-15:00	0.5	-	0.5	0.5	0.5	0.5	
15:00-16:00	0.5	-	0.6	0.5	0.5	0.5	
16:00-17:00	0.5	0.5	0.6	0.5	0.5	0.5	
17:00-18:00	0.5	0.5	0.6	0.6	0.5	0.5	
18:00-19:00	0.5	0.5	0.5	0.6	0.5	0.5	
19:00-20:00	0.6	0.5	0.5	0.6	0.6	0.5	
20:00-21:00	0.6	0.5	0.6	0.6	0.5	0.5	
21:00-22:00	0.6	0.5	0.6	0.6	0.5	0.5	
22:00-23:00	0.5	0.5	0.6	0.6	0.5	0.5	
23:00-00:00	0.5	0.5	0.5	0.6	0.5	0.5	
00:00-01:00	0.5	0.5	0.5	0.6	0.5	0.5	
01:00-02:00	0.5	0.5	0.5	0.5	0.5	0.5	
02:00-03:00	0.5	0.5	0.5	0.5	0.5	0.5	
03:00-04:00	0.5	0.5	0.5	0.5	0.5	0.5	
04:00-05:00	0.5	0.5	0.5	0.5	0.5	0.5	
05:00-06:00	0.5	0.5	0.5	0.5	0.5	0.5	
06:00-07:00	0.6	0.5	0.5	0.5	0.5	0.5	
07:00-08:00	0.6	0.5	0.5	0.5	0.6	0.5	
08:00-09:00	0.6	0.5	0.5	0.5	0.5	0.5	
24 Hours Average	**0.5**	**-**	**0.5**	**-**	**0.5**	**-**	**-**
1 Hour Maximum	**0.6**	**-**	**0.6**	**-**	**0.6**	**-**	**30**
8 Hours Maximum	**-**	**0.5**	**-**	**0.6**	**-**	**0.5**	**9**

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลย L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลย L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A8 : บ้านเลขที่ 99/1 บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586101 E, 1844171 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : NOx Chemiluminescence Analyzer Horiba Model APNA-370 Serial Number KFACV8NA

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-007
Report No. : 2024-RAAS423
Report Date : September 19, 2024

Interval Time	Result NO_2 (ppm)			Standard[1]
	Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24	
10:00-11:00	0.0045	0.0044	0.0046	
11:00-12:00	0.0044	0.0061	0.0096	
12:00-13:00	0.0051	0.0057	0.0074	
13:00-14:00	0.0051	0.0053	0.0053	
14:00-15:00	0.0052	0.0047	0.0051	
15:00-16:00	0.0048	0.0041	0.0052	
16:00-17:00	0.0047	0.0044	0.0052	
17:00-18:00	0.0044	0.0047	0.0045	
18:00-19:00	0.0045	0.0054	0.0042	
19:00-20:00	0.0043	0.0054	0.0050	
20:00-21:00	0.0047	0.0055	0.0047	
21:00-22:00	0.0046	0.0056	0.0046	
22:00-23:00	0.0046	0.0050	0.0067	
23:00-00:00	0.0041	0.0052	0.0045	
00:00-01:00	0.0041	0.0050	0.0041	
01:00-02:00	0.0040	0.0046	0.0040	
02:00-03:00	0.0041	0.0043	0.0038	
03:00-04:00	0.0041	0.0041	0.0041	
04:00-05:00	0.0042	0.0037	0.0047	
05:00-06:00	0.0042	0.0060	0.0045	
06:00-07:00	0.0045	0.0071	0.0041	
07:00-08:00	0.0047	0.0062	0.0039	
08:00-09:00	0.0042	0.0045	0.0056	
09:00-10:00	0.0040	0.0039	0.0053	
24 Hours Average	**0.0045**	**0.0050**	**0.0050**	-
1 Hour Maximum	**0.0052**	**0.0071**	**0.0096**	**0.17**

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Par 42D dated May 25, B.E.2538 (1995), Notification No.28, B.E.2550 (2007), published in the Royal Government Gazette No.124 Special Part 58D dated May 14, B.E.2550 (2007) and Notification No.33, B.E.2552 (2009), published in the Royal Government Gazette No.126 Special Part 114D dated August 14, B.E.2552 (2009), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho) Laboratory Reviewer

(Ms.Panicha Promchai) Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลย L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลย L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A8 : บ้านเลขที่ 99/1 บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586101 E, 1844171 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : SO_2 UV-Fluorescence Analyzer Horiba Model APSA-370 Serial Number X7L602W6

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-007
Report No. : 2024-RAAS424
Report Date : September 19, 2024

Interval Time	Result SO_2 (ppm)			Standard
	Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24	
10:00-11:00	0.0014	0.0019	0.0017	
11:00-12:00	0.0015	0.0018	0.0018	
12:00-13:00	0.0015	0.0017	0.0018	
13:00-14:00	0.0016	0.0017	0.0018	
14:00-15:00	0.0016	0.0017	0.0018	
15:00-16:00	0.0016	0.0016	0.0017	
16:00-17:00	0.0017	0.0016	0.0017	
17:00-18:00	0.0017	0.0016	0.0017	
18:00-19:00	0.0017	0.0016	0.0017	
19:00-20:00	0.0017	0.0016	0.0018	
20:00-21:00	0.0018	0.0017	0.0018	
21:00-22:00	0.0018	0.0017	0.0018	
22:00-23:00	0.0019	0.0017	0.0018	
23:00-00:00	0.0017	0.0017	0.0018	
00:00-01:00	0.0018	0.0018	0.0017	
01:00-02:00	0.0019	0.0017	0.0017	
02:00-03:00	0.0018	0.0017	0.0018	
03:00-04:00	0.0018	0.0017	0.0018	
04:00-05:00	0.0019	0.0014	0.0018	
05:00-06:00	0.0017	0.0017	0.0018	
06:00-07:00	0.0018	0.0017	0.0018	
07:00-08:00	0.0018	0.0017	0.0018	
08:00-09:00	0.0017	0.0017	0.0019	
09:00-10:00	0.0017	0.0017	0.0019	
24 Hours Average	**0.0017**	**0.0017**	**0.0018**	**0.12[1]**
1 Hour Maximum	**0.0019**	**0.0019**	**0.0019**	**0.30[2]**

Remark : [1] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2] Notification of National Environmental Board, No.12, B.E.2538 (1995), published in the Royal Government Gazette No.112 Special Part 27D dated July 13, B.E.2538 (1995)and Notification No.21, B.E.2544 (2001), published in the Royal Government Gazette No.118 Special Part 39D dated April 30, B.E.2544 (2001), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho) Laboratory Reviewer

(Ms.Panicha Promchai) Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L2:/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A8 : บ้านเลขที่ 99/1 บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : LTM (WGS84) 47Q 0586101 E, 1844171 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : CO NDIR Analyzer Horiba Model APMA-360CE Serial Number 576876072

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-007
Report No. : 2024-RAAS425
Report Date : September 19, 2024

Interval Time	Result CO (ppm)						Standard[1/]
	Aug 22-23, 24		Aug 23-24, 24		Aug 24-25, 24		
	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	
10:00-11:00	0.6	-	0.4	0.4	0.6	0.4	
11:00-12:00	0.4	-	0.4	0.4	0.8	0.5	
12:00-13:00	0.3	-	0.5	0.4	0.5	0.5	
13:00-14:00	0.3	-	0.5	0.4	0.6	0.5	
14:00-15:00	0.3	-	0.5	0.4	0.6	0.6	
15:00-16:00	0.3	-	0.4	0.4	0.5	0.6	
16:00-17:00	0.4	-	0.4	0.4	0.5	0.6	
17:00-18:00	0.4	0.4	0.3	0.4	0.8	0.6	
18:00-19:00	0.4	0.4	0.4	0.4	0.7	0.6	
19:00-20:00	0.4	0.4	0.3	0.4	0.6	0.6	
20:00-21:00	0.4	0.4	0.4	0.4	0.6	0.6	
21:00-22:00	0.4	0.4	0.5	0.4	0.4	0.6	
22:00-23:00	0.3	0.4	0.5	0.4	0.4	0.6	
23:00-00:00	0.3	0.4	0.4	0.4	0.4	0.6	
00:00-01:00	0.3	0.4	0.4	0.4	0.4	0.5	
01:00-02:00	0.3	0.4	0.3	0.4	0.4	0.5	
02:00-03:00	0.3	0.3	0.3	0.4	0.4	0.4	
03:00-04:00	0.4	0.3	0.3	0.4	0.4	0.4	
04:00-05:00	0.4	0.3	0.4	0.4	0.4	0.4	
05:00-06:00	0.4	0.3	0.5	0.4	0.4	0.4	
06:00-07:00	0.4	0.4	0.5	0.4	0.4	0.4	
07:00-08:00	0.4	0.4	0.4	0.4	0.4	0.4	
08:00-09:00	0.4	0.4	0.4	0.4	0.5	0.4	
09:00-10:00	0.3	0.4	0.5	0.4	0.4	0.4	
24 Hours Average	**0.4**	**-**	**0.4**	**-**	**0.5**	**-**	**-**
1 Hour Maximum	**0.6**	**-**	**0.5**	**-**	**0.8**	**-**	**30**
8 Hours Maximum	**-**	**0.4**	**-**	**0.4**	**-**	**0.6**	**9**

Remark : 1/ Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho) (Ms.Panicha Promchai)
Laboratory Reviewer Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A9 : โรงเรียนบ้านบึงมาลย์ ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583912 E, 1842790 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : NOx Chemiluminescence Analyzer Horiba Model APNA-370 Serial Number J6GUBA4N

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-010
Report No. : 2024-RAAS426
Report Date : September 19, 2024

Interval Time	Result NO_2 (ppm)			Standard[1/]
	Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24	
09:00-10:00	0.0061	0.0067	0.0055	
10:00-11:00	0.0058	0.0074	0.0060	
11:00-12:00	0.0057	0.0076	0.0060	
12:00-13:00	0.0057	0.0079	0.0060	
13:00-14:00	0.0056	0.0062	0.0054	
14:00-15:00	0.0069	0.0060	0.0053	
15:00-16:00	0.0059	0.0063	0.0052	
16:00-17:00	0.0065	0.0068	0.0055	
17:00-18:00	0.0062	0.0078	0.0062	
18:00-19:00	0.0069	0.0067	0.0082	
19:00-20:00	0.0078	0.0071	0.0082	
20:00-21:00	0.0077	0.0075	0.0078	
21:00-22:00	0.0077	0.0077	0.0074	
22:00-23:00	0.0063	0.0078	0.0052	
23:00-00:00	0.0057	0.0077	0.0052	
00:00-01:00	0.0057	0.0071	0.0050	
01:00-02:00	0.0053	0.0069	0.0050	
02:00-03:00	0.0054	0.0063	0.0051	
03:00-04:00	0.0054	0.0054	0.0051	
04:00-05:00	0.0052	0.0053	0.0054	
05:00-06:00	0.0056	0.0099	0.0065	
06:00-07:00	0.0063	0.0094	0.0070	
07:00-08:00	0.0069	0.0076	0.0066	
08:00-09:00	0.0066	0.0060	0.0064	
24 Hours Average	**0.0062**	**0.0071**	**0.0061**	**-**
1 Hour Maximum	**0.0078**	**0.0099**	**0.0082**	**0.17**

Remark : 1/ Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), Notification No.28, B.E.2550 (2007), published in the Royal Government Gazette No.124 Special Part 58D dated May 14, B.E.2550 (2007) and Notification No.33, B.E.2552 (2009), published in the Royal Government Gazette No.126 Special Part 134D dated August 14, B.E.2552 (2009), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

[redacted] [redacted]

(Ms.Piyatida Pradangkho) (Ms.Panicha Promchai)
Laboratory Reviewer Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A9 : โรงเรียนบ้านบึงมาลย์ ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583912 E, 1842790 N
Measured Date : August 22-25, 2024
Measured By : Nr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : SO_2 UV-Fluorescence Analyzer Thermo Model 43i Serial Number CM14430005

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-010
Report No. : 2024-RAA5427
Report Date : September 19, 2024

Interval Time	Result SO_2 (ppm)			Standard
	Aug 22-23, 24	Aug 23-24, 24	Aug 24-25, 24	
09:00-10:00	0.0015	0.0016	0.0015	
10:00-11:00	0.0014	0.0013	0.0013	
11:00-12:00	0.0018	0.0016	0.0013	
12:00-13:00	0.0016	0.0015	0.0013	
13:00-14:00	0.0017	0.0017	0.0015	
14:00-15:00	0.0018	0.0020	0.0014	
15:00-16:00	0.0020	0.0019	0.0016	
16:00-17:00	0.0020	0.0017	0.0015	
17:00-18:00	0.0021	0.0018	0.0017	
18:00-19:00	0.0017	0.0019	0.0017	
19:00-20:00	0.0019	0.0017	0.0015	
20:00-21:00	0.0016	0.0017	0.0017	
21:00-22:00	0.0015	0.0015	0.0013	
22:00-23:00	0.0017	0.0013	0.0014	
23:00-00:00	0.0015	0.0014	0.0012	
00:00-01:00	0.0015	0.0015	0.0013	
01:00-02:00	0.0015	0.0012	0.0013	
02:00-03:00	0.0014	0.0012	0.0015	
03:00-04:00	0.0015	0.0015	0.0015	
04:00-05:00	0.0015	0.0014	0.0014	
05:00-06:00	0.0013	0.0013	0.0017	
06:00-07:00	0.0015	0.0014	0.0015	
07:00-08:00	0.0016	0.0015	0.0018	
08:00-09:00	0.0015	0.0015	0.0020	
24 Hours Average	**0.0016**	**0.0015**	**0.0015**	**0.12[1/]**
1 Hour Maximum	**0.0021**	**0.0020**	**0.0020**	**0.30[2/]**

Remark : [1/] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995) and Notification No.24, B.E.2547 (2004), published in the Royal Government Gazette No.121 Special Part 104D dated September 22, B.E.2547 (2004), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).
[2/] Notification of National Environmental Board, No.12, B.E.2538 (1995), published in the Royal Government Gazette No.112 Special Part 27D dated July 13, B.E.2538 (1995) and Notification No.21, B.E.2544 (2001), published in the Royal Government Gazette No.118 Special Part 39D dated April 30, B.E.2544 (2001), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

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(Ms.Piyatida Pradangkho)
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(Ms.Panicha Promchai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A9 : โรงเรียนบ้านบึงมาลย์ ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583912 E, 1842790 N
Measured Date : August 22-25, 2024
Measured By : Mr.Nitad Sirichad
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : CO NDIR Analyzer Horiba Model APMA-370 Serial Number SFB4TS99

Quotation No. : AR2024-00462
Analysis No. : 2024-AE209-010
Report No. : 2024-RAA5428
Report Date : September 19, 2024

Interval Time	Result CO (ppm)						Standard[1/]
	Aug 22-23, 24		Aug 23-24, 24		Aug 24-25, 24		
	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	1 hr Avg	8 hr Avg	
09:00-10:00	0.4	-	0.4	0.4	0.4	0.4	
10:00-11:00	0.4	-	0.4	0.4	0.4	0.4	
11:00-12:00	0.4	-	0.4	0.4	0.4	0.4	
12:00-13:00	0.4	-	0.4	0.4	0.4	0.4	
13:00-14:00	0.4	-	0.4	0.4	0.4	0.4	
14:00-15:00	0.4	-	0.4	0.4	0.4	0.4	
15:00-16:00	0.4	-	0.4	0.4	0.4	0.4	
16:00-17:00	0.4	0.4	0.4	0.4	0.4	0.4	
17:00-18:00	0.4	0.4	0.5	0.4	0.4	0.4	
18:00-19:00	0.4	0.4	0.4	0.4	0.4	0.4	
19:00-20:00	0.5	0.4	0.5	0.4	0.5	0.4	
20:00-21:00	0.4	0.4	0.5	0.4	0.4	0.4	
21:00-22:00	0.4	0.4	0.5	0.4	0.4	0.4	
22:00-23:00	0.4	0.4	0.5	0.5	0.3	0.4	
23:00-00:00	0.4	0.4	0.5	0.5	0.3	0.4	
00:00-01:00	0.3	0.4	0.4	0.5	0.3	0.4	
01:00-02:00	0.3	0.4	0.4	0.5	0.3	0.4	
02:00-03:00	0.3	0.4	0.4	0.5	0.4	0.4	
03:00-04:00	0.3	0.4	0.4	0.4	0.3	0.3	
04:00-05:00	0.3	0.3	0.4	0.4	0.3	0.3	
05:00-06:00	0.4	0.3	0.4	0.4	0.4	0.3	
06:00-07:00	0.4	0.3	0.5	0.4	0.4	0.3	
07:00-08:00	0.5	0.4	0.4	0.4	0.4	0.4	
08:00-09:00	0.4	0.4	0.4	0.4	0.4	0.4	
24 Hours Average	**0.4**	**-**	**0.4**	**-**	**0.4**	**-**	**-**
1 Hour Maximum	**0.5**	**-**	**0.5**	**-**	**0.5**	**-**	**30**
8 Hours Maximum	**-**	**0.4**	**-**	**0.5**	**-**	**0.4**	**9**

Remark : [1/] Notification of National Environmental Board, No.10, B.E.2538 (1995), published in the Royal Government Gazette No.112 Part 42D dated May 25, B.E.2538 (1995), under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992).

[redacted] [redacted]

(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A10 : บ้านเลขที่ 55/3 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584253 E, 1840548 N
Quotation No. : AR2024-00462
Measured Date : August 22-25, 2024
Analysis No. : 2024-AE209-001 - 003
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS413
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024

Date/Time	Aug 22-23, 24		Aug 23-24, 24		Aug 24-25, 24	
	WS	WD	WS	WD	WS	WD
10:00-11:00	0.4	SE	0.9	SE	0.4	SE
11:00-12:00	0.4	SSE	1.3	ESE	0.4	SE
12:00-13:00	0.4	SW	0.9	SSW	0.9	SSE
13:00-14:00	1.3	SE	0.9	S	1.3	SSW
14:00-15:00	1.3	SSW	1.3	NW	1.3	S
15:00-16:00	1.3	S	1.3	W	1.3	S
16:00-17:00	1.3	S	0.9	N	2.2	SW
17:00-18:00	1.3	SSE	0.9	ESE	1.8	NW
18:00-19:00	0.9	S	2.2	SSE	0.4	NW
19:00-20:00	1.3	NW	1.3	S	<0.4	Calm
20:00-21:00	0.4	NW	<0.4	Calm	<0.4	Calm
21:00-22:00	1.3	WNW	<0.4	Calm	2.2	S
22:00-23:00	1.8	WNW	<0.4	Calm	3.1	S
23:00-00:00	1.8	WNW	<0.4	Calm	1.3	S
00:00-01:00	0.4	NW	<0.4	Calm	0.4	SW
01:00-02:00	1.3	NW	<0.4	Calm	<0.4	Calm
02:00-03:00	0.9	NW	1.3	NW	0.4	SE
03:00-04:00	1.8	NW	2.2	NNW	1.3	SSE
04:00-05:00	1.8	NNW	1.3	NNE	1.3	SE
05:00-06:00	0.4	ENE	0.9	SE	<0.4	Calm
06:00-07:00	0.9	ESE	<0.4	Calm	<0.4	Calm
07:00-08:00	<0.4	Calm	<0.4	Calm	0.4	NNE
08:00-09:00	<0.4	Calm	<0.4	Calm	0.4	ENE
09:00-10:00	0.4	ENE	<0.4	Calm	0.4	ENE

Remark : WS = Wind Speed (m/s)
WD = Wind Direction
Height of wind vane and anemometer above ground 10 meters.

[redacted]

(Ms.Piyatida Pradangkho)
Laboratory Reviewer

[redacted]

(Ms.Panicha Promchai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A10 : บ้านเลขที่ 55/3 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584253 E, 1840548 N
Quotation No. : AR2024-00462
Measured Date : August 22-25, 2024
Analysis No. : 2024-AE209-001 - 003
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS413
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024

Wind Direction	Percentage frequency of wind in each speed and direction					
	0.4-1.1	1.1-2.1	2.1-3.1	3.1-4.1	≥4.1	Total
N	1.38889	0.00000	0.00000	0.00000	0.00000	**1.38889**
NNE	1.38889	1.38889	0.00000	0.00000	0.00000	**2.77778**
NE	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
ENE	5.55556	0.00000	0.00000	0.00000	0.00000	**5.55556**
E	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
ESE	2.77778	1.38889	0.00000	0.00000	0.00000	**4.16667**
SE	8.33333	2.77778	0.00000	0.00000	0.00000	**11.11111**
SSE	2.77778	2.77778	1.38889	0.00000	0.00000	**6.94445**
S	2.77778	8.33333	1.38889	1.38889	0.00000	**13.88889**
SSW	1.38889	2.77778	0.00000	0.00000	0.00000	**4.16667**
SW	2.77778	0.00000	1.38889	0.00000	0.00000	**4.16667**
WSW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
W	0.00000	1.38889	0.00000	0.00000	0.00000	**1.38889**
WNW	0.00000	4.16667	0.00000	0.00000	0.00000	**4.16667**
NW	5.55556	8.33333	0.00000	0.00000	0.00000	**13.88889**
NNW	0.00000	1.38889	1.38889	0.00000	0.00000	**2.77778**
Calm	**23.61110**					

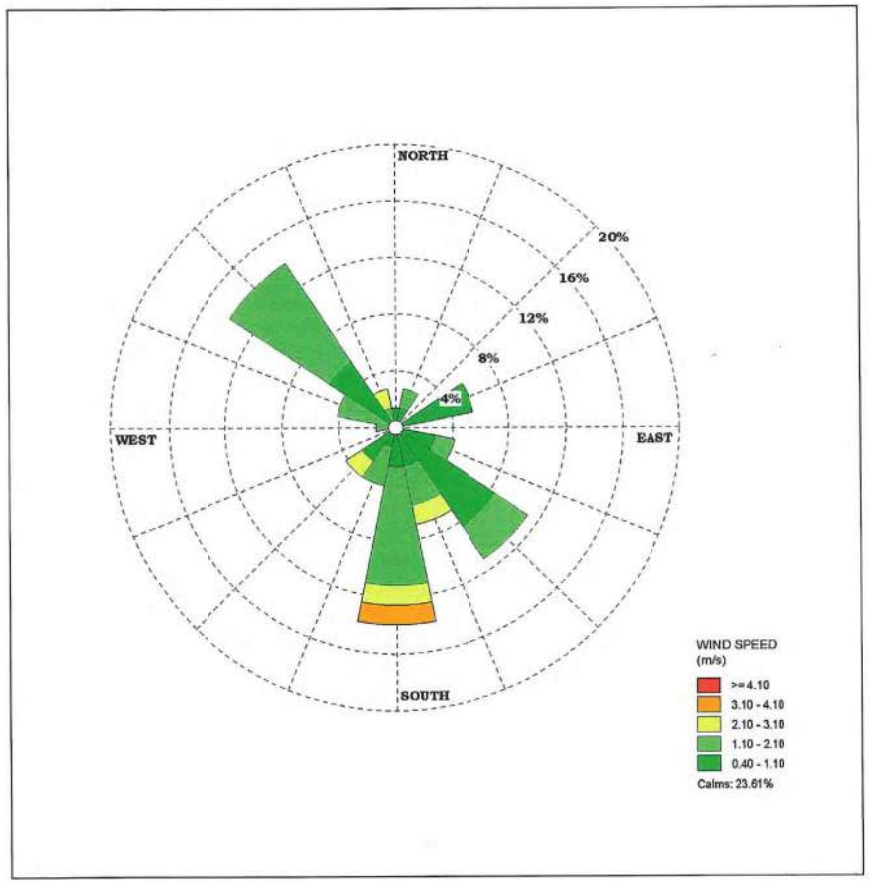
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Project Name : โครงการผลิตบีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/54 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A10 : บ้านเลขที่ 55/3 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
Measured Date : August 22-25, 2024
Report No. : 2024-RAAS413



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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : A11 : บ้านเลขที่ 74 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582540 E, 1839038 N
Quotation No. : AR2024-00462
Measured Date : August 22-25, 2024
Analysis No. : 2024-AE209-004 - 006
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS414
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024

Date/Time	Aug 22-23, 24		Aug 23-24, 24		Aug 24-25, 24	
	WS	WD	WS	WD	WS	WD
09:00-10:00	<0.4	Calm	0.4	ENE	0.4	ESE
10:00-11:00	0.4	SE	0.9	SE	0.4	SE
11:00-12:00	0.4	SSE	0.9	E	0.4	WSW
12:00-13:00	0.4	SW	0.9	ESE	0.9	ENE
13:00-14:00	1.3	SE	0.9	WNW	0.9	ESE
14:00-15:00	1.3	SSW	0.9	SSW	0.9	ENE
15:00-16:00	1.3	S	0.9	WSW	0.9	ESE
16:00-17:00	1.3	S	0.9	WNW	2.7	S
17:00-18:00	1.3	SSE	0.9	E	1.3	W
18:00-19:00	0.9	S	1.3	E	0.4	WNW
19:00-20:00	1.3	NW	0.4	E	<0.4	Calm
20:00-21:00	0.4	NW	<0.4	Calm	<0.4	Calm
21:00-22:00	1.3	WNW	<0.4	Calm	1.8	SSE
22:00-23:00	1.8	WNW	<0.4	Calm	1.8	SE
23:00-00:00	1.8	WNW	0.4	W	0.4	SSE
00:00-01:00	0.4	NW	<0.4	Calm	0.9	S
01:00-02:00	1.3	NW	0.4	WSW	0.4	WSW
02:00-03:00	0.9	NW	0.9	WNW	0.4	E
03:00-04:00	1.8	NW	2.2	WNW	0.4	ESE
04:00-05:00	1.8	NNW	1.3	N	0.9	ENE
05:00-06:00	0.4	ENE	0.9	NE	<0.4	Calm
06:00-07:00	0.9	ESE	0.4	SSW	0.4	WNW
07:00-08:00	<0.4	Calm	0.4	SSW	0.4	WNW
08:00-09:00	<0.4	Calm	0.4	W	0.4	ENE

Remark : WS = Wind Speed (m/s)
WD = Wind Direction
Height of wind vane and anemometer above ground 10 meters.

[redacted] [redacted]

(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Visicn E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานกลุ่มผลิตบึงม่วงใต้ 2 (BMS2) : A11 : บ้านเลขที่ 74 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582540 E, 1839038 N
Quotation No. : AR2024-00462
Measured Date : August 22-25, 2024
Analysis No. : 2024-AE209-004 - 006
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS414
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024

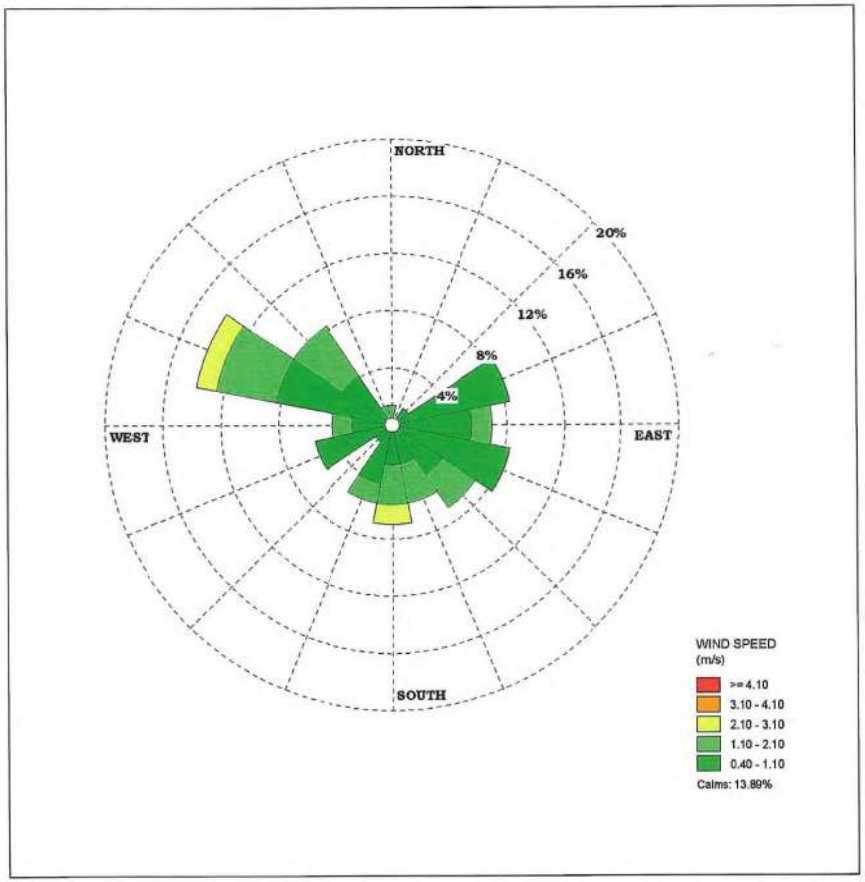
Wind Direction	Percentage frequency of wind in each speed and direction					
	0.4-1.1	1.1-2.1	2.1-3.1	3.1-4.1	≥4.1	Total
N	0.00000	1.38889	0.00000	0.00000	0.00000	**1.38889**
NNE	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
NE	1.38889	0.00000	0.00000	0.00000	0.00000	**1.38889**
ENE	8.33333	0.00000	0.00000	0.00000	0.00000	**8.33333**
E	5.55556	1.38889	0.00000	0.00000	0.00000	**6.94445**
ESE	8.33333	0.00000	0.00000	0.00000	0.00000	**8.33333**
SE	4.16667	2.77778	0.00000	0.00000	0.00000	**6.94445**
SSE	2.77778	2.77778	0.00000	0.00000	0.00000	**5.55556**
S	2.77778	2.77778	1.38889	0.00000	0.00000	**6.94445**
SSW	4.16667	1.38889	0.00000	0.00000	0.00000	**5.55556**
SW	1.38889	0.00000	0.00000	0.00000	0.00000	**1.38889**
WSW	5.55556	0.00000	0.00000	0.00000	0.00000	**5.55556**
W	2.77778	1.38889	0.00000	0.00000	0.00000	**4.16667**
WNW	8.33333	4.16667	1.38889	0.00000	0.00000	**13.88889**
NW	4.16667	4.16667	0.00000	0.00000	0.00000	**8.33334**
NNW	0.00000	1.38889	0.00000	0.00000	0.00000	**1.38889**
Calm	**13.88890**					

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Measured Point : **ฐานกลุ่มผลิตบึงม่วงใต้ 2 (BMS2) : A11 : บ้านเลขที่ 74 บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
Measured Date : August 22-25, 2024
Report No. : 2024-RAAS414



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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A8 : บ้านเลขที่ 99/1 บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586101 E, 1844171 N
Quotation No. : AR2024-00462
Measured Date : August 22-25, 2024
Analysis No. : 2024-AE209-007 - 009
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS415
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024

Date/Time	Aug 22-23, 24		Aug 23-24, 24		Aug 24-25, 24	
	WS	WD	WS	WD	WS	WD
10:00-11:00	0.4	SW	0.9	SSE	0.4	S
11:00-12:00	0.9	SW	1.3	SE	0.4	N
12:00-13:00	1.3	S	1.3	SSW	0.9	SSE
13:00-14:00	1.3	S	1.3	SSW	1.3	SSE
14:00-15:00	1.3	S	0.4	SSE	0.9	SE
15:00-16:00	1.3	SW	0.9	WNW	1.3	SE
16:00-17:00	1.8	SE	0.9	W	2.7	WSW
17:00-18:00	1.3	SSE	1.3	SE	1.8	W
18:00-19:00	1.3	S	0.9	SSE	0.4	W
19:00-20:00	0.9	WNW	0.4	S	<0.4	Calm
20:00-21:00	<0.4	Calm	<0.4	Calm	0.4	SSW
21:00-22:00	1.3	WSW	<0.4	Calm	1.8	SSW
22:00-23:00	1.3	W	<0.4	Calm	3.1	S
23:00-00:00	1.8	WNW	<0.4	Calm	1.3	S
00:00-01:00	0.9	W	0.4	WNW	0.9	SW
01:00-02:00	0.9	WNW	0.4	W	0.9	SSW
02:00-03:00	0.4	W	0.4	W	0.4	SE
03:00-04:00	0.4	WNW	2.7	N	0.9	SSE
04:00-05:00	0.9	N	1.3	NNE	0.9	SE
05:00-06:00	0.9	ENE	0.9	SE	<0.4	Calm
06:00-07:00	0.9	ESE	0.4	SW	0.4	N
07:00-08:00	0.4	NNE	<0.4	Calm	0.4	N
08:00-09:00	0.4	NNE	<0.4	Calm	0.4	NE
09:00-10:00	0.9	N	0.9	S	0.4	S

Remark : WS = Wind Speed (m/s)
WD = Wind Direction
Height of wind vane and anemometer above ground 10 meters.

[redacted] [redacted]

(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A8 : บ้านเลขที่ 99/1 บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0586101 E, 1844171 N
Quotation No. : AR2024-00462
Measured Date : August 22-25, 2024
Analysis No. : 2024-AE209-007 - 009
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS415
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024

Wind Direction	Percentage frequency of wind in each speed and direction					
	0.4-1.1	1.1-2.1	2.1-3.1	3.1-4.1	≥4.1	Total
N	6.94444	0.00000	1.38889	0.00000	0.00000	**8.33333**
NNE	2.77778	1.38889	0.00000	0.00000	0.00000	**4.16667**
NE	1.38889	0.00000	0.00000	0.00000	0.00000	**1.38889**
ENE	1.38889	0.00000	0.00000	0.00000	0.00000	**1.38889**
E	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
ESE	1.38889	0.00000	0.00000	0.00000	0.00000	**1.38889**
SE	5.55556	5.55556	0.00000	0.00000	0.00000	**11.11112**
SSE	6.94444	2.77778	0.00000	0.00000	0.00000	**9.72222**
S	5.55556	6.94444	0.00000	1.38889	0.00000	**13.88889**
SSW	2.77778	4.16667	0.00000	0.00000	0.00000	**6.94445**
SW	5.55556	1.38889	0.00000	0.00000	0.00000	**6.94445**
WSW	0.00000	1.38889	1.38889	0.00000	0.00000	**2.77778**
W	8.33333	2.77778	0.00000	0.00000	0.00000	**11.11111**
WNW	6.94444	1.38889	0.00000	0.00000	0.00000	**8.33333**
NW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
NNW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
Calm	**12.50000**					

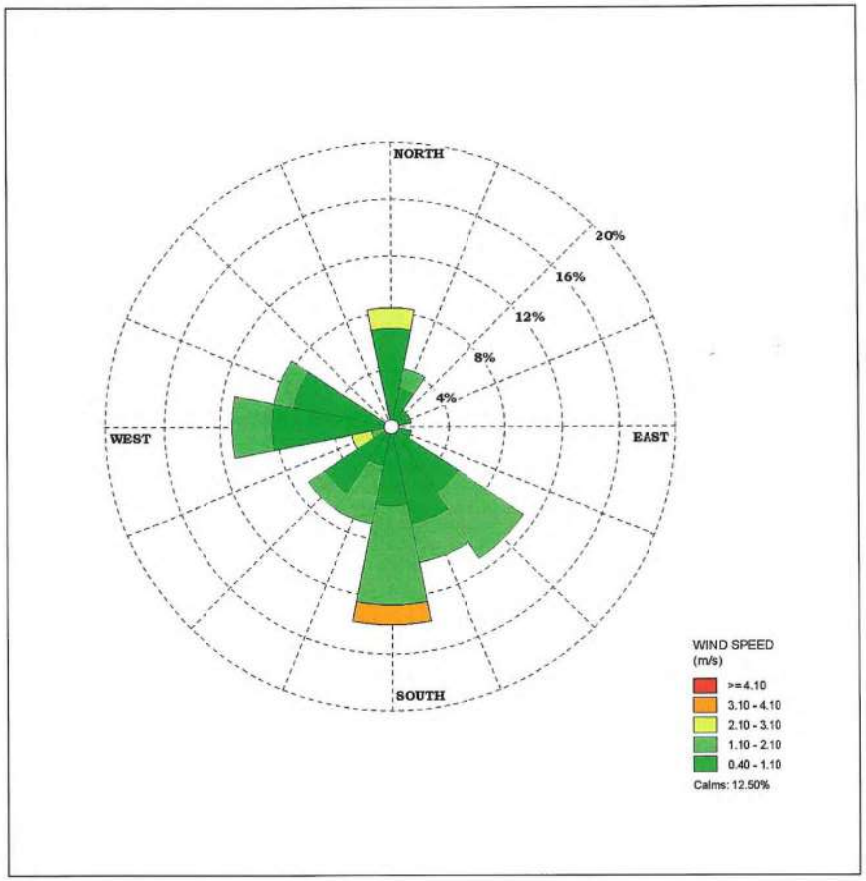
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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/54 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Measured Point : **ฐานหลุมผลิต BM3 : A8 : บ้านเลขที่ 99/1 บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
Measured Date : August 22-25, 2024
Report No. : 2024-RAAS415



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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co. Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A9 : โรงเรียนบ้านบึงมาลย์ ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583912 E, 1842790 N
Quotation No. : AR2024-00462
Measured Date : August 22-25, 2024
Analysis No. : 2024-AE209-010 - 012
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS416
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024

Date/Time	Aug 22-23, 24		Aug 23-24, 24		Aug 24-25, 24	
	WS	WD	WS	WD	WS	WD
09:00-10:00	0.4	SW	0.9	N	0.4	E
10:00-11:00	0.4	ENE	0.9	N	0.4	ESE
11:00-12:00	0.9	ESE	1.3	NW	0.4	NNW
12:00-13:00	0.9	SE	0.9	ENE	0.9	NE
13:00-14:00	0.9	ENE	0.9	ESE	0.9	ENE
14:00-15:00	1.3	ESE	1.3	SE	0.9	NE
15:00-16:00	1.3	SE	1.8	SSE	1.3	E
16:00-17:00	1.3	NE	1.3	S	2.2	ESE
17:00-18:00	1.3	ENE	0.9	NE	1.8	SE
18:00-19:00	1.3	SW	1.3	NE	0.4	SW
19:00-20:00	1.3	SW	0.4	ENE	<0.4	Calm
20:00-21:00	0.4	SW	<0.4	Calm	<0.4	Calm
21:00-22:00	1.3	SW	<0.4	Calm	1.8	ESE
22:00-23:00	1.8	SW	0.4	SSW	2.2	SW
23:00-00:00	1.8	SW	0.4	SSE	1.3	SW
00:00-01:00	0.9	SW	0.4	SSE	0.9	SW
01:00-02:00	1.3	SW	0.4	SSE	0.9	SW
02:00-03:00	0.9	SW	1.3	S	0.4	ESE
03:00-04:00	0.9	SW	2.2	SW	0.9	E
04:00-05:00	0.9	SW	0.9	NE	0.4	NE
05:00-06:00	0.4	NNE	0.9	ENE	<0.4	Calm
06:00-07:00	0.4	NE	0.4	SW	0.4	N
07:00-08:00	0.4	N	0.4	SW	0.4	SW
08:00-09:00	0.4	N	0.4	SW	0.4	NNW

Remark : WS = Wind Speed (m/s)
WD = Wind Direction
Height of wind vane and anemometer above ground 10 meters.

[redacted] [redacted]

(Ms.Piyatida Pradangkho)
Laboratory Reviewer

(Ms.Panicha Promchai)
Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบีโครเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Air Quality
Measured Point : **ฐานหลุมผลิต BM3 : A9 : โรงเรียนบ้านบึงมาลย์ ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583912 E, 1842790 N
Quotation No. : AR2024-00462
Measured Date : August 22-25, 2024
Analysis No. : 2024-AE209-010 - 012
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS416
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024

Wind Direction	Percentage frequency of wind in each speed and direction					
	0.4-1.1	1.1-2.1	2.1-3.1	3.1-4.1	≥4.1	Total
N	6.94444	0.00000	0.00000	0.00000	0.00000	**6.94444**
NNE	1.38889	0.00000	0.00000	0.00000	0.00000	**1.38889**
NE	8.33333	2.77778	0.00000	0.00000	0.00000	**11.11111**
ENE	8.33333	1.38889	0.00000	0.00000	0.00000	**9.72222**
E	2.77778	1.38889	0.00000	0.00000	0.00000	**4.16667**
ESE	5.55556	2.77778	1.38889	0.00000	0.00000	**9.72223**
SE	1.38889	4.16667	0.00000	0.00000	0.00000	**5.55556**
SSE	4.16667	1.38889	0.00000	0.00000	0.00000	**5.55556**
S	0.00000	2.77778	0.00000	0.00000	0.00000	**2.77778**
SSW	1.38889	0.00000	0.00000	0.00000	0.00000	**1.38889**
SW	18.05560	9.72222	2.77778	0.00000	0.00000	**30.55560**
WSW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
W	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
WNW	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**
NW	0.00000	1.38889	0.00000	0.00000	0.00000	**1.38889**
NNW	2.77778	0.00000	0.00000	0.00000	0.00000	**2.77778**
Calm	**6.94444**					

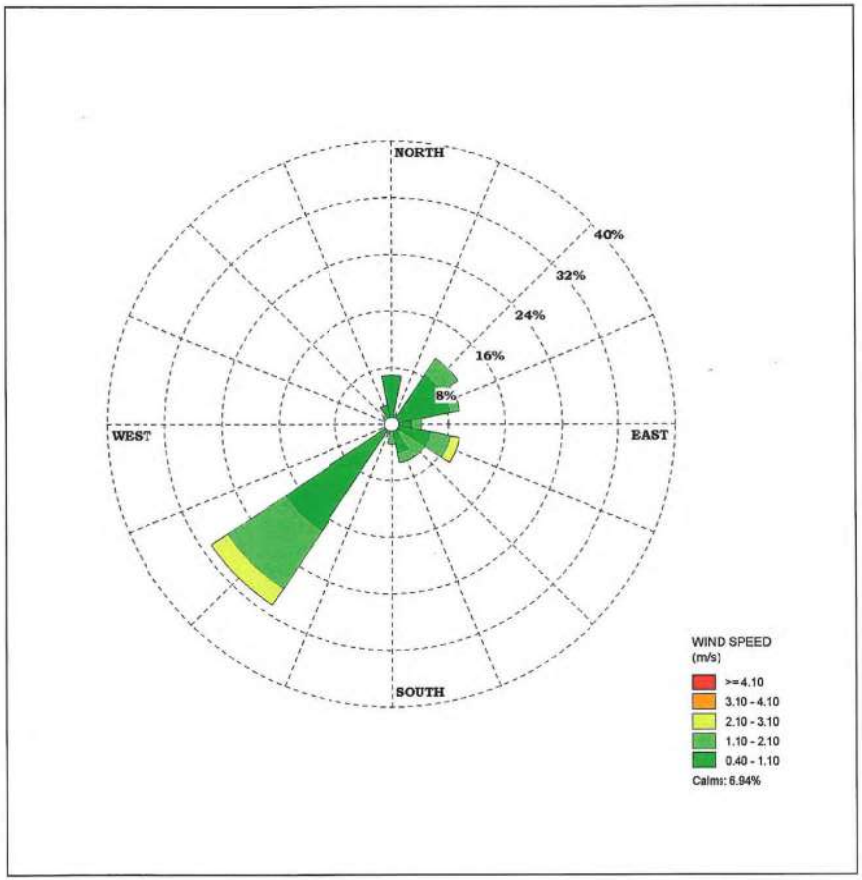
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Project Name : โครงการผลิตบีโครเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Measured Point : **ฐานหลุมผลิต BM3 : A9 : โรงเรียนบ้านบึงมาลย์ ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
Measured Date : August 22-25, 2024
Report No. : 2024-RAAS416



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บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม
โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ
และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง.4

ระดับเสียง

ระยะเจาะหลุมปิโตรเลียม

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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/54 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Noise
Measured Point : **ฐานหลุมผลิต BM6 : N8 : บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583088 E, 1842837 N
Quotation No. : AR2024-00465
Measured Date : June 9-10, 2024
Analysis No. : 2024-AC919-007
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAM599
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : July 6, 2024
Measured Instrument : Integrating Sound Level Meter Scarlet Tech Model ST-15D Serial Number 10338009

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	58.1	84.6	65.5	61.9	50.8	46.2
09:00-10:00	58.3	76.9	65.7	62.3	48.9	44.9
10:00-11:00	56.9	81.0	63.3	59.8	50.3	45.6
11:00-12:00	55.9	74.6	62.9	58.9	48.9	45.3
12:00-13:00	57.1	85.5	65.2	61.9	47.5	43.4
13:00-14:00	55.5	75.0	61.7	58.2	50.3	46.7
14:00-15:00	54.6	74.2	60.5	57.6	50.7	46.4
15:00-16:00	56.6	82.1	63.2	59.4	49.3	45.4
16:00-17:00	56.0	77.6	63.1	59.8	47.9	43.2
17:00-18:00	56.3	84.4	62.2	58.6	49.0	45.0
18:00-19:00	56.3	74.6	63.2	60.2	50.6	46.5
19:00-20:00	54.4	89.6	60.8	55.8	48.9	46.2
20:00-21:00	56.0	73.6	60.4	59.0	54.5	50.6
21:00-22:00	55.2	79.0	59.5	57.5	53.4	49.9
22:00-23:00	50.0	66.0	50.9	50.3	49.7	49.2
23:00-00:00	49.6	71.2	51.4	50.2	49.4	48.9
00:00-01:00	48.8	66.8	49.9	49.4	48.6	48.1
01:00-02:00	48.2	61.2	49.4	49.0	48.0	47.5
02:00-03:00	53.3	66.3	54.5	54.2	53.0	52.1
03:00-04:00	54.4	78.3	55.7	55.2	54.1	52.8
04:00-05:00	49.3	74.1	53.3	50.5	48.5	46.9
05:00-06:00	61.0	87.2	68.7	65.5	49.4	45.9
06:00-07:00	60.9	78.1	68.3	65.4	51.2	46.9
07:00-08:00	65.1	93.1	71.4	66.9	51.2	46.2
24 Hours Measurement	**57.2**	**93.1**	**63.8**	**60.4**	**50.6**	**47.8**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**62.6**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enfancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

[redacted] [redacted]

(Ms.Supawan Suwannapa) (Ms.Thanida Bunrungrueang)
Laboratory Reviewer Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Noise
Measured Point : **ฐานหลุมผลิต BM6 : N8 : บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583088 E, 1842837 N
Quotation No. : AR2024-00465
Measured Date : June 10-11, 2024
Analysis No. : 2024-AC919-007
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAM599
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : July 6, 2024
Measured Instrument : Integrating Sound Level Meter Scarlet Tech Model ST-15D Serial Number 10338009

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	64.6	88.0	71.2	67.5	54.9	51.5
09:00-10:00	63.5	87.9	69.9	65.6	53.7	51.5
10:00-11:00	62.2	82.9	68.8	64.3	52.4	49.6
11:00-12:00	63.1	84.4	69.0	65.9	55.6	48.4
12:00-13:00	61.4	87.9	69.0	66.2	51.8	46.1
13:00-14:00	57.0	81.5	62.2	59.4	51.6	48.7
14:00-15:00	62.0	97.4	68.1	65.7	53.7	49.1
15:00-16:00	59.1	88.5	65.3	60.4	51.4	48.2
16:00-17:00	57.7	84.2	63.5	60.2	51.7	48.7
17:00-18:00	59.3	81.1	66.2	62.9	51.6	47.3
18:00-19:00	57.4	91.3	64.9	61.1	47.7	42.4
19:00-20:00	49.9	82.2	55.2	50.8	40.9	39.5
20:00-21:00	46.2	71.7	50.3	46.3	43.8	42.8
21:00-22:00	48.7	70.9	52.5	49.4	47.4	46.6
22:00-23:00	50.3	65.3	50.9	50.6	50.0	49.6
23:00-00:00	50.2	65.9	51.6	50.6	49.7	49.0
00:00-01:00	49.1	61.8	50.2	49.7	48.9	48.4
01:00-02:00	48.8	60.1	50.7	49.6	48.4	47.8
02:00-03:00	51.4	64.5	52.9	52.5	51.2	49.8
03:00-04:00	52.8	76.9	54.3	54.0	52.7	51.1
04:00-05:00	51.3	89.9	59.0	52.4	45.7	44.2
05:00-06:00	62.0	86.1	69.6	66.5	49.2	44.6
06:00-07:00	61.4	79.2	69.2	65.9	50.7	45.4
07:00-08:00	62.3	87.0	69.9	66.6	52.2	47.9
24 Hours Measurement	**59.4**	**97.4**	**66.1**	**62.6**	**51.3**	**48.2**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**63.6**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enfancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

[redacted] [redacted]

(Ms.Supawan Suwannapa) (Ms.Thanida Bunrungrueang)
Laboratory Reviewer Laboratory Supervisor

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ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

ANALYSIS REPORT

Customer Name	: Vision E. Consultants Co., Ltd.
Address	: 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name	: โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location	: จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source	: Ambient Noise
Measured Point	: **ฐานหลุมผลิต BM6 : N8 : บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate	: UTM (WGS84) 47Q 0583088 E, 1842837 N
Measured Date	: June 11-12, 2024
Measured By	: Mr.Nitad Sirichad
Analyzed By	: Environment Research & Technology Co., Ltd.
Measured Instrument	: Integrating Sound Level Meter Scarlet Tech Model ST-15D Serial Number 10338009
Quotation No.	: AR2024-00465
Analysis No.	: 2024-AC919-007
Report No.	: 2024-RAAM599
Report Date	: July 6, 2024

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	61.0	78.4	68.6	65.0	52.3	49.1
09:00-10:00	58.7	83.0	65.8	61.8	51.8	48.8
10:00-11:00	57.2	76.5	64.0	60.3	50.8	47.9
11:00-12:00	59.8	76.7	67.4	64.1	52.2	49.4
12:00-13:00	57.3	86.5	64.3	60.6	48.7	45.5
13:00-14:00	65.9	93.8	70.9	69.1	61.5	55.7
14:00-15:00	61.3	86.1	67.9	64.7	55.8	52.2
15:00-16:00	55.1	87.4	62.0	58.2	48.3	44.8
16:00-17:00	56.3	76.6	63.1	60.0	49.4	44.8
17:00-18:00	56.0	85.9	62.3	58.9	48.1	43.1
18:00-19:00	52.5	83.4	58.8	54.3	45.6	43.0
19:00-20:00	49.4	82.4	53.4	50.3	45.0	44.1
20:00-21:00	48.9	84.9	54.9	49.5	47.8	46.6
21:00-22:00	48.0	65.2	49.6	48.5	47.6	46.9
22:00-23:00	51.2	75.2	54.3	51.6	50.3	49.7
23:00-00:00	50.1	66.0	51.1	50.9	49.9	49.2
00:00-01:00	47.4	56.9	48.2	47.9	47.3	46.7
01:00-02:00	48.3	64.8	49.3	49.0	47.8	46.7
02:00-03:00	47.7	57.6	49.2	48.7	47.4	46.7
03:00-04:00	48.7	78.6	53.3	49.6	48.0	47.2
04:00-05:00	44.8	73.9	49.8	45.3	44.4	43.8
05:00-06:00	57.8	83.6	64.4	62.0	48.6	44.6
06:00-07:00	62.4	88.1	70.4	67.4	51.0	45.9
07:00-08:00	64.1	82.8	71.3	68.7	56.7	47.8
24 Hours Measurement	**58.3**	**93.8**	**65.0**	**62.1**	**52.2**	**48.3**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**62.4**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

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Laboratory Reviewer

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Laboratory Supervisor

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รายงานผลการตรวจวัดเสียงรบกวน

ชื่อลูกค้า	: บริษัท วิชั่นอี คอนซัลแทนท์ จำกัด
ที่อยู่ลูกค้า	: เลขที่ 101/22 หมู่ที่ 2 ซอยมณียา ซอย 3 ตำบลไทรม้า อำเภอเมืองนนทบุรี จังหวัดนนทบุรี 11000
ชื่อโครงการ	: โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
ที่ตั้งโครงการ	: จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
ประเภทของแหล่งกำเนิด	: เสียงรบกวนกรณีที่ 4 เกิดจากการก่อสร้างฐานหลุมผลิต
บริเวณที่ตรวจวัดเสียงขณะมีการรบกวน	: ฐานหลุมผลิต BM6 : N8 : บ้านบึงมาลย์ หมู่ที่ 4 UTM (WGS84) 47Q 0583086 E, 1842838 N
บริเวณที่ตรวจวัดเสียงขณะไม่มีการรบกวน	: จุดอ้างอิง UTM (WGS84) 47Q 0583025 E, 1842805 N
ตรวจวัดโดย	: นายนิทัศน์ ศิริชาติ
วิเคราะห์โดย	: บริษัท เอ็นไวรอนเมนท รีเสริช แอนด์ เทคโนโลยี จำกัด
เครื่องมือที่ใช้ตรวจวัด	: เครื่องวัดระดับเสียง Scarlet Tech Model ST-15D Serial Number 10338009, เครื่องวัดระดับเสียง Scarlet Tech Model ST-15D Serial Number 10338010
หมายเลขใบเสนอราคา	:AR2024-00465
หมายเลขปฏิบัติการ	:2024-AC919-007
หมายเลขรายงานผล	:2024-RAAM598
วันที่รายงานผล	:6 กรกฎาคม 2567

ระดับเสียงขณะเกิดเสียงของแหล่งกำเนิด			ระดับเสียงขณะไม่มีการรบกวน				การคำนวณระดับการรบกวน[1/]					มาตรฐาน[2/]	สรุปผล
วันที่	ช่วงเวลา	ระดับเสียงเฉลี่ย ($L_{Aeq,Ts}$; dB(A))	วันที่	ช่วงเวลา	ระดับเสียงเฉลี่ย 5 นาที ($L_{Aeq,R}$; dB(A))	ระดับเสียงพื้นฐาน (L_{A90}; dB(A))	ระยะเวลาของช่วงเวลาที่แหล่งกำเนิดเกิดเสียง (Ts; นาที)	ระดับเสียงขณะมีการรบกวน ($L_{Aeq,Tr}$; dB(A))	กรณีที่ 4 บวกเพิ่ม 3 dB(A)	กรณีที่ 5 บวกเพิ่ม 5 dB(A)	ระดับการรบกวน		
9 มิ.ย. 67	22:50-22:55	49.9	9 มิ.ย. 67	22:10-22:15	48.2	46.5	5	45.0	48.0	-	1.5	≤10	ไม่เป็นเสียงรบกวน
10 มิ.ย. 67	22:40-22:45	50.2	10 มิ.ย. 67	22:55-23:00	47.8	46.9	5	46.5	49.5	-	2.6	≤10	ไม่เป็นเสียงรบกวน
12 มิ.ย. 67	02:55-03:00	48.3	12 มิ.ย. 67	02:00-02:05	46.9	45.3	5	42.7	45.7	-	0.4	≤10	ไม่เป็นเสียงรบกวน

หมายเหตุ : [1/] ประกาศคณะกรรมการควบคุมมลพิษ เรื่อง วิธีการตรวจวัดระดับเสียงพื้นฐาน ระดับเสียงขณะไม่มีการรบกวน การตรวจวัดและคำนวณระดับเสียงขณะมีการรบกวน การคำนวณค่าระดับการรบกวน และแบบบันทึกการตรวจวัดเสียงรบกวน พ.ศ. 2565
[2/] ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 29 (พ.ศ. 2550) เรื่อง ค่าระดับเสียงรบกวน

[redacted]
(นางสาวสุภาวรรณ สุวรรณภา)
ผู้ทบทวน

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(นางสาวธนิดา บุญรุ่งเรือง)
ผู้ควบคุมการตรวจวัด

ห้ามคัดถ่ายใบรับรองหรือรายงานผลแต่เพียงบางส่วน โดยไม่ได้รับอนุญาตจากบริษัท เอ็นไวรอนเมนท รีเสริช แอนด์ เทคโนโลยี จำกัด เป็นลายลักษณ์อักษร
รายงานนี้รับรองเฉพาะวัตถุตัวอย่างที่ได้ตรวจ วิเคราะห์ ทดสอบเท่านั้น

ระยะผลิตปิโตรเลียม
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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Noise
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : N10 : บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584125 E, 1840431 N
Quotation No. : AR2024-00462
Measured Date : August 22-23, 2024
Analysis No. : 2024-AE209-013
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS613
Analyzed By : Environment Research & Technology Co., Ltd
Report Date : September 19, 2024
Measured Instrument : Integrating Sound Level Meter Scarlet Tech Model ST-11D Serial Number 820966

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	45.3	66.5	50.2	48.4	42.7	39.9
09:00-10:00	44.3	67.8	49.2	47.0	42.1	38.8
10:00-11:00	41.7	68.9	45.4	43.0	39.3	37.3
11:00-12:00	40.6	61.6	45.1	43.0	38.7	36.8
12:00-13:00	41.1	71.0	43.6	42.3	39.4	37.7
13:00-14:00	42.0	66.9	45.1	43.8	39.2	37.2
14:00-15:00	43.9	66.9	48.3	46.3	41.2	38.4
15:00-16:00	41.0	66.9	45.2	43.2	39.0	36.8
16:00-17:00	43.5	66.9	47.7	44.6	40.1	38.0
17:00-18:00	45.7	62.7	49.4	48.1	44.3	41.8
18:00-19:00	46.8	67.5	50.8	49.6	45.5	42.4
19:00-20:00	49.1	74.5	49.9	49.6	48.7	47.7
20:00-21:00	50.0	64.3	51.1	50.9	49.9	48.7
21:00-22:00	48.9	61.4	50.5	50.2	48.8	47.2
22:00-23:00	49.0	61.0	50.4	50.1	48.2	47.4
23:00-00:00	47.9	57.3	49.1	48.9	47.8	46.7
00:00-01:00	46.7	60.1	48.4	48.0	46.6	44.8
01:00-02:00	48.4	60.1	50.3	50.0	48.3	45.9
02:00-03:00	48.4	58.8	49.7	49.3	48.3	47.1
03:00-04:00	47.8	58.4	48.7	48.5	47.7	47.1
04:00-05:00	47.2	59.7	48.4	48.1	47.1	46.3
05:00-06:00	41.7	57.0	43.7	43.0	41.3	40.0
06:00-07:00	45.5	64.1	51.1	48.8	41.2	37.1
07:00-08:00	47.9	70.3	53.6	51.1	42.8	38.8
24 Hours Measurement	**46.5**	**74.5**	**49.2**	**48.1**	**45.6**	**44.1**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**53.6**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

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Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Noise
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : N10 : บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584125 E, 1840431 N
Quotation No. : AR2024-00462
Measured Date : August 23-24, 2024
Analysis No. : 2024-AE209-013
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS613
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024
Measured Instrument : Integrating Sound Level Meter Scarlet Tech Model ST-11D Serial Number 820966

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	45.8	75.2	49.2	47.5	41.0	37.9
09:00-10:00	43.2	63.7	49.1	46.3	39.7	36.6
10:00-11:00	47.1	75.0	53.8	47.4	39.0	35.8
11:00-12:00	42.8	71.8	44.6	43.3	39.1	36.4
12:00-13:00	38.7	61.3	43.7	41.2	36.2	33.7
13:00-14:00	41.2	59.6	47.1	44.0	38.2	35.6
14:00-15:00	54.3	73.7	59.8	58.6	51.4	49.9
15:00-16:00	53.5	70.8	58.6	57.2	51.7	48.6
16:00-17:00	41.6	65.2	47.0	45.0	38.2	34.5
17:00-18:00	42.4	63.3	47.2	45.0	39.3	36.4
18:00-19:00	41.0	69.5	44.9	42.4	38.1	35.9
19:00-20:00	47.2	67.4	48.3	47.7	46.7	45.9
20:00-21:00	47.3	58.5	48.3	48.0	47.2	46.6
21:00-22:00	45.1	60.9	46.2	45.8	44.9	44.1
22:00-23:00	45.2	60.4	46.1	45.9	44.9	44.5
23:00-00:00	47.7	57.1	49.0	48.7	47.3	46.3
00:00-01:00	48.4	76.0	50.5	49.4	47.8	46.3
01:00-02:00	47.0	71.7	50.7	47.9	45.6	44.2
02:00-03:00	58.5	74.0	60.9	60.3	57.7	56.1
03:00-04:00	59.1	81.6	61.2	59.4	57.6	56.7
04:00-05:00	57.9	67.8	59.1	58.7	57.7	57.0
05:00-06:00	59.5	68.9	61.1	60.8	59.4	57.6
06:00-07:00	51.7	69.7	56.0	54.4	50.0	48.2
07:00-08:00	54.6	69.8	58.6	57.3	53.0	49.9
24 Hours Measurement	**52.7**	**81.6**	**55.6**	**54.4**	**51.8**	**50.3**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**61.6**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

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Customer Name : Vsion E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมขึ้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Noise
Measured Point : **ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : N10 : บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584125 E, 1840431 N
Quotation No. : AR2024-00462
Measured Date : August 24-25, 2024
Analysis No. : 2024-AE209-013
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS613
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024
Measured Instrument : Integrating Sound Level Meter Scarlet Tech Model ST-11D Serial Number 820966

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	55.7	76.6	58.6	57.9	55.1	52.4
09:00-10:00	50.2	68.5	54.5	53.3	48.2	44.8
10:00-11:00	48.0	70.7	54.3	51.3	42.4	39.8
11:00-12:00	44.1	70.7	49.8	46.1	39.9	37.4
12:00-13:00	46.2	68.1	51.6	49.1	41.0	38.2
13:00-14:00	45.0	69.6	51.0	47.4	40.6	37.8
14:00-15:00	45.5	67.5	50.4	48.5	42.7	39.9
15:00-16:00	48.5	70.1	52.5	50.5	46.8	44.3
16:00-17:00	46.2	66.7	49.5	48.1	45.1	43.2
17:00-18:00	47.5	66.9	53.0	50.9	44.3	42.0
18:00-19:00	46.6	67.6	52.0	49.2	42.7	40.6
19:00-20:00	54.3	62.4	55.6	55.1	54.1	53.3
20:00-21:00	54.8	63.0	56.0	55.6	54.7	54.0
21:00-22:00	53.2	59.7	54.0	53.8	52.9	52.5
22:00-23:00	52.8	57.1	53.6	53.5	52.4	52.1
23:00-00:00	50.6	58.7	51.6	51.4	50.5	49.6
00:00-01:00	49.8	58.4	51.4	51.1	49.6	48.1
01:00-02:00	48.7	58.9	49.8	49.6	48.6	47.5
02:00-03:00	50.4	57.0	51.2	50.9	50.3	49.8
03:00-04:00	52.4	58.7	53.1	52.9	52.3	51.7
04:00-05:00	50.4	59.7	51.5	51.0	50.2	49.5
05:00-06:00	47.6	65.2	50.1	48.5	47.0	45.7
06:00-07:00	46.0	67.4	51.7	48.3	41.1	38.2
07:00-08:00	50.7	78.5	57.7	53.7	42.4	38.8
24 Hours Measurement	**50.6**	**78.5**	**53.5**	**52.1**	**49.7**	**48.5**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**56.8**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

[redacted] (Ms.Supawan Suwannapa)
Laboratory Reviewer

[redacted] (Ms.Thanida Bunrungrueang)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมขึ้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Noise
Measured Point : **ฐานหลุมผลิต BM3 : N5 : หมู่ที่ 4 บ้านบึงมาลย์ (1) บ้านเลขที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584353 E, 1842952 N
Quotation No. : AR2024-00462
Measured Date : August 22-23, 2024
Analysis No. : 2024-AE209-014
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS614
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024
Measured Instrument : Integrating Sound Level Meter Scarlet Tech Model ST-11D Serial Number 820870

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	44.5	64.2	49.2	47.6	42.6	39.1
09:00-10:00	44.9	65.0	48.4	47.5	43.9	40.2
10:00-11:00	56.7	82.5	59.2	57.9	42.5	38.5
11:00-12:00	64.1	82.5	69.4	68.4	59.4	50.6
12:00-13:00	59.0	76.5	64.6	63.2	55.8	49.4
13:00-14:00	62.4	82.6	67.6	66.2	58.4	52.9
14:00-15:00	59.8	77.9	67.2	64.7	50.2	45.4
15:00-16:00	61.0	75.9	66.7	65.7	56.5	48.8
16:00-17:00	52.2	81.7	56.7	53.8	43.5	41.1
17:00-18:00	47.2	68.5	51.7	49.4	44.2	40.3
18:00-19:00	50.5	66.7	53.6	52.6	49.7	47.2
19:00-20:00	58.1	65.6	60.6	60.1	56.8	54.4
20:00-21:00	60.6	66.0	62.1	61.7	59.4	58.2
21:00-22:00	59.4	65.3	61.1	60.8	58.6	56.4
22:00-23:00	57.6	63.9	59.2	58.9	57.2	54.6
23:00-00:00	56.8	63.3	58.6	58.3	56.0	53.7
00:00-01:00	60.8	64.7	63.0	62.7	59.2	55.3
01:00-02:00	54.9	64.0	58.4	57.7	53.9	50.8
02:00-03:00	54.6	63.1	57.2	56.9	54.1	49.4
03:00-04:00	55.6	70.8	57.7	57.3	55.3	52.9
04:00-05:00	57.6	64.8	60.5	59.9	57.0	53.5
05:00-06:00	57.4	69.5	60.9	60.4	56.5	50.6
06:00-07:00	48.9	77.8	54.5	52.6	46.2	43.2
07:00-08:00	45.5	66.0	49.2	47.7	43.9	42.3
24 Hours Measurement	**58.0**	**82.6**	**62.4**	**61.3**	**55.4**	**51.8**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**63.6**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

[redacted] (Ms.Supawan Suwannapa)
Laboratory Reviewer

[redacted] (Ms.Thanida Bunrungrueang)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vsion E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโดรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระและพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Noise
Measured Point : **ฐานหลุมผลิต BM3 : N5 : หมู่ที่ 4 บ้านบึงมาลย์ (1) บ้านเลขที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584353 E, 1842952 N
Quotation No. : AR2024-00462
Measured Date : August 23-24, 2024
Analysis No. : 2024-AE209-014
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS614
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024
Measured Instrument : Integrating Sound Level Meter Scarlet Tech Model ST-11D Serial Number 820870

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	46.1	64.9	51.1	49.3	43.5	40.0
09:00-10:00	48.6	71.4	53.0	51.6	44.6	38.3
10:00-11:00	41.8	61.5	47.5	43.9	39.2	37.5
11:00-12:00	42.0	60.2	47.0	45.1	39.4	36.8
12:00-13:00	39.5	58.6	45.1	42.8	37.3	36.5
13:00-14:00	62.5	75.7	65.4	65.7	59.5	52.4
14:00-15:00	63.6	80.3	67.9	67.1	62.1	52.1
15:00-16:00	64.2	78.9	67.6	67.0	60.8	52.7
16:00-17:00	46.7	73.0	51.4	48.7	42.4	39.0
17:00-18:00	45.3	69.8	50.2	47.9	42.0	38.3
18:00-19:00	50.4	75.5	55.1	53.4	47.9	43.5
19:00-20:00	52.8	69.8	55.7	55.8	51.9	48.0
20:00-21:00	56.5	62.0	58.9	58.5	56.4	52.0
21:00-22:00	56.3	66.0	58.7	58.1	54.3	51.7
22:00-23:00	58.8	62.2	60.3	60.1	55.4	54.3
23:00-00:00	58.9	65.2	60.2	60.1	58.3	54.7
00:00-01:00	56.4	62.1	58.0	57.8	55.1	51.5
01:00-02:00	48.1	58.1	50.3	49.9	47.9	45.7
02:00-03:00	56.7	77.8	60.0	59.2	55.9	52.2
03:00-04:00	57.7	81.5	60.9	58.5	56.2	54.6
04:00-05:00	57.4	64.6	59.2	58.8	57.2	55.8
05:00-06:00	56.6	68.8	58.8	58.6	56.3	53.7
06:00-07:00	50.4	69.5	55.4	53.5	47.8	44.4
07:00-08:00	48.8	71.0	53.8	51.9	46.1	42.0
24 Hours Measurement	**57.1**	**81.5**	**60.4**	**59.7**	**55.2**	**50.7**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**63.2**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

[redacted] [redacted]

(Ms.Supawan Suwannapa) Laboratory Reviewer
(Ms.Thanida Bunrungrueang) Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบิโดรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระและพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Ambient Noise
Measured Point : **ฐานหลุมผลิต BM3 : N5 : หมู่ที่ 4 บ้านบึงมาลย์ (1) บ้านเลขที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584353 E, 1842952 N
Quotation No. : AR2024-00462
Measured Date : August 24-25, 2024
Analysis No. : 2024-AE209-014
Measured By : Mr.Nitad Sirichad
Report No. : 2024-RAAS614
Analyzed By : Environment Research & Technology Co., Ltd.
Report Date : September 19, 2024
Measured Instrument : Integrating Sound Level Meter Scarlet Tech Model ST-11D Serial Number 820870

Interval Time	Noise Level, dB(A)					
	Leq	Lmax	L5	L10	L50	L90
08:00-09:00	49.4	72.7	54.7	52.7	46.4	42.0
09:00-10:00	48.7	84.6	53.9	50.9	42.5	38.2
10:00-11:00	46.4	70.0	51.7	49.0	43.3	39.5
11:00-12:00	45.7	80.3	51.2	47.6	41.8	39.4
12:00-13:00	43.5	61.4	49.2	47.0	41.3	37.8
13:00-14:00	44.2	61.7	49.9	47.4	41.7	38.4
14:00-15:00	47.4	66.2	53.0	50.9	44.7	39.4
15:00-16:00	49.1	69.3	55.0	52.4	45.0	41.6
16:00-17:00	45.6	72.3	50.8	48.6	41.8	37.4
17:00-18:00	47.6	72.0	52.5	50.3	44.7	40.6
18:00-19:00	48.8	75.4	53.0	51.5	47.1	43.4
19:00-20:00	56.1	65.0	57.4	57.2	54.5	53.1
20:00-21:00	56.2	70.9	57.7	57.3	54.8	53.3
21:00-22:00	52.1	68.4	53.6	53.0	51.4	50.3
22:00-23:00	50.7	58.4	52.1	51.7	50.0	49.2
23:00-00:00	49.6	56.5	51.4	51.0	49.3	48.1
00:00-01:00	49.3	56.4	51.1	50.6	49.1	47.9
01:00-02:00	51.4	57.3	53.0	52.6	51.0	49.7
02:00-03:00	52.1	56.7	53.2	53.0	51.3	50.7
03:00-04:00	53.6	60.6	54.8	54.5	53.5	52.5
04:00-05:00	55.0	58.3	55.9	55.7	54.9	54.2
05:00-06:00	53.6	65.5	55.7	55.4	53.2	51.5
06:00-07:00	48.9	65.5	53.6	51.9	46.8	42.8
07:00-08:00	46.5	67.9	52.1	50.3	42.9	38.6
24 Hours Measurement	**51.1**	**84.6**	**53.7**	**52.7**	**49.9**	**48.4**
Standard[1/]	**70**	**115**	-	-	-	-
Ldn	**58.3**	-	-	-	-	-

Remark : [1/] Notification of National Environmental Board, No.15, B.E.2540 (1997) under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.114 Part 27D dated April 3, B.E.2540 (1997).

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(Ms.Supawan Suwannapa) Laboratory Reviewer
(Ms.Thanida Bunrungrueang) Laboratory Supervisor

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www.enviresearch.co.th

รายงานผลการตรวจวัดเสียงรบกวน

ชื่อลูกค้า : บริษัท วีรันธ์ คอนซัลแทนท์ จำกัด
ที่อยู่ลูกค้า : เลขที่ 101/22 หมู่ที่ 2 ซอยมณียา ซอย 3 ตำบลไทรม้า อำเภอเมืองนนทบุรี จังหวัดนนทบุรี 11000
ชื่อโครงการ : โครงการผลิตบีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
ที่ตั้งโครงการ : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
ประเภทของแหล่งกำเนิด : เสียงรบกวนกรณีที่ 4 เกิดจากการผลิตบีโตรเลียม
บริเวณที่ตรวจวัดเสียงขณะมีการรบกวน : ฐานหลุมผลิตบึงม่วงใต้ 2 (BMS2) : N10 : บ้านหนองไม้แดง หมู่ที่ 7 UTM (WGS84) 47Q 0584125 E, 1840431 N
บริเวณที่ตรวจวัดเสียงขณะไม่มีการรบกวน : จุดอ้างอิง UTM (WGS84) 47Q 0584184 E, 1840568 N
ตรวจวัดโดย : นายนิทัศน์ ศิริชาติ
วิเคราะห์โดย : บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด
เครื่องมือที่ใช้ตรวจวัด : เครื่องวัดระดับเสียง Scarlet Tech Model ST-11D Serial Number 820966,
เครื่องวัดระดับเสียง Scarlet Tech Model ST-11D Serial Number 820934

หมายเลขใบเสนอราคา :AR2024-00462
หมายเลขปฏิบัติการ :2024-AE209-013
หมายเลขรายงานผล :2024-RAAS615
วันที่รายงานผล :19 กันยายน 2567

ระดับเสียงขณะเกิดเสียงของแหล่งกำเนิด			ระดับเสียงขณะไม่มีการรบกวน				การคำนวณระดับการรบกวน[1/]					มาตรฐาน[2/]	สรุปผล
วันที่	ช่วงเวลา	ระดับเสียงเฉลี่ย ($L_{Aeq,TS}$; dB(A))	วันที่	ช่วงเวลา	ระดับเสียงเฉลี่ย 5 นาที ($L_{Aeq,R}$; dB(A))	ระดับเสียงพื้นฐาน (L_{A90}; dB(A))	ระยะเวลาของช่วงเวลาที่แหล่งกำเนิดเกิดเสียง (Ts; นาที)	ระดับเสียงขณะมีการรบกวน ($L_{Aeq,Tr}$; dB(A))	กรณีที่ 4 บวกเพิ่ม 3 dB(A)	กรณีที่ 5 บวกเพิ่ม 5 dB(A)	ระดับการรบกวน		
23 ส.ค. 67	03:30-03:35	47.8	23 ส.ค. 67	03:15-03:20	42.5	41.2	5	46.3	49.3	-	8.1	≤10	ไม่เป็นเสียงรบกวน
23 ส.ค. 67	23:45-23:50	48.9	23 ส.ค. 67	23:25-23:30	44.8	43.0	5	46.8	49.8	-	6.8	≤10	ไม่เป็นเสียงรบกวน
25 ส.ค. 67	02:20-02:25	50.3	25 ส.ค. 67	02:15-02:20	45.5	43.5	5	48.6	51.6	-	8.1	≤10	ไม่เป็นเสียงรบกวน

หมายเหตุ : [1/] ประกาศคณะกรรมการควบคุมมลพิษ เรื่อง วิธีการตรวจวัดระดับเสียงพื้นฐาน ระดับเสียงขณะไม่มีการรบกวน การตรวจวัดและคำนวณระดับเสียงขณะมีการบกวน การคำนวณค่าระดับการรบกวน และแบบบันทึกการตรวจวัดเสียงรบกวน พ.ศ. 2565
[2/] ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 29 (พ.ศ. 2550) เรื่อง ค่าระดับเสียงรบกวน

[redacted]
(นางสาวสุภาวรรณ สุวรรณภา)
ผู้ทบทวน

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[redacted]
(นางสาวธนิดา บุญรุ่งเรือง)
ผู้ควบคุมการตรวจวัด

ห้ามคัดถ่ายใบรับรองหรือรายงานผลแต่เพียงบางส่วน โดยไม่ได้รับอนุญาตจากบริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เป็นลายลักษณ์อักษร
รายงานนี้รับรองเฉพาะวัตถุตัวอย่างที่ได้ตรวจ วิเคราะห์ ทดสอบเท่านั้น

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www.enviresearch.co.th

รายงานผลการตรวจวัดเสียงรบกวน

ชื่อลูกค้า : บริษัท วีรันธ์ คอนซัลแทนท์ จำกัด
ที่อยู่ลูกค้า : เลขที่ 101/22 หมู่ที่ 2 ซอยมณียา ซอย 3 ตำบลไทรม้า อำเภอเมืองนนทบุรี จังหวัดนนทบุรี 11000
ชื่อโครงการ : โครงการผลิตบีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
ที่ตั้งโครงการ : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
ประเภทของแหล่งกำเนิด : เสียงรบกวนกรณีที่ 4 เกิดจากการผลิตบีโตรเลียม
บริเวณที่ตรวจวัดเสียงขณะมีการรบกวน : ฐานหลุมผลิต BM3 : N5 : หมู่ที่ 4 บ้านบึงมาลย์ (1) บ้านเลขที่ 6 UTM (WGS84) 47Q 0584353 E, 1842952 N
บริเวณที่ตรวจวัดเสียงขณะไม่มีการรบกวน : จุดอ้างอิง UTM (WGS84) 47Q 0583945 E, 1842762 N
ตรวจวัดโดย : นายนิทัศน์ ศิริชาติ
วิเคราะห์โดย : บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด
เครื่องมือที่ใช้ตรวจวัด : เครื่องวัดระดับเสียง Scarlet Tech Model ST-11D Serial Number 820870,
เครื่องวัดระดับเสียง RION Model NL-31 Serial Number 00593653

หมายเลขใบเสนอราคา :AR2024-00462
หมายเลขปฏิบัติการ :2024-AE209-014
หมายเลขรายงานผล :2024-RAAS616
วันที่รายงานผล :19 กันยายน 2567

ระดับเสียงขณะเกิดเสียงของแหล่งกำเนิด			ระดับเสียงขณะไม่มีการรบกวน				การคำนวณระดับการรบกวน[1/]					มาตรฐาน[2/]	สรุปผล
วันที่	ช่วงเวลา	ระดับเสียงเฉลี่ย ($L_{Aeq,TS}$; dB(A))	วันที่	ช่วงเวลา	ระดับเสียงเฉลี่ย 5 นาที ($L_{Aeq,R}$; dB(A))	ระดับเสียงพื้นฐาน (L_{A90}; dB(A))	ระยะเวลาของช่วงเวลาที่แหล่งกำเนิดเกิดเสียง (Ts; นาที)	ระดับเสียงขณะมีการรบกวน ($L_{Aeq,Tr}$; dB(A))	กรณีที่ 4 บวกเพิ่ม 3 dB(A)	กรณีที่ 5 บวกเพิ่ม 5 dB(A)	ระดับการรบกวน		
23 ส.ค. 67	04:50-04:55	56.9	23 ส.ค. 67	04:45-04:50	51.6	50.4	5	55.4	58.4	-	8.0	≤10	ไม่เป็นเสียงรบกวน
24 ส.ค. 67	04:50-04:55	56.9	24 ส.ค. 67	04:05-04:10	53.5	51.5	5	54.2	57.2	-	5.7	≤10	ไม่เป็นเสียงรบกวน
25 ส.ค. 67	01:50-01:55	51.7	25 ส.ค. 67	01:20-01:25	46.1	44.6	5	50.3	53.3	-	8.7	≤10	ไม่เป็นเสียงรบกวน

หมายเหตุ : [1/] ประกาศคณะกรรมการควบคุมมลพิษ เรื่อง วิธีการตรวจวัดระดับเสียงพื้นฐาน ระดับเสียงขณะไม่มีการรบกวน การตรวจวัดและคำนวณระดับเสียงขณะมีการบกวน การคำนวณค่าระดับการรบกวน และแบบบันทึกการตรวจวัดเสียงรบกวน พ.ศ. 2565
[2/] ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 29 (พ.ศ. 2550) เรื่อง ค่าระดับเสียงรบกวน

[redacted]
(นางสาวสุภาวรรณ สุวรรณภา)
ผู้ทบทวน

[redacted]
(นางสาวธนิดา บุญรุ่งเรือง)
ผู้ควบคุมการตรวจวัด

ห้ามคัดถ่ายใบรับรองหรือรายงานผลแต่เพียงบางส่วน โดยไม่ได้รับอนุญาตจากบริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เป็นลายลักษณ์อักษร
รายงานนี้รับรองเฉพาะวัตถุตัวอย่างที่ได้ตรวจ วิเคราะห์ ทดสอบเท่านั้น
หน้า 1/1
F-RP-006 Rev. 05, January 18, 2021

บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม
โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ
และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง.5

คุณภาพน้ำผิวดิน

ระยะเจาะหลุมปิโตรเลียม

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : SW1.7 : คลองส่งน้ำชลประทาน (3) บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582266 E, 1843395 N
Sampling Date : July 17, 2024 **Quotation No.** : AR2024-00465
Sampling Time : 14:35 **Analysis No.** : 2024-AD640-002
Sampling Method : Grab **Received Date** : July 19, 2024
Sampling By : Mr.Romsea Kateh **Analytical Date** : July 19-August 7, 2024
Analyzed By : Envronment Research & Technology Co., Ltd. **Report No.** : 2024-RAAP098
Physical Properties : Turbid, Light Yellow, Sediment, Odorless **Report Date** : August 8, 2024

Parameter	Unit	Methed of Analysis[1/]	MRL	Result	Standard[2/]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	30.5	n'	n'
pH	-	Electrometric	-	7.4	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	6.8	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test Membrane Electrode	1.0	1.8	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	35,000	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	7,900	4,000	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.017	0.1	0.1
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.016	0.1	0.1
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.276	1.0	1.0
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.04	1.0	1.0
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3/]	0.005[3/]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.006	0.05	0.05
Mercury	mg/L	Digestion, Cold-/apor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0022	0.01	0.01
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.10	-	-
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	13	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	215	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	1.8	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	162	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	264	-	-

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E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : SW1.7 : คลองส่งน้ำชลประทาน (3) บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582266 E, 1843395 N
Sampling Date : July 17, 2024 **Quotation No.** : AR2024-00465
Sampling Time : 14:35 **Analysis No.** : 2024-AD640-002
Sampling Method : Grab **Received Date** : July 19, 2024
Sampling By : Mr.Romsea Kateh **Analytical Date** : July 19-August 7, 2024
Analyzed By : Environment Research & Technology Co., Ltd. **Report No.** : 2024-RAAP098
Physical Properties : Turbid, Light Yellow, Sediment, Odorless **Report Date** : August 8, 2024

Parameter	Unit	Method of Analysis[1/]	MRL	Result	Standard[2/]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_5-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : 1/ Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
2/ Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
3/ When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 22 mg/l)
n' = naturally but changing not more than 3°C

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
laboratory Supervisor

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E-mail : envi@envisearch.co.th
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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบีโดเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : SW1.8 : คลองส่งน้ำชลประทาน (4) บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583367 E, 1843003 N
Sampling Date : July 17, 2024
Sampling Time : 13:35
Sampling Method : Grab
Sampling By : Mr.Romsea Kateh
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-003
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP099
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	29.5	n[4]	n[4]
pH	-	Electrometric	-	7.4	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	6.0	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	2.4	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	35,000	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	13,000	4,000	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.009	0.1	0.1
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.011	0.1	0.1
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.205	1.0	1.0
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	1.0	1.0
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3]	0.005[3]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.001	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0009	0.01	0.01
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.08	-	-
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	5.6	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	195	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	1.2	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	149	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	130	-	-

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E-mail : envi@envisearch.co.th
www.envisearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบีโดเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : SW1.8 : คลองส่งน้ำชลประทาน (4) บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583367 E, 1843003 N
Sampling Date : July 17, 2024
Sampling Time : 13:35
Sampling Method : Grab
Sampling By : Mr.Romsea Kateh
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00465
Analysis No. : 2024-AD640-003
Received Date : July 19, 2024
Analytical Date : July 19-August 7, 2024
Report No. : 2024-RAAP099
Report Date : August 8, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
[3] When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 50 mg/l)
n[4] = naturally but changing not more than 3°C

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ระยะผลิตปิโตรเลียม
(การผลิตปิโตรเลียม)

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : SW1.3 : คลองวังเฉลียง (1) บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583048 E, 1845148 N
Sampling Date : August 23, 2024
Sampling Time : 13:09
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-001
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR794
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	33.6	n'	n'
pH	-	Electrometric	-	8.1	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	6.2	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	2.4	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	33	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	<1.8	4,000	-
Copper	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Nickel	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	0.163	1.0	1.0
Zinc	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.01	0.03	1.0	1.0
Cadmium	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3]	0.005[3]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0004	0.01	0.01
Barium	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.01	0.04	-	-
Iron	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.1	0.2	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	175	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	141	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	5.9	-	-

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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : SW1.3 : คลองวังเฉลียง (1) บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583048 E, 1845148 N
Sampling Date : August 23, 2024
Sampling Time : 13:09
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-001
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR794
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
[3] When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 68 mg/l)
n' = naturally but changing not more than 3°C

[redacted] [redacted]

(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : SW1.4 : คลองวังเฉลียง (2) บ้านนิคมพัฒนา หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0585782 E, 1846407 N
Sampling Date : August 23, 2024
Sampling Time : 13:47
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-002
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR795
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1/]	MRL	Result	Standard[2/]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	32.9	n[4/]	n[4/]
pH	-	Electrometric	-	8.0	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	6.0	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	<1.0	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	79	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	<1.8	4,000	-
Copper	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Nickel	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	0.645	1.0	1.0
Zinc	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.01	0.02	1.0	1.0
Cadmium	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3/]	0.005[3/]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0005	0.01	0.01
Barium	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.01	0.05	-	-
Iron	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.1	0.4	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	209	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	170	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	<5.0	-	-

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ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตบีโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-2 : SW1.4 : คลองวังเฉลียง (2) บ้านนิคมพัฒนา หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0585782 E, 1846407 N
Sampling Date : August 23, 2024
Sampling Time : 13:47
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-002
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR795
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1/]	MRL	Result	Standard[2/]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hycrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : 1/ Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
2/ Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
3/ When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 72 mg/l)
n' = naturally bet changing not more than 3°C

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : SW1.5 : คลองวังเฉลียง (3) บ้านบึงหญ้า หมู่ที่ 5 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0586736 E, 1848695 N
Sampling Date : August 23, 2024
Sampling Time : 11:29
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-003
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR796
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1/]	MRL	Result	Standard[2/]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	34.9	n'	n'
pH	-	Electrometric	-	8.0	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	7.6	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	2.3	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	170	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	45	4,000	-
Copper	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Nickel	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.156	1.0	1.0
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.04	1.0	1.0
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3/]	0.005[3/]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.002	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0007	0.01	0.01
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	-	-
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.3	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	184	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	156	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	5.0	-	-

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : SW1.5 : คลองวังเฉลียง (3) บ้านบึงหญ้า หมู่ที่ 5 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0586736 E, 1848695 N
Sampling Date : August 23, 2024
Sampling Time : 11:29
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-003
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR796
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1/]	MRL	Result	Standard[1/]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : 1/ Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
2/ Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
3/ When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 64 mg/l)
n' = naturally but changing not more than 3°C

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : SW1.6 : สระใหญ่บึงหญ้า บ้านนิคมพัฒนา หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0584437 E, 1846912 N
Sampling Date : August 23, 2024
Sampling Time : 10:45
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-004
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR797
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	31.8	n'	n'
pH	-	Electrometric	-	8.4	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	7.7	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	2.6	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	1,300	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	790	4,000	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.136	1.0	1.0
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.02	1.0	1.0
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3]	0.005[3]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0003	0.01	0.01
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.05	-	-
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	0.2	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	234	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	172	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	7.2	-	-

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BY1-20 : SW1.6 : สระใหญ่บึงหญ้า บ้านนิคมพัฒนา หมู่ที่ 8 ตำบลหนองจิก อำเภอคีรีมาศ จังหวัดสุโขทัย**
GPS. Coordinate : UTM (WGS84) 47Q 0584437 E, 1846912 N
Sampling Date : August 23, 2024
Sampling Time : 10:45
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-004
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR797
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_5-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
[3] When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 79 mg/l)
n' = naturally but changing not more than 3°C

[redacted] [redacted]

(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

Environment Research & Technology Company Limited
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E-mail : envi@enviresearch.co.th
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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : SW1.11 : คลองคณฑี (3) บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582783 E, 1839767 N
Sampling Date : August 24, 2024
Sampling Time : 15:00
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-005
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR798
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	34.3	n'	n'
pH	-	Electrometric	-	8.2	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	3.9	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	3.2	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	<1.8	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	<1.8	4,000	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.006	0.1	0.1
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.565	1.0	1.0
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.03	1.0	1.0
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3]	0.005[3]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.002	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Specrometry	0.0002	0.0008	0.01	0.01
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.09	-	-
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	3.2	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Specrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	258	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	1.3	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	204	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	77	-	-

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : SW1.11 : คลองคณฑี (3) บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582783 E, 1839767 N
Sampling Date : August 24, 2024
Sampling Time : 15:00
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-005
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR798
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
[3] When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 90 mg/l)
n' = naturally bit changing not more than 3°C

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : SW1.12 : คลองคณฑี (4) บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583646 E, 1840787 N
Sampling Date : August 24, 2024
Sampling Time : 13:48
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-006
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR799
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	32.8	n'	n'
pH	-	Electrometric	-	8.1	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	3.8	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	2.4	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	1,300	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	140	4,000	-
Copper	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	0.006	0.1	0.1
Nickel	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	0.636	1.0	1.0
Zinc	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.01	0.04	1.0	1.0
Cadmium	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3]	0.005[3]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.005	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0005	0.01	0.01
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.10	-	-
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	4.9	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	257	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	161	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	39	-	-

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BMS2 : SW1.12 : คลองคณฑี (4) บ้านหนองไม้แดง หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583646 E, 1840787 N
Sampling Date : August 24, 2024
Sampling Time : 13:48
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odorless

Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-006
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR799
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
[3] When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 87 mg/l)
n' = naturally but changing not more than 3°C

[redacted]
(Ms.Yuwadee Na Rahong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanuku)
Laboratory Supervisor

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www.envisearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3 : SW1.9 : คลองคณฑี (1) บ้านบึงมาลย์ หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584296 E, 1841814 N
Sampling Date : August 24, 2024
Sampling Time : 13:10
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-008
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR801
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	32.9	n'	n'
pH	-	Electrometric	-	8.2	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	3.6	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	1.3	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	170	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	45	4,000	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.319	1.0	1.0
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.05	1.0	1.0
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3]	0.005[3]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	<0.001	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0015	0.01	0.01
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.08	-	-
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	1.8	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	254	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	151	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	33	-	-

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ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

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E-mail : envi@envisearch.co.th
www.envisearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3 : SW1.9 : คลองคณฑี (1) บ้านบึงมาลย์ หมู่ที่ 7 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0584296 E, 1841814 N
Sampling Date : August 24, 2024
Sampling Time : 13:10
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-008
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR801
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
[3] When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 89 mg/l)
n' = naturally but changing not more than 3°C

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM3 : SW1.10 : คลองคณฑี (2) บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0585369 E, 1843434 N
Sampling Date : August 24, 2024
Sampling Time : 11:52
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-009
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR815
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1/]	MRL	Result	Standard[2/]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	32.9	n'	n'
pH	-	Electrometric	-	8.1	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	3.6	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	2.1	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	130	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	78	4,000	-
Copper	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Nickel	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.005	0.314	1.0	1.0
Zinc	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.01	0.03	1.0	1.0
Cadmium	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3/]	0.005[3/]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Specrometry	0.001	0.002	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Specrometry	0.0002	0.0004	0.01	0.01
Barium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.08	-	-
Iron	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.1	1.3	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	252	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	163	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	21	-	-

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : ฐานหลุมผลิต BM3 : SW1.10 : คลองคณฑี (2) บ้านใหม่สามัคคี หมู่ที่ 6 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร
GPS. Coordinate : UTM (WGS84) 47Q 0585369 E, 1843434 N
Sampling Date : August 24, 2024
Sampling Time : 11:52
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-009
Received Date : August 27, 2024
Analytical Date : August 27-September 13, 2024
Report No. : 2024-RAAR815
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1/]	MRL	Result	Standard[1/]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hydrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : 1/ Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
2/ Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
3/ When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 89 mg/l)
n' = naturally but changing not more than 3°C

[redacted]
(Ms.Yuwadee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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F-RP-026 Rev. 05, January 18, 2021

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : SW1.7 : คลองส่งน้ำชลประทาน (3) บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582266 E, 1843395 N
Sampling Date : August 24, 2024
Sampling Time : 11:12
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-010
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAR816
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Temperature	°C	Certified Thermometer	-	31.8	n'	n'
pH	-	Electrometric	-	8.1	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	2.6	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	7.8	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	330	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	78	4,000	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.009	0.1	0.1
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	<0.005	0.1	0.1
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	1.2	1.0	1.0
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.06	1.0	1.0
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3]	0.005[3]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.003	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	<0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0016	0.01	0.01
Barium	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.01	0.08	-	-
Iron	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.1	2.3	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	269	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	177	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	39	-	-

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Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : SW1.7 : คลองส่งน้ำชลประทาน (3) บ้านบึงม่วง หมู่ที่ 11 ตำบลหนองหลวง อำเภอลานกระบือ จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0582266 E, 1843395 N
Sampling Date : August 24, 2024
Sampling Time : 11:12
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor
Quotation No. : AR2024-00462
Analysis No. : 2024-AE212-010
Received Date : August 27, 2024
Analytical Date : August 27-September 16, 2024
Report No. : 2024-RAAR816
Report Date : September 16, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2]	
					Class 3	Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hycrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
[3] When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 82 mg/l)
n' = naturally bit changing not more than 3°C

[redacted]
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : SW1.8 : คลองส่งน้ำชลประทาน (4) บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองไม้แดง จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583367 E, 1843003 N
Sampling Date : August 29, 2024
Sampling Time : 15:03
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE299-001
Received Date : September 2, 2024
Analytical Date : September 2-20, 2024
Report No. : 2024-RAAS084
Report Date : September 23, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2] Class 3	Standard[2] Class 4
Temperature	°C	Certified Thermometer	-	31.9	n[3]	n[3]
pH	-	Electrometric	-	8.3	5.0-9.0	5.0-9.0
Dissolved Oxygen	mg/L	Azide Modification	1.0	1.6	≥4.0	≥2.0
Biochemical Oxygen Demand	mg/L	5-Day BOD Test, Membrane Electrode	1.0	5.6	2.0	4.0
Total Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	92,000	20,000	-
Fecal Coliform Bacteria	MPN/100 mL	Most Probable Number	1.8	24,000	4,000	-
Copper	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.022	0.1	0.1
Nickel	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	0.021	0.1	0.1
Manganese	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.005	1.5	1.0	1.0
Zinc	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.01	0.10	1.0	1.0
Cadmium	mg/L	Digestion, Inductively Coupled Plasma (ICP-OES)	0.003	<0.003	0.005[3]	0.005[3]
Chromium Hexavalent	mg/L	Filtration, Colorimetric	0.005	<0.005	0.05	0.05
Lead	mg/L	Digestion, Electrothermal Atomic Absorption Spectrometry	0.001	0.030	0.05	0.05
Mercury	mg/L	Digestion, Cold-Vapor Atomic Absorption Spectrometry	0.0005	0.0005	0.002	0.002
Arsenic	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	0.0014	0.01	0.01
Barium	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.01	0.27	-	-
Iron	mg/L	Digestion, Inducively Coupled Plasma (ICP-OES)	0.1	26	-	-
Selenium	mg/L	Digestion, Hydride Generation Atomic Absorption Spectrometry	0.0002	<0.0002	-	-
Conductivity	µs/cm	Electrical Conductivity Meter	0.1	204	-	-
Oil and Grease	mg/L	Liquid-Liquid Partition, Gravimetric	1.0	<1.0	-	-
Salinity	ppt	Electrical Conductivity Meter	0.1	0.1	-	-
Total Dissolved Solids	mg/L	Dried at 180°C	50	154	-	-
Total Suspended Solids	mg/L	Dried at 103-105°C	5.0	573	-	-

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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Sampling Source : Surface Water Sampling
Sampling Point : **ฐานหลุมผลิต BM6 : SW1.8 : คลองส่งน้ำชลประทาน (4) บ้านบึงมาลย์ หมู่ที่ 4 ตำบลหนองไม้แดง จังหวัดกำแพงเพชร**
GPS. Coordinate : UTM (WGS84) 47Q 0583367 E, 1843003 N
Sampling Date : August 29, 2024
Sampling Time : 15:03
Sampling Method : Grab
Sampling By : Mr.Suchapong Rungrueang
Analyzed By : Environment Research & Technology Co., Ltd.
Physical Properties : Turbid, Light Yellow, Sediment, Odor

Quotation No. : AR2024-00462
Analysis No. : 2024-AE299-001
Received Date : September 2, 2024
Analytical Date : September 2-20, 2024
Report No. : 2024-RAAS084
Report Date : September 23, 2024

Parameter	Unit	Method of Analysis[1]	MRL	Result	Standard[2] Class 3	Standard[2] Class 4
Benzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Ethylbenzene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Toluene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	1.0	<1.0	-	-
Total Xylene	µg/L	Purge and Trap, Gas Chromatographic Mass Spectrometric (GC-MS)	3.0	<3.0	-	-
TPH (Gasoline Range Hydrocarbons; C_6-C_9)	mg/L	Purge and Trap, Gas Chromatographic (GC-FID)	0.040	<0.040	-	-
TPH (Kerosene Range Hydrocarbons; C_{10}-C_{14})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Diesel Range Hycrocarbons; C_{15}-C_{28})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-
TPH (Heavy Oil Range Hydrocarbons; C_{29}-C_{36})	mg/L	Liquid-Liquid Extraction, Gas Chromatographic (GC-FID)	0.020	<0.020	-	-

Remark : [1] Standard Method for Examination of Water and Wastewater, 24th Edition, 2023.
[2] Notification of the National Environment Board, No.8, B.E.2537 (1994), issued under the Enhancement and Conservation of National Environmental Quality Act B.E.2535 (1992), published in the Royal Government Gazette No.111 Part 16, dated February 24, B.E.2537 (1994). (Standard Value of Surface Water for Class 3, 4)
[3] When water hardness not more than 100 mg/l as $CaCO_3$ (Hardness as $CaCO_3$ is 63 mg/l)
n[3] = naturally bit changing not more than 3°C

[redacted]
(Ms.Yawaluee Na Ranong)
Laboratory Reviewer

[redacted]
(Mr.Virat Hemvannanukul)
Laboratory Supervisor

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Page 1/2
F-RP-026 Rev. 05, January 18, 2021



บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม
โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ
และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง.6
สภาพแวดล้อมในการทำงาน

ความร้อนภายในฐานหลุมผลิต

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ANALYSIS REPORT

Customer Name :Vision E. Consultants Co., Ltd.
Address :101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name :โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location :จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source :Work Place Air Temperature
Measured Date :August 22, 2024
Measured By :Mr.Wadcharapong Phunkhetkit
Analyzed By :Environment Research & Technology Co., Ltd.
Measured Instrument :Heat Stress Monitor/Electronic Metrosonics Model hs-32 Serial Number MCD070019

Quotation No. : AR2024-00462
Analysis No. : 2024-AE192-007
Report No. : 2024-RAAR740
Report Date : September 4, 2024

Measured Location	Employee Name	Duration	Measurement Temperature; °C					Job Description/ Activities	Work Load, WL			Standard[2]
			T_{NWB}	T_{DB}	T_{GT}	WBGT	WBGT[1] (Avg.)		Metabolic Rate (Kcal/hr)	Metabolic Rate Average (Kcal/hr)	Workload Rate	
BM 3 Injection Pump (Beam Pump) (Outdoor)	คุณพิษณุ แป้นจันทร์	10:30-12:30	27.7	33.2	49.1	32.5	**32.5**	ตรวจสอบเกจ์และวาล์ว		138.0	Light	**34.0**
								- เดินบนพื้นราบ	60.0			
								สังเกตการทำงานของเครื่องจักร				
								- ยืน	18.0			
		-	-	-	-	-		การเผาผลาญพื้นฐานของร่างกาย	60.0			

Remark : T_{NWB} = Nature Wet Bulb Temperature, T_{DB} = Dry Bulb Temperature, T_{GT} = Globe Temperature, WBGT = Wet Bulb Globe Temperature Index.
[1] Calculate by ((WBGT$_1$ x Time$_1$)+(WBGT$_2$ x Time$_2$)+...+(WBGTn x Timen)) / (Time$_1$ + Time$_2$ +...+Timen)
[2] Ministerial Regulation of the Ministry of Labour, B.E.2559 (2016), published in the Royal Government Gazette No.133, Part 91A dated October 17, B.E.2559 (2016).

[redacted]

(Ms.Thidarat Pukkha)
Laboratory Reviewer

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(Ms.Thanida Bunrungrueang)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name :Vision E. Consultants Co., Ltd.
Address :101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name :โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location :จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source :Work Place Air Temperature
Measured Date :August 22, 2024
Measured By :Mr.Wadcharapong Phunkhetkit
Analyzed By :Environment Research & Technology Co., Ltd.
Measured Instrument :Heat Stress Monitor/Electronic Quest Technologies Model QT-32 Serial Number TPG030012

Quotation No. : AR2024-00462
Analysis No. : 2024-AE192-008
Report No. : 2024-RAAR741
Report Date : September 4, 2024

Measured Location	Employee Name	Duration	Measurement Temperature; °C					Job Description/ Activities	Work Load, WL			Standard[2]
			T_{NWB}	T_{DB}	T_{GT}	WBGT	WBGT[1] (Avg.)		Metabolic Rate (Kcal/hr)	Metabolic Rate Average (Kcal/hr)	Workload Rate	
BM 3 Separator (Outdoor)	คุณศราวุธ ฮู่เทศ	10:32-12:32	28.4	32.8	48.9	32.9	**32.9**	โหลดน้ำมัน		141.0	Light	**34.0**
								- ยืน ทำงานด้วยแขนทั้ง 2 ข้าง (เบา)	63.0			
								สังเกตการทำงานของเครื่องจักร				
								- ยืน	18.0			
		-	-	-	-	-		การเผาผลาญพื้นฐานของร่างกาย	60.0			

Remark : T_{NWB} = Nature Wet Bulb Temperature, T_{DB} = Dry Bulb Temperature, T_{GT} = Globe Temperature, WBGT = Wet Bulb Globe Temperature Index.
[1] Calculate by ((WBGT$_1$ x Time$_1$)+(WBGT$_2$ x Time$_2$)+...+(WBGTn x Timen)) / (Time$_1$ + Time$_2$ +...+Timen)
[2] Ministerial Regulation of the Ministry of Labour, B.E.2559 (2016), published in the Royal Government Gazette No.133, Part 91A dated October 17, B.E.2559 (2016).

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(Ms.Thanida Bunrungrueang)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name :Vision E. Consultants Co., Ltd.
Address :101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name :โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location :จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source :Work Place Air Temperature
Measured Date :August 22, 2024
Measured By :Mr.Wadcharapong Phunkhetkit
Analyzed By :Environment Research & Technology Co., Ltd.
Measured Instrument :Heat Stress Monitor/Electronic Metrosonics Model hs-32 Serial Number MCB110008

Quotation No. : AR2024-00462
Analysis No. : 2024-AE192-009
Report No. : 2024-RAAR742
Report Date : September 4, 2024

Measured Location	Employee Name	Duration	Measurement Temperature; °C					Job Description/ Activities	Work Load, WL			Standard[2/]
			T_{NWB}	T_{DB}	T_{GT}	WBGT	WBGT[1/] (Avg.)		Metabolic Rate (Kcal/hr)	Metabolic Rate Average (Kcal/hr)	Workload Rate	
BMS 2 Injection Pump (Beam Pump) (Outdoor)	คุณพิสิษฐ์ แป้นจันทร์	11:04-13:04	28.2	32.4	51.1	33.2	**33.2**	ตรวจสอบเกจ์และวาล์ว		138.0	Light	**34.0**
								- เดินบนพื้นราบ	60.0			
								สังเกตการทำงานของเครื่องจักร				
								- ยืน	18.0			
		-	-	-	-	-		การเผาผลาญพื้นฐานของร่างกาย	60.0			

Remark : T_{NWB} = Nature Wet Bulb Temperature, T_{DB} = Dry Bulb Temperature, T_{GT} = Globe Temperature, WBGT = Wet Bulb Globe Temperature Index.
1/ Calculate by $((WBGT_1 \times Time_1)+(WBGT_2 \times Time_2)+...+(WBGTn \times Timen)) / (Time_1 + Time_2 +...+Timen)$
2/ Ministerial Regulation of the Ministry of Labour, B.E.2559 (2016), published in the Royal Government Gazette No.133, Part 91A dated October 17, B.E.2559 (2016).

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(Ms.Thidarat Pukkha)
Laboratory Reviewer

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(Ms.Thanida Bunrungrueang)
Laboratory Supervisor

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ANALYSIS REPORT

Customer Name :Vision E. Consultants Co., Ltd.
Address :101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name :โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location :จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source :Work Place Air Temperature
Measured Date :August 22, 2024
Measured By :Mr.Wadcharapong Phunkhetkit
Analyzed By :Environment Research & Technology Co., Ltd.
Measured Instrument :Heat Stress Monitor/Electronic Metrosonics Model hs-32 Serial Number MCH110038

Quotation No. : AR2024-00462
Analysis No. : 2024-AE192-010
Report No. : 2024-RAAR743
Report Date : September 4, 2024

Measured Location	Employee Name	Duration	Measurement Temperature; °C					Job Description/ Activities	Work Load, WL			Standard[2/]
			T_{NWB}	T_{DB}	T_{GT}	WBGT	WBGT[1/] (Avg.)		Metabolic Rate (Kcal/hr)	Metabolic Rate Average (Kcal/hr)	Workload Rate	
BMS 2 Loading Station (Indoor)	คุณสาทุพงษ์ สิงห์สุวรรณ	11:10-13:10	27.2	32.4	38.1	30.5	**30.5**	โหลดน้ำมัน		141.0	Light	**34.0**
								- ยืน ทำงานด้วยแขนทั้ง 2 ข้าง (เบา)	63.0			
								สังเกตการทำงานของเครื่องจักร				
								- ยืน	18.0			
		-	-	-	-	-		การเผาผลาญพื้นฐานของร่างกาย	60.0			

Remark : T_{NWB} = Nature Wet Bulb Temperature, T_{DB} = Dry Bulb Temperature, T_{GT} = Globe Temperature, WBGT = Wet Bulb Globe Temperature Index.
1/ Calculate by $((WBGT_1 \times Time_1)+(WBGT_2 \times Time_2)+...+(WBGTn \times Timen)) / (Time_1 + Time_2 +...+Timen)$
2/ Ministerial Regulation of the Ministry of Labour, B.E.2559 (2016), published in the Royal Government Gazette No.133, Part 91A dated October 17, B.E.2559 (2016).

[redacted]

(Ms.Thidarat Pukkha)
Laboratory Reviewer

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(Ms.Thanida Bunrungrueang)
Laboratory Supervisor

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F-RP-012 Rev. 05, January 18, 2021

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ANALYSIS REPORT

Customer Name :Vision E. Consultants Co., Ltd.
Address :101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name :โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location :จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source :Work Place Air Temperature
Measured Date :August 22, 2024
Measured By :Mr.Wadcharapong Phunkhetkit
Analyzed By :Environment Research & Technology Co., Ltd.
Measured Instrument :Heat Stress Monitor/Electronic Metrosonics Model hs-32 Serial Number MCB030005

Quotation No. : AR2024-00462
Analysis No. : 2024-AE192-011
Report No. : 2024-RAAR744
Report Date : September 4, 2024

Measured Location	Employee Name	Duration	Measurement Temperature; °C					Job Description/ Activities	Work Load, WL			Standard[2/]
			T_{NWB}	T_{DB}	T_{GT}	WBGT	WBGT[1/] (Avg.)		Metabolic Rate (Kcal/hr)	Metabolic Rate Average (Kcal/hr)	Workload Rate	
BMS 2 บ๊อม รปภ. (Indoor)	คุณประดิษฐ์ มุกดา	11:15-13:15	18.5	25.2	27.2	21.1	**21.1**	บันทึกข้อมูล		102.0	Light	**34.0**
								- นั่ง ทำงานด้วยมือ (เบา)	42.0			
		-	-	-	-	-	-	การเผาผลาญพื้นฐานของร่างกาย	60.0			

Remark : T_{NWB} = Nature Wet Bulb Temperature, T_{DB} = Dry Bulb Temperature, T_{GT} = Globe Temperature, WBGT = Wet Bulb Globe Temperature Index.
1/ Calculate by $((WBGT_1 \times Time_1)+(WBGT_2 \times Time_2)+...+(WBGT_n \times Time_n)) / (Time_1 + Time_2 +...+Time_n)$
2/ Ministerial Regulation of the Ministry of Labour, B.E.2559 (2016), published in the Royal Government Gazette No.133, Part 91A dated October 17, B.E.2559 (2016).

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2 Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Work Place Light Intensity
Measured Date : August 22, 2024
Measured Time : 08:55 - 08:56
Measured By : Mr.Wadcharapong Phunkhetkit (Personnel of Environment Research & Technology Co., Ltd.)
Measured Instrument : Lux Meter, DIGICON Model LX-73 Serial Number Q961815
Reported Number : LIC008/2567

Item	Measured Location	Type of Work	Light Intensity; LUX		Condition
			Result	Standard 1/	
1	BMS 2 บริเวณป้อมยาม (โต๊ะทำงานคุณประดิษฐ์ มุกดา)	บันทึกข้อมูลผู้มาติดต่อ	417	300 - 400	-

Remark : 1/ The Announcement of the Department of Labour Protection and Welfare, issued under the Labour Ministerial Regulation, B.E.2559 (2016), published in the Royal Government Gazette Volume 135 Special Part 39D dated February 21, B.E.2561 (2018).

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Work Place Noise
Measured Date : August 22, 2024
Measured By : Mr.Wadcharapong Phunkhetkit
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : Integrating Sound Level Meter RION Model NL-42 Serial Number 01085956

Quotation No. : AR2024-00462
Analysis No. : 2024-AE192-001
Report No. : 2024-NH-001
Report Date : September 4, 2024

Measured Location/ Employee Name	Interval Time	Equivalent Level; dB(A)	Maximum Level; dB(A)	Standard
BM 3 Injection Pump (Beam Pump) (คุณทิษณุ แป้นจันทร์)	08:10 - 09:10	56.7	70.6	-
	09:10 - 10:10	56.4	60.5	-
	10:10 - 11:10	56.9	64.8	-
	11:10 - 12:10	56.7	66.1	-
	12:10 - 13:10	55.3	59.1	-
	13:10 - 14:10	56.7	62.7	-
	14:10 - 15:10	57.0	71.0	-
	15:10 - 16:10	55.4	67.8	-
	Equivalent Level 8 hrs (Leq 8 hrs)	**56.4**		**-**
	Time Weighted Average (TWA_{8hrs})[1/]	**56**		**85[2/]**
	Maximum Level (Lmax)	**71.0**		**115[3/]**

Remark : [1/] Calculates the Case of Employees Working in this Area throughout the Work Period.
[2/] The Announcement of the Department of Labour Protection and Welfare, issued under the Labour Ministerial Regulation, B.E.2559 (2016), published in the Royal Government Gazette Volume 135 Special Part 19D dated January 26, B.E.2561 (2018) and published in the Royal Government Gazette Volume 135 Special Part 57D dated March 12, B.E.2561 (2018).
[3/] Ministerial Regulation of the Ministry of Labour, B.E.2559 (2016), published in the Royal Government Gazette No.133, Part 91A datec October 17, B.E.2559 (2016).

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Work Place Noise
Measured Date : August 22, 2024
Measured By : Mr.Wadcharapong Phunkhetkit
Analyzed By : Environment Research & Technology Co., Ltd.
Measured Instrument : Integrating Sound Level Meter RION Model NL-42 Serial Number 00221384

Quotation No. : AR2024-00462
Analysis No. : 2024-AE192-002
Report No. : 2024-NH-002
Report Date : September 4, 2024

Measured Location/ Employee Name	Interval Time	Equivalent Level; dB(A)	Maximum Level; dB(A)	Standard
BMS 2 Injection Pump (Beam Pump) (คุณเกานุพงษ์ สิงห์สุวะรณ)	08:40 - 09:40	63.2	75.5	-
	09:40 - 10:40	62.7	68.7	-
	10:40 - 11:40	62.5	71.7	-
	11:40 - 12:40	62.4	68.0	-
	12:40 - 13:40	62.4	72.9	-
	13:40 - 14:40	62.6	78.3	-
	14:40 - 15:40	62.7	75.2	-
	15:40 - 16:40	62.7	70.3	-
	Equivalent Level 8 hrs (Leq 8 hrs)	**62.7**		**-**
	Time Weighted Average (TWA_{8hrs})[1/]	**62**		**85[2/]**
	Maximum Level (Lmax)	**78.3**		**115[3/]**

Remark : [1/] Calculates the Case of Employees Working in this Area throughout the Work Period.
[2/] The Announcement of the Department of Labour Protection and Welfare, issued under the Labour Ministerial Regulation, B.E.2559 (2016), published in the Royal Government Gazette Volume 135 Special Part 19D dated January 26, B.E.2561 (2018) and published in the Royal Government Gazette Volume 135 Special Part 57D dated March 12, B.E.2561 (2018).
[3/] Ministerial Regulation of the Ministry of Labour, B.E.2559 (2016), published in the Royal Government Gazette No.133, Part 91A dated October 17, B.E.2559 (2016).

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Page 1/1
F-RP-014 Rev. 06, January 18, 2021

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ANALYSIS REPORT

Customer Name : Vision E. Consultants Co., Ltd.
Address : 101/22 Moo 2, Soi Maneeya Soi 3, Sai Ma, Mueang Nonthaburi, Nonthaburi 11000
Project Name : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)
Project Location : จังหวัดสุโขทัย และจังหวัดกำแพงเพชร
Measured Source : Personal Noise Dose
Measured By : Mr.Wadcharapong Phunkhetkit
Analyzed By : Environment Research & Technology Co., Ltd.

Quotation No. : AR2024-00462
Analysis No. : 2024-AE192
Report No. : 2024-ND-001
Report Date : September 4, 2024

Item	Measured Location	Employee Name	Working Time		Measured Date	Measured Time		Serial Number of Noise Dosimeter	Summary of Measurement Results[1/]	
			Interval Time	Period (Hr)		Interval Time	Period (Hr)		Project Dose (%)	Time Weighted Average 8 hrs (dB(A))
	BM 3									
1	พนักงานประจำฐาน	คุณพิชญ์ แป้นจันทร์	07:00 - 17:00	9.00	Aug 22, 24	08:18 – 15:55	7.37	170400043	10.40	75
2	พนักงานประจำฐาน	คุณเศรวุธ ภู่เทศ	07:00 - 16:00	8.00	Aug 22, 24	08:25 – 15:56	7.31	190800276	5.60	72
	BMS 2									
3	Loading Station	คุณภานุพงษ์ สิงห์สุวรรณ	07:00 - 17:00	9.00	Aug 22, 24	08:50 – 16:11	7.21	190800266	0.35	60
4	พนักงานประจำฐาน	คุณทิสิษฐ์ แป้นจันทร์	07:00 - 17:00	9.00	Aug 22, 24	08:52 – 16:13	7.21	190600234	2.40	68
Standard[2/]									100	85

Remark : 1/ Using 3 dB Energy Exchange Rate, Slow Response, 85 dB Criteria Level, 80 dB Threshold Level.
2/ The Announcement of the Department of Labour Protection and Welfare, issued under the Labour Ministerial Regulation, B.E.2559 (2016), published in the Royal Government Gazette Volume 135 Special Part 19D dated January 26, B.E.2561 (2018) and published in the Royal Government Gazette Volume 135 Special Part 57D dated March 12, B.E.2561 (2018).

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บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง.7
เอกสารขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์



ที่ อก ๐๓๑๐(๑)/๗ ๓ ๒๕

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๙ กรกฎาคม ๒๕๖๔

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๓๐ มีนาคม ๒๕๖๔

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒ รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ แผ่น
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๙๙ สถานที่ตั้งเลขที่ ๒๕/๑๑๔ หมู่ที่ ๖ ซอยชินเขต ๑ ถนนงามวงศ์วาน แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๔๙ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๒๗ รายการ น้ำใต้ดิน จำนวน ๕๘ รายการ อากาศเสีย จำนวน ๒๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๒๐ รายการ และ ดิน จำนวน ๕๖ รายการ รวมทั้งสิ้นจำนวน ๑๘๗ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๘ พฤษภาคม ๒๕๖๗ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

[redacted]

(นายจันทร์ เดชะครรชิตา)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๒๐๒ ๔๐๐๒ ๐ ๒๒๐๒ ๔๑๔๖
โทรสาร ๐ ๒๓๕๔ ๓๔๑๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๙๙
ที่ อก ๐๓๑๐(๑)/๗๓๒๕ ลงวันที่ ๒๙ กรกฎาคม ๒๕๖๔

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖ ราย

๑) นางสาวปณิชา พรมชัย	ทะเบียนเลขที่ ว-๐๙๙-ค-๒๔๑๔
๒) นางณัฐรดา เลี้ยงรักษา	ทะเบียนเลขที่ ว-๐๙๙-ค-๓๐๐๒
๓) นายมงคล บูรภักดิ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๕๕๐๐
๔) นางสาวธนิดา บุญรุ่งเรือง	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๐๒๓
๕) นางสาวรมิตา แตงไทย	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๖๖๔
๖) นางสาวไรวินทร์ โพธิ์สิทธิ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๖๖๕
๗) นางสาวณัฐนิชา เสริมมติวงศ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๖๖๖
๘) นายนพสิทธิ์ ทวีพรประดิษฐ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๖๖๗
๙) นางสาวธิดารัตน์ ปุกคะ	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๑
๑๐) นายอภิชาติ พูลพล	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๒
๑๑) นายนิทัศน์ ศิริชาติ	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๓
๑๒) นายสุทธิชาญ สังข์ทอง	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๔
๑๓) นางสาวยุวดี ณ ระนอง	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๕
๑๔) นางสาววาสนา ขันเงิน	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๖
๑๕) นางสาวสุภาวรรณ สุวรรณภา	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๗
๑๖) นางสาวนภาจรัส หมื่นวงษ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๘

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอ็นไวรอนเมน์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๙๙
ที่ อก ๐๓๑๐(๑)/ ลงวันที่

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๔๙ ราย

๑) นางสาวเปรมาตี ปุรีโธสง ทะเบียนเลขที่ ว-๐๙๙-จ-๕๔๐๒
๒) นางสาวจิตตวรรณ ลิ้มสมบูรณ์ ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๒๖
๓) นางสาวธนัชพร คนแรง ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๒๙
๔) นางสาวสุดารัตน์ เขจรรักษ์ ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๓๗
๕) นางสาววลิตา โพธิ์เจริญ ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๔๒
๖) นางสาวรัชนีวรรณ ภูประเสริฐ ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๔๔
๗) นายภาณุพล โพธิ์แดง ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๔๕
๘) นายวันชนะ สีหามาตร ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๐
๙) นายโสพล ป้อยแก้ว ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๔
๑๐) นายอภิวัฒน์ ชำนาญเวช ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๖
๑๑) นางสาวอชิรญาณัฐ อ่อนน้อม ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๑
๑๒) นายวัชรางกูร กองแสง ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๒
๑๓) นางสาวสุธาทิพย์ อิ่มน้อย ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๓
๑๔) นายชยณัฐ บุญก้านตง ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๕
๑๕) นางสาวพิชาดา เขียวนรภัย ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๖
๑๖) นางสาวสายใจ ลาดบัวขาว ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๐
๑๗) นางสาวรัตนาภรณ์ วงศ์ประโคน ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๒
๑๘) นางสาวจารุวรรณ แป้นจำนงค์ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๓
๑๙) นางสาวชมพูนุท กสิชีวิน ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๕
๒๐) นางสาวรวีวรรณ สุขารมย์ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๖
๒๑) นางสาวนัฐภรณ์ กันสุข ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๗
๒๒) นางสาวอรอนงค์ นวนนุ่ม ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๘
๒๓) นางสาวสรวรรณ พุฒพันมาต ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๙
๒๔) นางสาวกัญญาลักษณ์ กระทาง ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๑
๒๕) นางสาวปิยธิดา ประแดงโค ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๓
๒๖) นางสาวปวิตรา นาเหล็ก ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๔
๒๗) นางสาวชนิดา นิลผาย ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๕
๒๘) นางสาวพิยะดา จารุไชย ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๖
๒๙) นางสาวทักษพร ไกรสิงห์ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๗
๓๐) นางสาวฉวีวรรณ บุญจันทึก ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๘
๓๑) นางสาวเบญจวรรณ คำหงษา ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๙
๓๒) นางสาวพัชชา แก้วย้อย ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๐
๓๓) นางสาวณัฐชา ส้มฤทธิ์ดี ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๑
๓๔) นางสาวอังคนา อุ่นตา ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๓
๓๕) นางสาวบุศดี มุภาษา ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๔

๓๖) นายรอมซี...

๓๖) นายรอมซี กาเต๊ะ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๕
๓๗) นายสุริยะ ชูทอง ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๖
๓๘) นายศักรินทร์ นิภานันท์ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๗
๓๙) นายอภิเดช ยาสมดี ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๘
๔๐) นายฉันทวิชญ์ เหลาภูล ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๙
๔๑) นายศิวาวุธ ธรรมนิทา ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๐
๔๒) นายนัฐพล สุทธิมล ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๑
๔๓) นายอาทิตย์ นุชบุษบา ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๒
๔๔) นายอนุวัฒน์ เรืองอ่อน ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๔
๔๕) นายฉัตรชัย โยวะผุย ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๕
๔๖) นายกลยุทธ์ อินทร์คำ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๗
๔๗) นางสาวนันทชา เนื้อนวล ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๘
๔๘) นางสาวพิไลวรรณ แปงทา ทะเบียนเลขที่ ว-๐๙๙-จ-๙๕๒๑
๔๙) นางสาวจารุวรรณ กระจ่างพันธุ์ ทะเบียนเลขที่ ว-๐๙๙-จ-๙๕๒๒

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๔๙
ที่ อก ๐๓๑๐(๔)/ ลงวันที่

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๘๗ รายการ

น้ำเสีย จำนวน 27 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[3]
		2) Digestion, Inductively Coupled Plasma Method[3]
2	Barium	Digestion, Inductively Coupled Plasma Method[3]
3	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method[3]
		2) 5-Day BOD Test, Membrane Electrode Method[3]
4	Cadmium	Digestion, Inductively Coupled Plasma Method[3]
5	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method[3]
6	Chromium	Digestion, Inductively Coupled Plasma Method[3]
7	Color	ADMI Weighted-Ordinate Spectrophotometric Method[3]
8	Copper	Digestion, Inductively Coupled Plasma Method[3]
9	Cyanide	Distillation, Colorimetric method[3]
10	Formaldehyde	Distillation, Colorimetric Method[2]
11	Free Chlorine	1) Iodometric Method[3]
		2) DPD Colorimetric Method[3]
12	Hexavalent Chromium	Colorimetric Method[3]
13	Lead	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method[3]
		2) Digestion, Inductively Coupled Plasma Method[3]
14	Manganese	Digestion, Inductively Coupled Plasma Method[3]
15	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[3]
16	Nickel	Digestion, Inductively Coupled Plasma Method[3]
17	Oil & Grease	Liquid-Liquid, Partition-Gravimetric Method[3]
18	pH	Electrometric Method[3]
19	Phenols	Distillation, Direct Photometric Method[3]
20	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[3]
		2) Digestion, Inductively Coupled Plasma Method[3]
21	Sulfide	Iodometric method[3]

[redacted]

(นางวิภาญจน์ ฉัตรสกุลวิไล)
ผู้อำนวยการสถูมมาตรฐานวิธีการวิเคราะห์ทดลองและเสริม
และทะเบียนห้องปฏิบัติการ

22 Temperature...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
22	Temperature	Laboratory and Field Methods[3]
23	Total Dissolved Solids	Dried at 180 °C[3]
24	Total Kjeldahl Nitrogen	1) Macro Kjeldahl Method[3]
		2) Semi-Micro Kjeldahl Method[3]
25	Total Suspended Solids	Dried at 103-105 °C[3]
26	Trivalent Chromium	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[3]
27	Zinc	Digestion, Inductively Coupled Plasma Method[3]

น้ำใต้ดิน จำนวน 58 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acetone	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method[3]
2	Antimony	Digestion, Inductively Coupled Plasma Method[3]
3	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[3]
		2) Digestion, Inductively Coupled Plasma Method[3]
4	Barium	Digestion, Inductively Coupled Plasma Method[3]
5	Benzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
6	Beryllium	Digestion, Inductively Coupled Plasma Method[3]
7	Bromodichloromethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
8	Bromoform	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
9	Cadmium	Digestion, Inductively Coupled Plasma Method[3]
10	Carbon Disulfide	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
11	Carbon Tetrachloride	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
12	Chlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
13	Chlorodibromomethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]

[redacted]

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14 Chloroform...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Chloroform	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
15	Chromium	Digestion, Inductively Coupled Plasma Method[3]
16	Chromium (III)	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[3]
17	Chromium (VI)	Colorimetric Method[3]
18	Cyanide	Colorimetric Method[3]
19	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
20	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[[3]
21	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
22	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
23	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
24	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
25	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
26	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
27	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
28	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
29	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
30	Ethylbenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
31	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]

[redacted]

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32 Lead...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
32	Lead	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method[3] 2) Digestion, Inductively Coupled Plasma Method[3]
33	Manganese	Digestion, Inductively Coupled Plasma Method[3]
34	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[3]
35	Methyl Bromide	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
36	Methylene Chloride	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
37	Methyl Tert-Butyl Ether	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
38	Naphthalene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
39	Nickel	Digestion, Inductively Coupled Plasma Method[3]
40	pH	Electrometric method[3]
41	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[3] 2) Digestion, Inductively Coupled Plasma Method[3]
42	Silver	Digestion, Inductively Coupled Plasma Method[3]
43	Styrene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
44	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
45	Tetrachloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
46	Toluene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
47	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
48	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
49	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]

[redacted]

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50 Trichloroethylene..

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
50	Trichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
51	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
52	Vanadium	Digestion, Inductively Coupled Plasma Method[3]
53	Vinyl Chloride	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
54	m-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
55	o-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
56	p-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
57	Xylene (Total)	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
58	Zinc	Digestion, Inductively Coupled Plasma Method[3]

<u>อากาศเสีย (ปล่องระบาย) จำนวน 26 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
2	Arsenic	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
3	Beryllium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
4	Cadmium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
5	Carbon Monoxide	Instrumental Analyzer Method[4]
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method[4] 2) Isokinetic Sampling, Ion Chromatographic Method[4]

[redacted]

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ปฏิบัติราชการแทนเลขาธิการสำนักงานปลัดกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
7	Chromium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
8	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
9	Copper	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
10	Dioxin/Furans	Isokinetic Sampling[4]
11	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method[4] 2) Isokinetic Sampling, Ion Chromatographic Method[4]
12	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method[4] 2) Isokinetic Sampling, Ion Chromatographic Method[4]
13	Hydrogen Sulfide	Absorption Sampling, Iodometric Method[4]
14	Lead	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[4] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
15	Manganese	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
16	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4]
17	Nickel	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
18	Opacity	Ringelmann's Method[1]
19	Oxide of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method[4] 2) Instrumental Analyzer Method[4]
20	Selenium	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]

[redacted]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
21	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method[4] 2) Isokinetic Sampling, Barium-Thorin Titrimetric Method[4] 3) Instrumental Analyzer Method[4]
22	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method[4]
23	Tin	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
24	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method[4]
25	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
26	Xylene	Adsorption Sampling, Gas Chromatographic Method[4]

<u>สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 20 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Digestion, Inductively Coupled Plasma Method[5,8]
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5,9] 2) Digestion, Inductively Coupled Plasma Method[5,8]
3	Barium	Digestion, Inductively Coupled Plasma Method[5,8]
4	Beryllium	Digestion, Inductively Coupled Plasma Method[5,8]
5	Cadmium	Digestion, Inductively Coupled Plasma Method[5,8]
6	Chromium	Digestion, Inductively Coupled Plasma Method[5,8]
7	Chromium (III)	Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colormetric Method; Calculation Method[5,6,8,10]
8	Chromium (VI)	Alkaline Digestion, Colormetric Method[6,10]
9	Cobalt	Digestion, Inductively Coupled Plasma Method[5,8]
10	Copper	Digestion, Inductively Coupled Plasma Method[5,8]
11	Lead	Digestion, Inductively Coupled Plasma Method[5,8]
12	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[11]
13	Molybdenum	Digestion, Inductively Coupled Plasma Method[5,8]
14	Nickel	Digestion, Inductively Coupled Plasma Method[5,8]

[redacted]

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15 pH...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	pH	Electrometric Method[14]
16	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5,12] 2) Digestion, Inductively Coupled Plasma Method[5,8]
17	Silver	Digestion, Inductively Coupled Plasma Method[5,8]
18	Thallium	Digestion, Inductively Coupled Plasma Method[5,8]
19	Vanadium	Digestion, Inductively Coupled Plasma Method[5,8]
20	Zinc	Digestion, Inductively Coupled Plasma Method[5,8]

<u>ดิน จำนวน 56 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
2	Antimony	Digestion, Inductively Coupled Plasma Method[5,8]
3	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5,9] 2) Digestion, Inductively Coupled Plasma Method[5,8]
4	Barium	Digestion, Inductively Coupled Plasma Method[5,8]
5	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
6	Beryllium	Digestion, Inductively Coupled Plasma Method[5,8]
7	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
8	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
9	Cadmium	Digestion, Inductively Coupled Plasma Method[5,8]
10	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
11	Carbon Tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
12	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
13	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]

[redacted]

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และทะเบียนห้องปฏิบัติการ

14 Chloroform...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
15	Chromium	Digestion, Inductively Coupled Plasma Method[5,8]
16	Chromium (III)	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation Method[5,7,9,11]
17	Chromium (VI)	Alkaline Digestion, Colorimetric Method[7,11]
18	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
19	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
20	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
21	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
22	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
23	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
24	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
25	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
26	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
27	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
28	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
29	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
30	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
31	Lead	Digestion, Inductively Coupled Plasma Method[5,8]
32	Manganese	Digestion, Inductively Coupled Plasma Method[5,8]
33	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[1:]

[redacted]

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34 Methyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
34	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
35	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
36	Methyl Tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
37	Naphthalene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
38	Nickel	Digestion, Inductively Coupled Plasma Method[5,8]
39	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5,12] 2) Digestion, Inductively Coupled Plasma Method[5,8]
40	Silver	Digestion, Inductively Coupled Plasma Method[5,8]
41	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
42	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
43	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
44	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
45	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
46	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
47	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
48	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
49	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
50	Vanadium	Digestion, Inductively Coupled Plasma Method[5,8]
51	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]

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52 m-Xylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
52	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
53	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
54	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
55	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
56	Zinc	Digestion, Inductively Coupled Plasma Method[5,8]

เอกสารอ้างอิง

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2. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. **คู่มือวิเคราะห์น้ำเสีย.** พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.

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ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
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ที่ อก ๐๓๑๐(๑)/ ๒๐๓๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๐ กุมภาพันธ์ ๒๕๖๕

เรื่อง เปลี่ยนแปลงสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๔ ธันวาคม ๒๕๖๔

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๙๙ สถานที่ตั้งเลขที่ ๒๕/๑๑๔ หมู่ที่ ๖ ซอยชินเขต ๑ ถนนงามวงศ์วาน แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพมหานคร ขอเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้วให้ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เพิ่มขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในดิน ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ที่ อก ๐๓๑๐(๑)/๗๓๒๕ ลงวันที่ ๒๙ กรกฎาคม ๒๕๖๔ คือในวันที่ ๑๘ พฤษภาคม ๒๕๖๗ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

[redacted]

(นางจินดา เตชะศรินทร์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕ โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์
บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๙๙
ที่ อก ๐๓๑๐(๑)/ ๒๐๓๙ ลงวันที่ ๑๐ กุมภาพันธ์ ๒๕๖๕

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓ รายการ

ดิน จำนวน 3 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	TPH ($C_5 - C_8$)	Purge and Trap, Gas Chromatographic Method[2,3]
2	TPH ($C_{>8} - C_{16}$)	Ultrasonic Extraction, Gas Chromatographic Method[1,3]
3	TPH ($C_{>16} - C_{35}$)	Ultrasonic Extraction, Gas Chromatographic Method[1,3]

เอกสารอ้างอิง

1. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Ultrasonic Extraction. SW-846 Method 3550C**, 2007.

2. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Closed System Purge and Trap and Extraction for Volatile Organics in Soil and Waste Sample. SW-846 Method 5035A**, 2002.

3. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Nonhalogenated Organics Using GC/FID. SW-846 Method 8015D**, 200[redacted]

ที่ อก ๐๓๑๐(๑)/ ๑๑๕๖๗

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๔ สิงหาคม ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด

อ้างถึง ๑. คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๑ สิงหาคม ๒๕๖๕

๒. หนังสือบริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ลงวันที่ ๑๑ สิงหาคม ๒๕๖๕

ตามหนังสือที่อ้างถึง ๑ และ ๒ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๙๙ สถานที่ตั้งเลขที่ ๒๕/๑๑๔ หมู่ที่ ๖ ซอยชินเขต ๑ ถนนงามวงศ์วาน แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๙ ราย

๑) นายโสพล ป้อยแก้ว	ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๔
๒) นางสาวอชิรญาณัฐ อ่อนน้อม	ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๑
๓) นางสาวรัตนาภรณ์ วงศ์ประโคน	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๒
๔) นางสาวสรวรรณ พุฒพันมาต	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๙
๕) นางสาวพิยะดา จารุไชย	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๖
๖) นางสาวฉวีวรรณ บุญจันทึก	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๘
๗) นายศักรินทร์ นิภานันท์	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๗
๘) นายอภิเดช ยาสมดี	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๘
๙) นางสาวพิไลวรรณ แปงทา	ทะเบียนเลขที่ ว-๐๙๙-จ-๙๕๒๑

๒. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๕ ราย

๑) ว่าที่ร้อยตรีหญิงภัทรนันท์ วิจิตรศักดิ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๑
๒) นางสาวณัฏฐณิชา ขาวสุทธิ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๒
๓) นางสาวเพชราภรณ์ พงษ์พันธ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๓
๔) นางสาวพัทธนันท์ คำยา	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๔
๕) นางสาวสุธิดา ทองประภา	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๕
๖) นางสาวรมย์ชลี เดือนแร่รัมย์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๖
๗) นายจิรยุทธ์ สามารถ	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๗
๘) นายอัษฎา ไขยวงค์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๘
๙) นางสาวณัฐริสา บุญหนัก	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๙
๑๐) นางสาวสุพัตรา สุนทร	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๐

๑๑) นายพงศ์ปวีร์...

๑๑) นายพงศ์ปวีร์ สัตระ	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๑
๑๒) นายฤดม โชติกาญจน์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๒
๑๓) นางสาวพรทิพย์ อัมภรัตน์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๓
๑๔) นางสาวจันทนี บิติพัทธ์พงศ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๔
๑๕) นายอัครวัฒน์ คชบก	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๕

๓. ให้เปลี่ยนชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จากเดิมนางสาววาสนา ขันเงิน ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๖ เป็น นางสาวถิรณัฏฐ์ ขันเงิน

๔. ให้เปลี่ยนชื่อ-สกุลเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จากเดิมนางสาวเปรมวดี ปุรีโธสง ทะเบียนเลขที่ ว-๐๙๙-จ-๕๔๐๒ เป็น นางเตชินี สืบเสระ

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ที่ อก ๐๓๑๐(๑)/๗๓๒๕ ลงวันที่ ๒๙ กรกฎาคม ๒๕๖๔ คือในวันที่ ๑๘ พฤษภาคม ๒๕๖๗ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

[redacted]

(นางจินตา เตชะศรินทร์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



ที่ อก ๐๓๑๐(๑)/ ๑๑๙๔๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๗ สิงหาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๙ มิถุนายน ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด จำนวน ๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๙๙ สถานที่ตั้งเลขที่ ๒๕/๑๑๔ หมู่ที่ ๖ ซอยชินเขต ๑ ถนนงามวงศ์วาน แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ ราย

นางสาวถิรณัฏฐ์ ขันเงิน	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๖

๒. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๒ ราย

๑) นายอภิวัฒน์ ชำนาญเวช	ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๖
๒) นางสาวสายใจ ลาดบัวขาว	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๐
๓) นางสาวจารุวรรณ แป้นจำนงค์	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๓
๔) นางสาวนัฐภรณ์ กันสุข	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๗
๕) นางสาวชนิดา นิลผาย	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๕
๖) นางสาวบุศดี มุภาษา	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๔
๗) นายอาทิตย์ นุชบุษบา	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๒
๘) นางสาวจารุวรรณ กระจ่างพันธุ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๙๕๒๒
๙) ว่าที่ร้อยตรีหญิงภัทรนันท์ วิจิตรศักดิ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๑
๑๐) นางสาวรมย์ชลี เดือนแรัมย์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๖
๑๑) นายพงศ์ปวีร์ สัตระ	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๑
๑๒) นางสาวจันทนี ปิติพัทธ์พงศ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๔

๓. ให้เพิ่มขอบข่าย...

๓. ให้เพิ่มขอบข่ายสารมลพิษที่วิเคราะห์ในสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน คือในวันที่ ๑๘ พฤษภาคม ๒๕๖๗ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

[redacted]

(นายประสม ดำรงพงษ์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๙๙

ที่ อก ๐๓๑๐(๑)/ ๑ ๑ ๙ ๔ ๙ ลงวันที่ ๑ ๗ สิงหาคม ๒๕๖๖

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๘ รายการ

<u>สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 18 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
2	Barium	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
3	Beryllium	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
4	Cadmium	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
5	Chromium	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
6	Chromium (III)	Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation[1,2,3,4]
7	Chromium (VI)	Waste Extraction, Colorimetric Method[1,4]
8	Cobalt	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
9	Copper	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
10	Lead	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
11	Mercury	Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[1,2,5]
12	Molybdenum	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
13	Nickel	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
14	Selenium	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]

15 Silver...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Silver	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
16	Thallium	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
17	Vanadium	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]
18	Zinc	Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,2,3]

<u>เอกสารอ้างอิง</u>

1. กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2548. เรื่อง การกำจัดสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว.**ราชกิจจานุเบกษา**. 25 มกราคม 2549. เล่มที่ 123 ตอนพิเศษ 11ง.

2. United States Environmental Protection Agency. **Test Methods for Evaluation Solid Waste Physical/Chemical Methods. SW-846,** 1997.

3. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Inductively Coupled Plasma-Optical Emission Spectrometry. SW-846 Method 6010D,** 2018.

4. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Chromium, Hexavalent (Colorimetric). SW-846 Method 7196A**, 1992.

5. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Mercury in Liquid Waste (Manual Cold-Vapor Technique). SW-846 Method 7470A,** 1994.

คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน

วันที่ 24 เดือน เมษายน พ.ศ. 2567

เรียน อธิบดีกรมโรงงานอุตสาหกรรม

ข้าพเจ้า ☐ ผู้รับใบอนุญาตประกอบกิจการโรงงาน.....

☑ บริษัท/ห้างหุ้นส่วนจำกัด / บริษัทเอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด

กองวิจัยและเตือนภัยมลพิษโรงงาน
รับที่ 2410/67
วันที่ ๒๔ เม.ย. ๒๕๖๗
เวลา 13.26 น.

สถานที่ตั้งห้องปฏิบัติการ

เลขที่ 25/114 หมู่ที่ 6 ตรอก/ซอย ชินเขต 1 ถนน งามวงศ์วาน

ตำบล/แขวง ท่างสองห้อง อำเภอ/เขต หลักสี่ จังหวัด กรุงเทพมหานคร

รหัสไปรษณีย์ 10210 โทรศัพท์ 0-2954-7745-6 E-mail -

เลขทะเบียนห้องปฏิบัติการ 3-099

ได้รับทราบ ประกาศกรมโรงงานอุตสาหกรรม เรื่อง ห้องปฏิบัติการวิเคราะห์เอกชน พ.ศ. 2566 โดยตลอดแล้ว และยินยอมปฏิบัติตามประกาศฯ ทุกประการ และได้แนบเอกสารต่างๆ ตามรายการเอกสารประกอบการพิจารณา (แบบ ปอ.1-1) มาพร้อมนี้

รายการขอดำเนินการ

การดำเนินการ	จำนวนสารมลพิษ					
	น้ำเสีย/น้ำทิ้ง (รายการ)	น้ำใต้ดิน (รายการ)	อากาศ (รายการ)	สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว (รายการ)	ดิน (รายการ)	รวมทั้งสิ้น (รายการ)
☐ ขอขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน						
☑ ต่ออายุห้องปฏิบัติการวิเคราะห์เอกชน	32 รายการ	64 รายการ	33 รายการ	40 รายการ	58 รายการ	227 รายการ
☑ เปลี่ยนแปลงสารมลพิษที่วิเคราะห์ ∅ เพิ่มสารมลพิษ ○ ยกเลิกสารมลพิษ		4 รายการ		1 รายการ	1 รายการ	
☑ เปลี่ยนแปลงบุคลากร ∅ เพิ่มบุคลากร ∅ ยกเลิกบุคลากร	จำนวน 1 ราย (รายละเอียดตาม แบบ ปว.1) จำนวน 1 ราย (รายละเอียดตาม แบบ ปว.1-1)					
☐ ยกเลิกห้องปฏิบัติการวิเคราะห์เอกชน						
☐ อื่นๆ โปรดระบุ.....						

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ และทะเบียนห้องปฏิบัติการ
รับที่ ๒๐๕๘ /๖๗
วันที่ ๒๕ เม.ย. ๖๗
เวลา ๑๕.๐๐ น.

จึงเรียนมาเพื่อโปรดพิจารณา

ลงชื่อ [redacted]

(นางสาวสุดารตน เขจรรณ)

ผู้มีอำนาจลงนามแทนนิติบุคคล

ประทับตรา (ถ้ามี)

ลงชื่อ [redacted]

(นายประสม ดำรงพงษ์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

บริษัท ซีเอ็นพีซีเอชเค (ไทยแลนด์) จำกัด

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร ฉบับเดือนกรกฎาคม - ธันวาคม พ.ศ.2567

ภาคผนวก ง.8
เอกสารสอบเทียบเครื่องมือตรวจวัด

ระยะเจาะหลุมปิโตรเลียม

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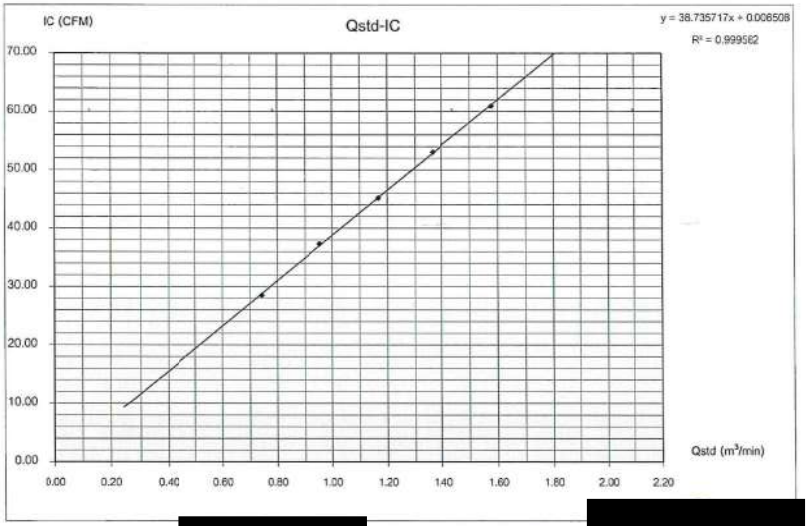
TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00465				Date	June 8, 2024
Sampler Location	บ้านมีผ่าง(A8)				Start Time	6:40 PM
Sampler Number	TSP No.A9	Transfer Standard Type		Orifice	Stop Time	6:50 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model		TE-5025A		
Motor Serial Number	16119	Calibrator Serial Number		2913	Calibrated By	Mr.Watcharin Charunsilthangkun
Recorder Serial Number	7137					

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) Sample Flow Rate Indicator (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.2	1.2	2.4	1.52214	0.74231	29.0	28.49	303.0	746.0		
7	2.0	2.0	4.0	1.96508	0.95549	38.0	37.34	303.0	746.0		
10	3.0	3.0	6.0	2.40672	1.16804	46.0	45.20	303.0	746.0		
13	4.1	4.1	8.2	2.81356	1.36385	54.0	53.06	303.0	746.0		
16	5.5	5.5	11.0	3.25871	1.57809	62.0	60.92	303.0	746.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	746.0		
1	Slope (m)			2.07779	Linear Equation			r^2	0.999582	Pstd(mmHg)	760.0
2	Intercept (b)			-0.02023	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.999791	T_{std}	298.0
3	Correlation Coefficient (r)			0.999833	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.965381275	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.98253818	

COMMENT

Andersen Instruments Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
(Mr.Panupon Podang)
Environmental Scientist

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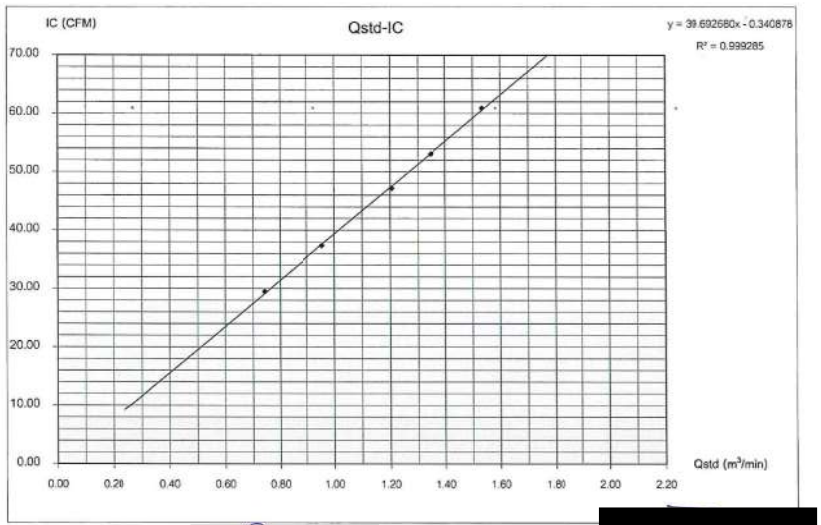
PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00465				Date	June 8, 2024
Sampler Location	บ้านมีผ่าง(A8)				Start Time	6:30 PM
Sampler Number	PM-10 No.11	Transfer Standard Type		Orifice	Stop Time	6:40 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model		TE-5025A		
Motor Serial Number	610-643	Calibrator Serial Number		2913	Calibrated By	Mr.Watcharin Charunsilthangkun
Recorder Serial Number	R0411-004					

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) Sample Flow Rate Indicator (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.2	1.2	2.4	1.52214	0.74231	30.0	29.48	303.0	746.0		
7	2.0	2.0	4.0	1.96508	0.95549	38.0	37.34	303.0	746.0		
10	3.2	3.2	6.4	2.48565	1.20693	48.0	47.16	303.0	746.0		
13	4.0	4.0	8.0	2.77904	1.34723	54.0	53.06	303.0	746.0		
16	5.2	5.2	10.4	3.16859	1.53472	62.0	60.92	303.0	746.0		
Linear Regresstion Y ON X: Y= mX + b							Average	303.0	746.0		
1	Slope (m)			2.07779	Linear Equation			r^2	0.999285	Pstd(mmHg)	760.0
2	Intercept (b)			-0.02023	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9996424	T_{std}	298.0
3	Correlation Coefficient (r)			0.99983	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.965381275	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.98253818	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
(Mr.Panupon Podang)
Environmental Scientist

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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

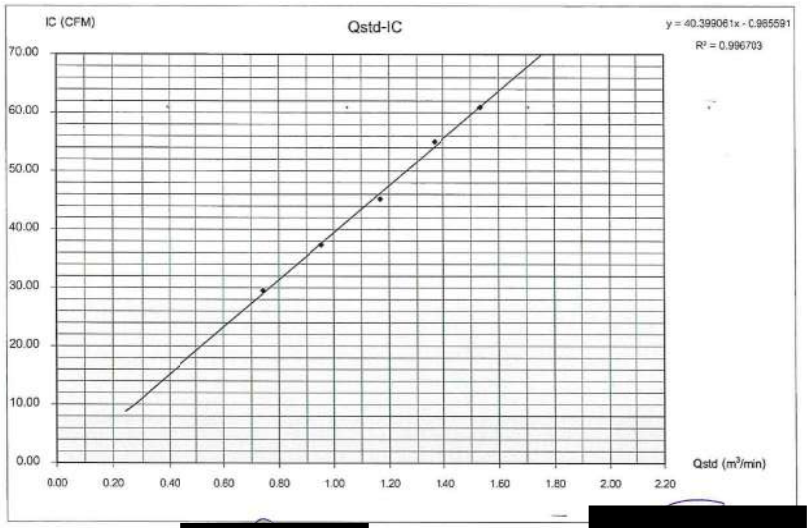
Quotation	2024-00465			*Date*	June 8, 2024
Sampler Location	บ้านมิ่งเมือง(A7)			*Start Time*	5:25 PM
Sampler Number	PM-10 No.19	Transfer Standard Type	Orifice	*Stop Time*	5:35 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Watcharin Charunsilthangkun
Motor Serial Number	2133	Calibrator Serial Number	2913		
Recorder Serial Number	2396				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH2O) Positive	Negative	ΔH2O	(A) [ΔH2O(Pa/Pstd)(Tstd/Ta)]^1/2	(X) Qstd = (1/m)[(A-b)] (m3/min)	(I) Sample Flow Rate Indicator (ft3/min)	(Y) IC = [(Pa/Pstd)(Tstd/Ta)]^1/2	Temperature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.2	1.2	2.4	1.52214	0.74231	30.0	29.48	303.0	746.0		
7	2.0	2.0	4.0	1.96508	0.95549	38.0	37.34	303.0	746.0		
10	3.0	3.0	6.0	2.40672	1.16804	46.0	45.20	303.0	746.0		
13	4.1	4.1	8.2	2.81356	1.36385	56.0	55.02	303.0	746.0		
18	5.2	5.2	10.4	3.16659	1.53472	62.0	60.92	303.0	746.0		
Linear Regression Y ON X : Y= mX + b							Average	303.0	746.0		

1	Slope (m)	2.07779	Linear Equation		r^2	0.996703	Pstd(mmHg) 760.0
2	Intercept (b)	-0.02023	Set Point Flow Rate (X) (m3/min)	1.133	r	0.9983501	T_{std} 298.0
3	Correlation Coefficient (r)	0.99983	Final Set Flow Rate = (I)	0	(Pa/Pstd)*(Tstd/Ta)		0.965361275
Result					C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.98253818

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

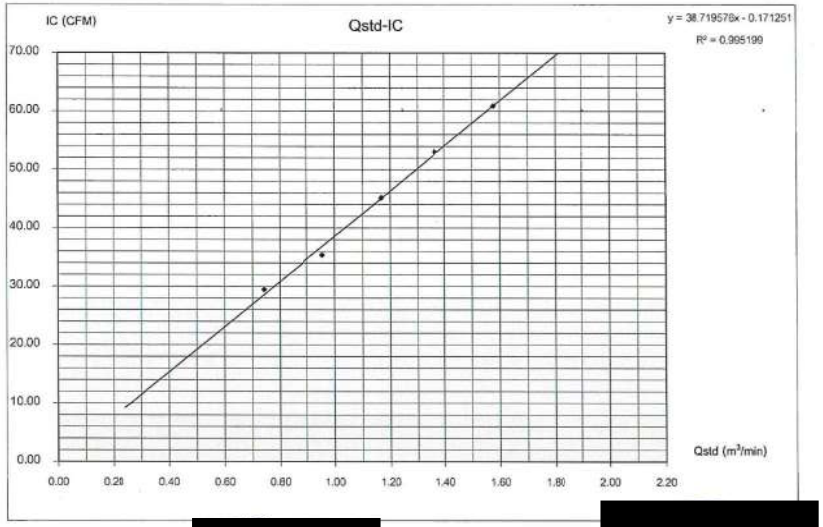
Quotation	2024-00465			*Date*	June 8, 2024
Sampler Location	บ้านมิ่งเมือง(A7)			*Start Time*	5:35 PM
Sampler Number	TSP No.A22	Transfer Standard Type	Orifice	*Stop Time*	5:45 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Watcharin Charunsilthangkun
Motor Serial Number	2054	Calibrator Serial Number	2913		
Recorder Serial Number	2187				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH2O) Positive	Negative	ΔH2O	(A) [ΔH2O(Pa/Pstd)(Tstd/Ta)]^1/2	(X) Qstd = (1/m)[(A-b)] (m3/min)	(I) Sample Flow Rate Indicator (ft3/min)	(Y) IC = [(Pa/Pstd)(Tstd/Ta)]^1/2	Temperature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.2	1.2	2.4	1.52214	0.74231	30.0	29.48	303.0	746.0		
7	2.0	2.0	4.0	1.96508	0.95549	36.0	35.37	303.0	746.0		
10	3.0	3.0	6.0	2.40672	1.16804	46.0	45.20	303.0	746.0		
13	4.1	4.1	8.2	2.81356	1.36385	54.0	53.06	303.0	746.0		
18	5.5	5.5	11.0	3.25871	1.57809	62.0	60.92	303.0	746.0		
Linear Regression Y ON X: Y= mX + b							Average	303.0	746.0		

1	Slope (m)	2.07779	Linear Equation		r^2	0.995199	Pstd(mmHg) 760.0
2	Intercept (b)	-0.02023	Set Point Flow Rate (X) (m3/min)	1.133	r	0.9975965	T_{std} 298.0
3	Correlation Coefficient (r)	0.99983	Final Set Flow Rate = (I)	0	(Pa/Pstd)*(Tstd/Ta)		0.965361275
Result					C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.98253818

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
(Mr.Panupon Podang)
Environmental Scientist

JIRANATEE ASSOCIATES CO.,LTD.

Jiranatee Associates Co.,Ltd.
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Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TISI-TIS 17025
CALIBRATION 0367

Flow measurement laboratory
Calibration services department.

NSC – TISI – TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. : **COF-013-66**

MEASUREMENT ITEM	: Top Load Orifice
MANUFACTURER	: TISCH
MODEL/TYPE	: TE-5025A
SERIAL NUMBER	: 2913
ID NUMBER	: -
CONDITION AS-RECEIVED	: Used item
CUSTOMER	: Environment Research & Technology Co., Ltd. 25/114 Moo 6 Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
RECEIVED DATE	: 08 Sep 2023
MEASUREMENT DATE	: 11 Sep 2023
ISSUE DATE	: 13 Sep 2023

Calibration procedure:
The Orifice gas flow device was calibrated against Standard Rotary Displacement Meter (Roots Meter) Model G65/IMC/W2-dp. The WI-CL-004 was used as a calibration guideline.

Traceability:
This certificate provides a traceability of The measurement to recognized the national standards, and to realization of the international system of units (SI) through the VSL (National Metrology Institute of Netherlands) via Certificate number: G2211901

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:

Temperature	: 23.0 ± 3.0	°C
Relative Humidity	: 55.0 ± 15.0	%RH
Atmospheric Pressure	: 1010 ± 10	hPa

CALIBRATION CONDITION:

Preconditioning	: 24 hours at ambient conditions.
Measurement Condition	: The average values during measurement are 24.5 °C and 47.7 %RH.

NOTED: *The certificate is valid only to the item calibrated on date and place of calibration.*

TABULATION OF RESULTS:
The table on next page give the measured values.

Calibrated by:
☑ Mr. Sorawit Thachalad
☐ Miss Jittraporn Lertsomphol

JNAC JIRANATEE ASSOCIATES CO.,LTD

Approved signatory: [redacted]
Mr. Parinya Booncharoen
Calibration Department Manager

THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Jiranatee Associates Co., Ltd.

JNAC JIRANATEE ASSOCIATES CO.,LTD.

Continuation of Certificate of Calibration Number COF-013-66

MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roots Meter). The Humid air was used as a medium in the system. The standard conditions are 25°C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of Q Standard calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_meter mmHg	Δp_Orifice inH_2O	Y	Standard Flow [Q_s] m^3/min
1	0.707	753.911	24.39	23.31	54.094	1.809	1.341	0.655
2	1.005	753.864	24.49	24.02	58.538	3.610	1.894	0.923
3	1.117	753.809	24.30	24.05	40.197	4.715	2.165	1.052
4	1.174	753.829	24.25	23.95	30.361	5.366	2.310	1.121
5	1.417	753.823	24.35	24.05	30.498	7.837	2.791	1.353

Slope (m): **2.07779**
Intercept (b): **-0.02023**
Correlation coefficient (r): **0.99983**
Uncertainty (k=2): **0.015** m^3/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_meter mmHg	Δp_Orifice inH_2O	Y	Standard Flow [Q_a] m^3/min
1	0.707	753.911	24.39	23.31	54.094	1.809	0.845	0.659
2	1.005	753.864	24.49	24.02	58.538	3.610	1.194	0.928
3	1.117	753.809	24.30	24.05	40.197	4.715	1.364	1.058
4	1.174	753.829	24.25	23.95	30.361	5.366	1.455	1.128
5	1.417	753.823	24.35	24.06	30.498	7.837	1.759	1.361

Slope (m): **1.30141**
Intercept (b): **-0.01275**
Correlation coefficient (r): **0.99983**
Uncertainty (k = 2): **0.015** m^3/min

*****End of Certificate of Calibration*****

JNAC JIRANATEE ASSOCIATES CO.,LTD.

Calibration Certificate ID
TH3067-067-011524-ACC-TH

METTLER TOLEDO

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+662 723 0382
MT-TH.ServiceSupport@mt.com

NSC-TISI-TIS 17025
CALIBRATION 0062

Accuracy Calibration Certificate

Customer

Company:	Environment Research & Technology Co., Ltd.		
Address:	25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Toongsonghong		
City:	Laksi	**Contact:**	Ramita Taengthai
Zip / Postal:	10210		
State / Province:	Bangkok		
Order Number:	0332963611		

Weighing Device

Manufacturer:	Mettler Toledo	**Instrument Type:**	Weighing Instrument
Model:	AE204-S	**Asset Number:**	ERTC-L-IN-0048
Serial No.:	1123103723	**Terminal Model:**	N/A
Building:	N/A	**Terminal Serial No.:**	N/A
Floor:	4	**Terminal Asset No.:**	N/A
Room:	406		

Range	Max. Capacity	Readability (d)
1	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CP/W00220

This calibration certificate contains measurements for As Found and As Left calibrations.

The sensitivity/span of the weighing instrument was adjusted before As Found and As Left calibrations with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 25.4 °C	End: 25.3 °C	Start: 36.4 %	End: 34.9 %
As Left	Start: 25.3 °C	End: 25.2 °C	Start: 34.9 %	End: 34.1 %

As Found Calibration Date: 15-Jan-2024
As Left Calibration Date: 15-Jan-2024
Issue Date: 15-Jan-2024

Calibrator: [redacted]
Nithit Jongkrod

Approved Signatory: [redacted]
Technical Manager / Head of Calibration Center

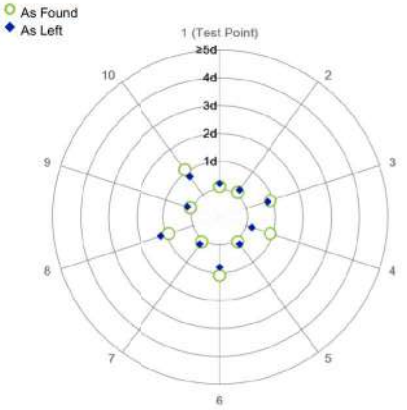
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Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	99.9993 g	100.0002 g
2	99.9993 g	100.0002 g
3	99.9992 g	100.0003 g
4	99.9992 g	100.0002 g
5	99.9993 g	100.0002 g
6	99.9994 g	100.0003 g
7	99.9993 g	100.0002 g
8	99.9992 g	100.0001 g
9	99.9993 g	100.0002 g
10	99.9994 g	100.0003 g
Standard Deviation	**0.00007 g**	**0.00006 g**



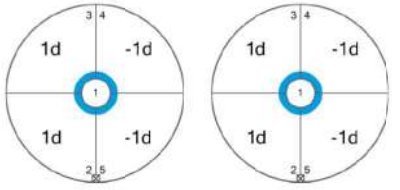
The "d" in the graph represents the readability of the range/interval in which the test was performed.

The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9993 g	100.0002 g
2	99.9994 g	100.0003 g
3	99.9994 g	100.0003 g
4	99.9992 g	100.0001 g
5	99.9992 g	100.0001 g
Maximum Deviation	**0.0001 g**	**0.0001 g**



The "d" in the graph represents the readability of the range/interval in which the test was performed.

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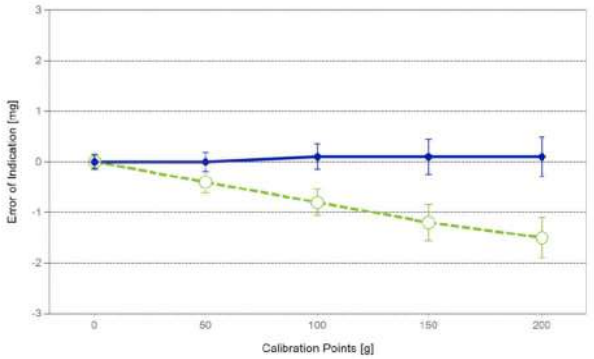
Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.16 mg	2
2	0.0500 g	0.0501 g	0.0001 g	0.17 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.17 mg	2
4	0.5000 g	0.5001 g	0.0001 g	0.17 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.17 mg	2
6	5.0000 g	4.9999 g	-0.0001 g	0.17 mg	2
7	10.0000 g	9.9998 g	-0.0002 g	0.18 mg	2
8	50.0000 g	49.9996 g	-0.0004 g	0.21 mg	2
9	100.0001 g	99.9993 g	-0.0008 g	0.26 mg	2
10	150.0001 g	149.9989 g	-0.0012 g	0.36 mg	2
11	200.0000 g	199.9985 g	-0.0015 g	0.40 mg	2

As Left

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.14 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.15 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.15 mg	2
4	0.5000 g	0.5000 g	0.0000 g	0.15 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.15 mg	2
6	5.0000 g	5.0000 g	0.0000 g	0.16 mg	2
7	10.0000 g	10.0000 g	0.0000 g	0.16 mg	2
8	50.0000 g	50.0000 g	0.0000 g	0.19 mg	2
9	100.0001 g	100.0002 g	0.0001 g	0.25 mg	2
10	150.0001 g	150.0002 g	0.0001 g	0.35 mg	2
11	200.0000 g	200.0001 g	0.0001 g	0.39 mg	2



As Found

As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor *k* – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated. The results of this calibration certificate relate only to the calibrated item.

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Calibration Certificate ID
TH3067-067-011524-ACC-TH

METTLER TOLEDO Service

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS52	Date of Issue:	22-Nov-2022
Certificate Number:	182272	Calibration Due Date:	21-May-2024

Thermo Hygrometer

Equipment No.:	IN302	Date of Issue:	11-Oct-2023
Certificate Number:	SG-H-00656/66	Calibration Due Date:	08-Oct-2024

Remarks

Value of the built-in weight adjusted

Equipment conditon: Good

Next calibration according to customer's procedure

Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Software Version: 1.23.2.187
Report Version: 2.17.16
Form Number: F103C

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Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $3.0 \cdot 10^{-6}$ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

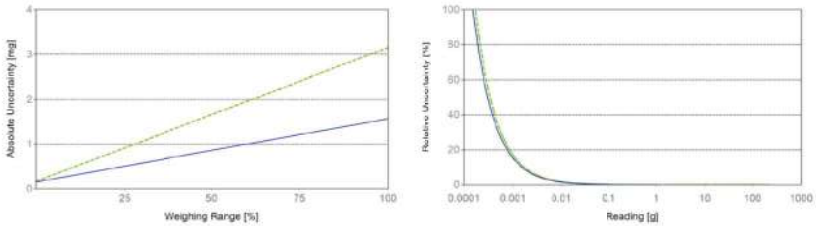
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.0001 g	220 g	U_1 = 0.17 mg + 0.0136 mg/g · R	U_1 = 0.15 mg + 0.00644 mg/g · R

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.0220 g	0.17 mg	0.77%	0.15 mg	0.68%
0.2200 g	0.17 mg	0.079%	0.15 mg	0.069%
2.2000 g	0.20 mg	0.0091%	0.16 mg	0.0075%
22.0000 g	0.47 mg	0.0021%	0.29 mg	0.0013%
220.0000 g	3.2 mg	0.0014%	1.6 mg	0.00071%



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GWP® Certificate

As Found ✓

The weighing device meets the given process requirements.

As Left ✓

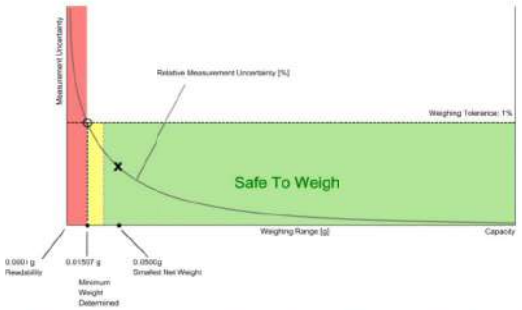
The weighing device meets the given process requirements.

Tests Performed: ☑ As Found ☑ As Left

Process Requirements

Weighing Tolerance: **1%** | Smallest Net Weight: **0.0500 g** | Safety Factor: **2**

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

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Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	1	2	3	5	10
0.1%	0.17097 g	0.34671 g	0.52742 g	0.90460 g	1.95110 g
0.2%	0.08490 g	0.17097 g	0.25823 g	0.43643 g	0.90460 g
0.5%	0.03382 g	0.05783 g	0.10202 g	0.17097 g	0.34671 g
1%	0.01689 g	0.03382 g	0.05080 g	0.08490 g	0.17097 g
2%	0.00844 g	0.01689 g	0.02535 g	0.04231 g	0.08490 g
5%	0.00337 g	0.00675 g	0.01013 g	0.01689 g	0.03382 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	1	2	3	5	10
0.1%	0.15153 g	0.30504 g	0.46056 g	0.77780 g	1.60910 g
0.2%	0.07552 g	0.15153 g	0.22803 g	0.38254 g	0.77780 g
0.5%	0.03015 g	0.05038 g	0.09068 g	0.15153 g	0.30504 g
1%	0.01507 g	0.03015 g	0.04525 g	0.07552 g	0.15153 g
2%	0.00753 g	0.01507 g	0.02261 g	0.03770 g	0.07552 g
5%	0.00301 g	0.00602 g	0.00904 g	0.01507 g	0.03015 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with k = 2 and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

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Attachment to Calibration Certificate:
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Measurement Results

Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed
✗ = Failed
⚠ = Safety Factor not met

Repeatability

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	N/A	0.00007 g*	N/A	0.00006 g*	N/A
0.2%	0.00005 g		✗		✗
0.5%	0.00013 g		✓		✓
1%	0.00025 g		✓		✓
2%	0.00050 g		✓		✓
5%	0.00125 g		✓		✓

*The calculated standard deviation value is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test and the calculation of the minimum weight.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0001 g	✓	0.0001 g	✓
0.2%	0.1000 g		✓		✓
0.5%	0.2500 g		✓		✓
1%	0.5000 g		✓		✓
2%	1.0000 g		✓		✓
5%	2.5000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

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Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	-0.0004 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	-0.0008 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	-0.0012 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0015 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

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envi research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

Environment Research & Technology Company Limited
25/114 Mu 6 Soi Chinnakhet 1, Ngam Wong Wan Road,
Thung Song Hong, Lak Si, Bangkok 10210
Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

Calibration Data of NOx Analyzer

Analyzer Performance Test

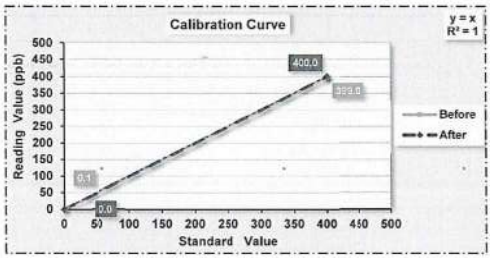
Equipment	Gas Analyzer (NOx)	Customer Name	Vision E.
Manufacture	HORIBA	Location	Envi Research
Model	APNA-370	Quatation	2024-00465
Serial No.	NKDVYFRX	Calibration Date	May 28, 2024
Analyzer Unit	ppb	Time	4:51 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	330	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value								% Abs Error
		NO_x (ppb)		NO (ppb)		NO_2 (ppb)		Stability		
		Before	After	Before	After	Before	After	Before	After	
Zero	0	0.1	0.0	0.1	0.0	0.0	0.0	-	-	-
Span	400	399.2	400.0	399.0	400.0	0.2	0.0	-	-	0.3



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	1.0	0.2	Voltage of the measured NO value
Signal NOx	mV	11.6	5.2	Voltage of the measured NOx value
Detector	°C	41.4	39.7	43 °C ± 5 °C
Ambient	kPa	100.8	101.1	Current atmospheric pressure
DC 24V	V	23.8	23.5	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.95620	1.20110	0.50000 - 2.0000
NOx Slope	-	0.94990	1.85600	0.50000 - 2.0000

Calibrate By : [redacted]
(MR.PANUPON PODANG)
May 28, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
May 28, 2024

envi research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

Environment Research & Technology Company Limited
25/114 Mu 6 Soi Chinnakhet 1, Ngam Wong Wan Road,
Thung Song Hong, Lak Si, Bangkok 10210
Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

Calibration Data of NOx Analyzer

Analyzer Performance Test

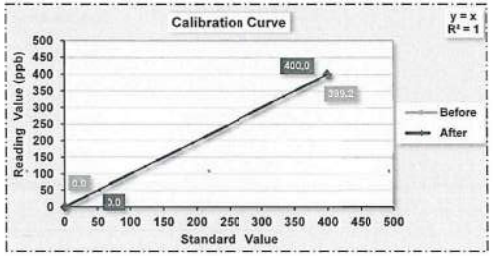
Equipment	Gas Analyzer (NOx)	Customer Name	Vision E.
Manufacture	HORIBA	Location	Envi Research
Model	APNA-370	Quatation	2024-00465
Serial No.	PA6WVAJ9	Calibration Date	May 6, 2024
Analyzer Unit	ppb	Time	6:23 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value						Stability		% Abs Error
		NO_x (ppb)		NO (ppb)		NO_2 (ppb)				
		Before	After	Before	After	Before	After	Before	After	
Zero	0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Span	400	399.9	400.0	399.2	400.0	0.7	0.0	-	-	0.2



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	0.5	1.0	Voltage of the measured NO value
Signal NOx	mV	9.3	10.5	Voltage of the measured NOx value
Detector	°C	41.3	42.1	43 °C ± 5 °C
Ambient	kPa	99.7	101.1	Current atmospheric pressure
DC 24V	V	23.0	23.7	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	1.91250	1.13670	0.50000 - 2.0000
NOx Slope	-	1.19659	1.14930	0.50000 - 2.0000

Calibrate By : [redacted]
(MR.PANUPON PODANG)
May 6, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
May 6, 2024

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E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

Calibration Data of SO_2 Analyzer

Analyzer Performance Test

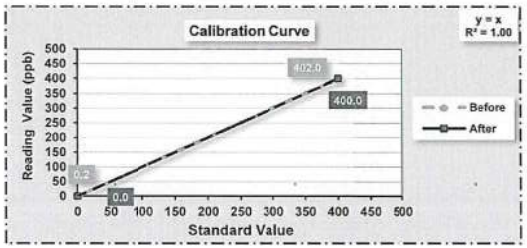
Equipment	Gas Analyzer (SO_2)	Customer Name	Vision E.
Manufacture	Thermo	Location	Envi Research
Model	43i-BNSAA	Quatation	2024-00465
Serial No.	CM14430003	Calibration Date	May 17, 2024
Analyzer Unit	ppb	Time	4:52 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppb)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.2	0.0	-	-	-
Span	400	402.0	400.0	-	-	0.5



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL 43i-BNSAA

Parameter	Display As	Unit	Observed Value		Nominal Range
			Before Adjust	After Adjust	
Range	RANGE	ppb	500	500	0 - 500 standard
Internal Temperature	INTERNAL	°c	34.4	36.4	8.0 °C to 45.0 °C
Chamber Temp	CHAMBER	°c	45.2	44.9	43.0 °C to 47.0 °C
Pressure	PRESSURE	mmHg	66.9	732.3	400.0 to 1,000
Sample Flow	SAMP FLOW	LPM	0.472	0.467	0.350 to 0.750
Lamp Intensity	LAMP INTENSITY	%	72	92	20 to 100
Lamp Voltage	LAMP VOLTAGE	V	823	1008	500 to 1200
SO2 Concentration	SO2 CONCENTRATION	ppb	1.8	1.4	0 to 10,000
Motherboard Status	MOTHERBOARD STATUS	-	OK	OK	OK
Interface Status	[redacted]TUS	-	OK	OK	OK

Calibrate By : [redacted]
(MR.PANUPON PODANG)
May 17, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
May 17, 2024

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Head Office/Tax ID 0105 542 064 981

Calibration Data of SO_2 Analyzer

Analyzer Performance Test

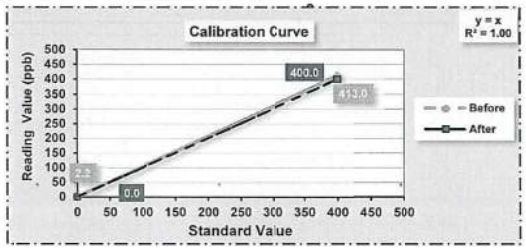
Equipment	Gas Analyzer (SO_2)	**Customer Name**	Vision E.
Manufacture	Thermo	**Location**	Envi Research
Mocel	43i-BNSAA	**Quatation**	2024-00465
Serial No.	CM14430005	**Calibration Date**	May 28, 2024
Analyzer Unit	ppb	**Time**	5:02 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppb)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	2.2	0.0	-	-	-
Span	400	413.0	400.0	-	-	3.3



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL 43i-BNSAA

Parameter	Display As	Unit	Observed Value		Nominal Range
			Before Adjust	After Adjust	
Range	RANGE	ppb	500	500	0 - 500 standard
Internal Temperature	INTERNAL	°c	32.0	32.1	8.0 °C to 45.0 °C
Chamber Temp	CHAMBER	°c	44.9	45.0	43.0 °C to 47.0 °C
Pressure	PRESSURE	mmHg	659.9	659.8	400.0 to 1,000
Sample Flow	SAMP FLOW	LPM	0.520	0.520	0.350 to 0.750
Lamp Intensity	LAMP INTENSITY	%	74	75	20 to 100
Lamp Voltage	LAMP VOLTAGE	V	1034	1034	500 to 1200
SO2 Concentration	SO2 CONCENTRATION	ppb	2.6	1	0 to 10,000
Motherboard Status	MOTHERBOARD STATUS	-	OK	OK	OK
Interface Status	INTERFACE STATUS	-	OK	OK	OK

Calibrate By : [redacted]
(MR.PANUPON PODANG)
May 28, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
May 28, 2024

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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

Calibration Data of CO Analyzer

Analyzer Performance Test

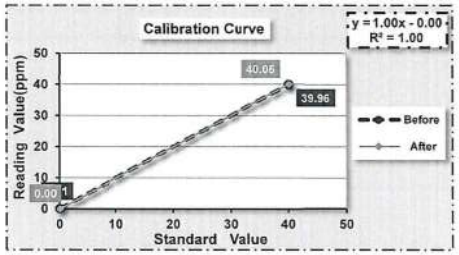
Equipment	Gas Analyzer (CO)	**Customer Name**	Vision E.
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-360 CE	**Quatation**	2024-00465
Serial No.	576876075	**Calibration Date**	May 24, 2024
Analyzer Unit	ppm	**Time**	1:44 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.11	0.00	-	-	-
Span	40	39.96	40.05	-	-	0.22



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-360CE

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL (MAIN)	mV	14.5	8.4	Voltage of the measured CO Value
SIGNALI (COMP)	mV	4.1	2.5	Voltage of the interference component Value
CELL	°C	33.5	39.8	Ambient + (5 to 15 °C)
SAMPLE	L/min	1.2	1.4	1 L/min to 2 L/min
OVER FLOW	LPM	0.0	0.0	< 1.2

Calibrate By : [redacted]
(MR.PANUPON PODANG)
May 24, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
May 24, 2024

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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

Calibration Data of CO Analyzer

Analyzer Performance Test

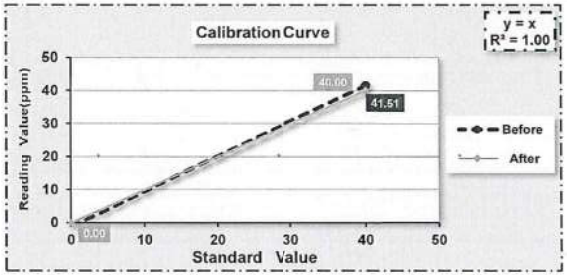
Equipment	Gas Analyzer (CO)	Customer Name	Vision E.
Manufacture	HORIBA	Location	Envi Research
Model	APMA-370	Quatation	2024-00465
Serial No.	3VJ73T6X	Calibration Date	May 3, 2024
Analyzer Unit	ppm	Time	1:35 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,487 ppm		
Cylinder No : EB0123013	NO = 46.1 ppm		
Expire Date : Oct 22, 2027	SO_2 = 46.0 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	-1.17	0.00	-	-	-
Span	40	41.51	40.00	-	-	3.78



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	2.5	3.2	Voltage of the measured CO Value
SIGNAL (COMP)	mV	1.0	1.1	Voltage of the interference component Value
CELL	°C	32.2	32.3	Ambient + (5 to 10 C)
PUMP	kpa	52.4	52.5	less than 65
AMBIENT	kpa	100.7	100.8	Atmospheric pressure
DC 24V	mV	23.9	23.9	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By : [redacted]
(MR.PANUPON PODANG)
May 3, 2024

envi research

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
May 3, 2024

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI99E15A0292	Reference Number:	160-401604495-1
Cylinder Number:	EB0123013	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12019	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Oct 22, 2019

Expiration Date: Oct 22, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytcal uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	55.00 PPM	55.27 PPM	G1	+/- 0.8% NIST Traceable	10/14/2019, 10/22/2019
NITRIC OXIDE	55.00 PPM	55.27 PPM	G1	+/- 0.8% NIST Traceable	10/14/2019, 10/22/2019
SULFUR DIOXIDE	55.00 PPM	54.93 PPM	G1	+/- 0.8% NIST Traceable	10/14/2019, 10/22/2019
CARBON MONOXIDE	4500 PPM	4516 PPM	G1	+/- 0.6% NIST Traceable	10/14/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13010429	KAL004123	57.6 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Jul 23, 2025
NTRM	13010429	KAL004123	57.6 PPM NOx/NITROGEN	+/- 0.8%	Jul 23, 2025
NTRM	16010235	KAL004419	57.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Dec 23, 2021
NTRM	08012318	KAL004620	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR - CO - 000928781	FTIR	Sep 26, 2019
MKS FTIR - NO - 000928781	FTIR	Oct 18, 2019
MKS FTIR - NOx - 000928781	FTIR	Oct 18, 2019
MKS FTIR - SO2 - 000928781	FTIR	Oct 03, 2019

Triad Data Available Upon Request

NOTES: Gross Weigh: 28.0 Kg, Net Weight: 4.6 Kg.

[redacted]
Approved for Release

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 11 August, 2023 Certification No. 282/23

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No 7425

Serial No. : WE60321A26A ID No. : No.5

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1007.9 hPa

NATIONAL STANDARD WIND TUNNEL :
: Thermal Anemometer 642 S/N 91563
: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023
N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec
: Ultrasonic Anemometer Model CA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : [redacted] Sig[redacted]

Mr. Watcharapol Subwat Mr. Pisood Promsut

Mechanical Engineer

(Authorised Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 282/23

11 August, 2023

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.2	0.82
5.00	-	-	-	4.5	0.50
7.04	-	-	-	6.3	0.74
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.3	0.71
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.3	0.71
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.3	0.72

Wind Aloft Plotting Board.
US.DEPARTMENT OF COMMERCE WEATHER BUREAU

WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : [redacted]

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 25 December, 2023 Certification No. 456/23

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WC20214A68 ID No. : No.3

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1018.1 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sersor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : [redacted] Sign[redacted]

Mr. Watcharapol Subwat Mr. Pisood Pronsut

Mechanical Engineer

(Authorised Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 456/23

25 December, 2023 Page : 2 of 2

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.9	0.11
15.01	-	-	-	14.5	0.51
17.02	-	-	-	16.9	0.12
20.02	-	-	-	19.5	0.52

Wind Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : [redacted]

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

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E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

Sound Level Meter Calibration Report

Support Equipment Type	:	Sound Level Calibrator
Manufacture	:	BSWA Technology
Model	:	CA114
Serial No.	:	470154
Range of Calibrator		
- Support Equipment Type	:	94.8
- Frequency	:	1,000 Hz.
Calibrated By	:	Mr.Nitad Sirchad
Calibration Date	:	June 8, 2024
Customer Name	:	Vision E. Consultants Co., Ltd. : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบก หมายเลข L21/43 จังหวัดสุโขทัย และจังหวัดกำแพงเพชร (ระยะเจาะหลุม)

Item	Equipment			Actual Reading (dB(A))		Status
	Brand	Model	Serial Number	Before Adjustment	After Adjustment	
1	Scarlet Tech	ST-15D	10338009	94.6	94.8	Pass
2	Scarlet Tech	ST-15D	10338010	94.4	94.8	Pass

Checked By [redacted]
Mr.Prayun Detkla

envi research

Approved By [redacted]
Ms.Sutatip Im-noi

TISTR
NSC-TISI-TIS 17025
CALIBRATION 0037

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0144 **MTC No.** EEL. BP. 19/1266

CALIBRATION CERTIFICATE

Submitted by : Environment Research & Technology Co.,Ltd.
Address : 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre. Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :
Description : Acoustic Calibrator
Manufacturer : ESWA TECH
Model : CA114
Serial No. : 470154

Ambient Environment
Temperature : (23 + 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.500) kPa

Standards used :
1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 13 Dec. 2023
Date of Calibration : 14 Dec. 2023

1. [redacted]

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

Head Office
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Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

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

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196 Phahonyothin Road, Chatuchak, Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0144 **MTC No.** EEL. BP. 19/1266

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20µPa at 1000 Hz

Acoustic Output in dB re 20µPa, Corrected to Reference Conditions: 101.325 kPa, 23.0 °C and 50 %RH.

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	94.76	0.76	± 0.10	±0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1000.9	0.9	± 1.5	±2.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1.70	± 0.50	±4.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by : [redacted]

(Mr.Weerachai Deechaiyae)

Approved by : [redacted]

(Mr.Prawate Khiaypa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 14 Dec. 2023

Date of Issue : 15 Dec. 2023

Ref : 20112661213049050l0

End of Certificate 2 / 2

The results relate only to the items tested/calibrated or value assigned.
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Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

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

NSC-TISI-TIS17025 CALIBRATION 0008

Cert.No.: 24CH16
Page.: 1 of 2

Certificate of Calibration

Equipment :	pH Meter
Manufacturer :	Water Proof
Model :	pHTestr 30
Serial No. :	3066354
ID No. :	-
Condition As-Received:	Used Item
Received Date :	05 January 2024
Calibration Date :	09 January 2024
Reference :	2401-0077DN-2
Submitted by :	Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
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)

Calibrated by : Walalak Sirithean

Approved by : [redacted]

Approved Signatory

(✓) Saithip Meangmai
( ) Warakorn Lerngagtrakul
( ) Ponpan Paipim

Issue Date : 10 January 2024

The Uncertainties are for a confidence probability of approximately 95%

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A 0062384

Condition of this calibration result

1. 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	940102	27 Nov 2025
pH 6.986	CPA chem	931959	01 Oct 2024
pH 9.997	CPA chem	940106	02 Nov 2024

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

Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor *k*
pH Electrode	4.008	4.01	N/A	0.0079	2.00
S/N.: 3066354	6.986	6.99	N/A	0.0099	2.00
	9.997	10.01	N/A	0.0085	2.00

Remark - pH meter does not have voltage mode.
- Can not connect the BNC because the plug does not match with the socket.
- N/A = Not Available

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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[redacted]

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Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : Pro20
Serial No. : 14L101229
ID No. : -
Received Date : 05 January 2024
Test Date : 08 January 2024
Reference : 2401-0077DN-5
Submitted by : Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technicue with Azide Modification Method
Tested by : Walalak Sirithean
Approved by : [redacted]
Approved Signatory

(✓) Saithip Meangmai
( ) Warakorn Lerngegtrakul
( ) Ponpan Paipim

Issue Date : 10 January 2024

Condition of this result of calibration

1. Reference Standard Instruments :
   This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technolcgy Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	130BU10	23CG1172	22 Mar 2025
2) Balance	1124013382	140RC006	23MM18	20 Feb 2024

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : **Dissolved Oxygen Meter Adjustment With Air 100 %**
Dissolved Oxygen Probe No.: 15K100212

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.18	8.17	0.0055

This report was certified only for the instrument we tested.It is allowable to use for study the system efficiency,The environmental impact control and present to organization it may concerned Intend to use for advertising and referral purpose is prohibited.This report may rot be reproduced other in full,without written approval of the laboratory

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[redacted]

a 1196378

Inctech Metrological Center Co.Ltd.
39/1 Soi 82, Sukhapiban 5 Rd., O ngoen,
Saimai, Bangkok 10220, Thailand
Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com

ilac-MRA ACCREDITED Calibration Cert. # 3814.01 ISO/IEC 17025

Certificate of Calibration

Certificate No. : MT23-7846
Page : 1 of 2

Customer : Environment Research & Technogy Co., Ltd.
Address : 25/114 Moo 6 Soi Chinaket1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210

Description : Incubator
Manufacturer : Accuplus
Model : Smart i250
Serial No. : 2059-0218-0002
Identification No. : ERTC-L-IN-143
Calibration Place : Customer Laboratory

Order No. : 3936/23
Received date : Dec 12, 2023
Calibration date : Dec 12, 2023
Environment Condition :
Temperature : (25+/-10) °C
Humidity : (50+/-30) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure *CP-MT-006* According to comparison with LXI Data Acquisition Switch Unit with sensor. The calibration methods based on Eurame: Calibration Guide No.20 - guidelines on the Calibration of Temperature and/or Humidity Controlled Enclosures.

Reference Standard Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
LXI Data Acquisition Switch Unit with Sensor	34972A	MY57003222	MT23-5938	Oct 05, 2024

This result of calibration was found accurate as shown on date and place of calibration only.
Traceability : This measurement are traceable to the International System of Unit (SI), through National Institute of Metrology Thailand (NIMT)

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor $k = 2$, providing a level of confidence of not less than 95%

CALIBRATION LABORATORY IMC INCTECH METROLOGICAL CENTER CO.,LTD.

Calibrated by : Mr.Yuttakorn Jamneansri
Issue date : Jan 09, 2024

Approved by : [redacted]
(Mr.Panuwat Phuklan)

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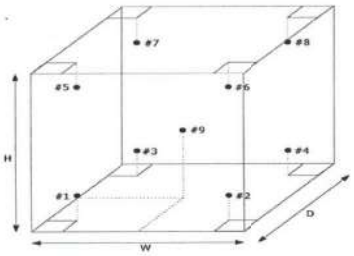
Inctech Metrological Center Co.Ltd.
39/1 Soi 82, Sukhapiban 5 Rd., O ngpen,
Saimai, Bangkok 10220, Thailand
Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com

ilac-MRA ACCREDITED Calibration Cert. # 3884.01 ISO/IEC 17025

Function : Temperature measurement
Calibration point : 20 °C
Result : Without adjustment
Resolution : 0.1 °C

Calibration point	Temperature of UUC* at each position (°C)									Uncertainty of measurement
(°C)	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Ch.8	Ch.9	(+/- °C)
20	20.542	20.166	20.504	20.211	20.551	20.501	20.477	20.723	19.867	0.46

Setting temperature (°C)	Indicating Temperature (°C)	Measured stability (+/- °C)	Measured uniformity (°C)	Overall variation (°C)
20.0	20 to 20.3	0.25	1.0	1.3



Front view

#1 Lower Left Front
#2 Lower Right Front
#3 Lower Left Rear
#4 Lower Right Rear
#5 Upper Left Front
#6 Upper Right Front
#7 Upper Left Rear
#8 Upper Right Rear
#9 Geometric Center

UUC* = Unit under calibration
Uniformity = Maximum and Minimum difference of measured temperature at any probes and the measured temperature at the reference and same time.
Overall Variation = Difference of temperature value between the maximum and minimum any time.
Stability = One half of the maximum difference of measured temperatures at any one probe.

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TEL. 0-2717-3000-29 FAX. 0-2719-9484

ilac-MRA NSC-TISI-TIS17025 CALIBRATION 0008

Certificate of Calibration

Equipment : Incubator
Manufacturer : Ehret
Model : BK 4106
Serial No. : 22162
ID No. : ERTC-L-In.-022
Submitted by : Environment Research & Technology Company Limited
25/114 Moo 6 Soi Chinaket 1,
Ngamwongwan Road, Toongsonghong, Laksi,
Bangkok 10210
Location : 408/2 ห้องปฏิบัติการบ่มอาหารเลี้ยงเชื้อ

Received Order : 03 January 2024
Calibration Date : 04 January 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Suwit Imjai

Approved by : [redacted]
Approved Signatory

( ) Pornthippa Tameyakul
(V) Ponpan Papim
( ) Kunchit Promprat

Issue Date : 16 January 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

Equipment : Incubator
Condition As-Received : Used Item
Reference : 2401-0001ON-6

Cert. No.: 24TM96

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

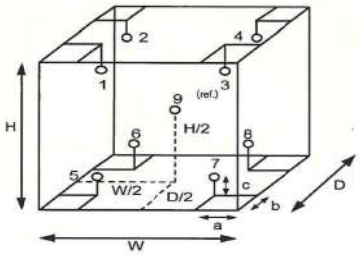
Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	26	29
REL.Humid. (%)	45	50
AC Supply (Volt)	225	226



Position :	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	23-18RTD-06
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of Chamber :

D = 0.50 m
W = 0.60 m
H = 0.50 m
Capacity = 0.15 m³

[redacted]

Equipment : Incubator
Condition As-Received : Used Item
Reference : 2401-0001ON-6

Cert. No.: 24TM96

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor *k*
44.5	44.5	45.0	0.20	0.77	1.6	2

Calibration Point (°C)	Measured Temperature (°C) Position									Uncertainty (±°C)
	1	2	3	4	5	6	7	8	9 (ref.)	
44.5	45.038	45.142	45.077	45.127	43.812	44.180	44.402	44.990	44.497	0.85

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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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[redacted]

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NSC-TISI-TIS17025
CALIBRATION 0008

Cert. No.: 24TM95
Page : 1 of 3

Certificate of Calibration

Equipment :	Incubator
Manufacturer :	Memmert
Model :	IF 160
Serial No. :	C522.0070
ID No. :	ERTC-L-In.-181
Submitted by :	Environment Research & Technology Company Limited 25/114 Moo 6 Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
Location :	408/2 ห้องปฏิบัติการบ่มอาหารเลี้ยงเชื้อ
Received Order :	03 January 2024
Calibration Date :	04 January 2024
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Suwit Imjai
Approved by :	[redacted] Approved Signatory

( ) Pornthippa Tameyakul
(V) Ponpan Paipim
( ) Kunchit Promprat

Issue Date : 16 January 2024

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Incubator
Condition As-Received : Used Item
Reference : 2401-0001ON-5

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

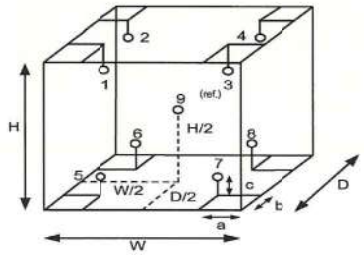
Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close
Fan setting : 50%

Environment during calibration		
	Beginning	**Finished**
Temp. (°C)	26	29
REL.Humid. (%)	47	50
AC Supply (Volt)	225	226



Position :	Ref. Std. ID No.:
1	22-18RTD-2/1
2	18RTD-2/2
3	18RTD-2/3
4	18RTD-2/4
5	18RTD-2/5
6	18RTD-2/6
7	18RTD-2/7
8	18RTD-2/8
9 (ref.)	18RTD-2/9

Probe Installation Details :

a =	5.0	cm
b =	5.0	cm
c =	5.0	cm

Dimension of Chamber :

D =	0.40	m
W =	0.56	m
H =	0.73	m
Capacity =	0.16	m³

[redacted]

Equipment : Incubator
Condition As-Received : Used Item
Reference : 2401-0001ON-5
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM95
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor *k*
35.0	35.0	35.0	0.020	0.15	0.24	2

Calibration Point	Measured Temperature (°C)									Uncertainty
	Position									
(°C)	1	2	3	4	5	6	7	8	9 (ref.)	(±°C)
35.0	35.043	34.933	35.015	34.992	35.019	34.980	34.843	34.961	34.985	0.32

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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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EQUIPMENT QUALIFICATION REPORT (EQR)

Agilent CrossLab Compliance Services

Agilent CrossLab Compliance

Qualification Type:	ES-OQ
System ID:	MY15330001
EQP Name:	AgilentRecommended
EQP Revision:	ES.02.50
EQP Publish Date:	March 2020
Date:	November 28, 2023 1:10:31 PM
Report Type:	Report
Org. Name:	Environment Research & Technology Co.,Ltd
Org. Location:	25/114 Moo 6 Soi Chinaket, Ngamwongwan Rd., Bangkok 10210

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Test Summary

Purpose

This section includes the Overall Qualification Status and details for each test that meets at least one of the following criteria: (1) was not scheduled; (2) was scheduled but not run; (3) was processed more than once; (4) passed recommended limits only when dual limits were selected; (5) required deviation(s) or comment(s); (6) required integration event change(s). Tests that pass and do not meet any criteria above are not included.

For a complete list of scheduled tests, see the table of contents. For supporting documentation, refer to the Attachments section.

NOTE: A Pass for the Overall Qualification Status indicates that all scheduled tests were run and passed; R, I, D, and C are blank if not applicable for that specific test.

R: runs
I: integration event changes
D: number of deviations submitted
C: number of comments submitted
Status: NS (not scheduled); NR (scheduled but not run); NC (unlocked but not completed)

Details

Test	Status			
	R	I	D	C

There were no repeated or re-integrated tests. All test resulted in a pass status.

Overall Qualification Status

Pass

Service Details

Purpose

This section includes local contact and delivery details for this service.

General Details

Service Order No./Request:	6006377416
EQP Name:	AgilentRecommended
EQP Revision:	ES.02.50
Report Type:	Report

Organization Details

Name:	Environment Research & Technology Co.,Ltd
Location:	25/114 Moo 6 Soi Chinaket, Ngamwongwan Rd., Bangkok 10210

Local Contact Details

Name:	K Raiwin Posit
Job Title:	Supervisor Scientist
Qualification Location:	ICPOES Room

Operator Details

Name:	Worawit Timakul
Job Title:	Field Service Engineer

Data Acquisition Details

Acquisition Software Name:	ICP Expert
Acquisition Software Revision:	7.1.0.6821
Customer Data System (CDS):	Es: ICP Expert

Instrument Details

Purpose

This section describes the as found system configuration.

Details

Spectrometer 1	
Manufacturer	Agilent Technologies
Name	5100 VDV
Model Number	G8011A
Sample Introduction	Double pass glass cyclonic spraychamber and seaspray nebulizer
Serial Number	MY15330001
Firmware Revision	2994
Chiller 1	
Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G8481A
Serial Number	1A1560387
Autosampler 1	
Manufacturer	Agilent Technologies
Name	SPS4
Model Number	G8410A
Serial Number	AU15220240
Vapor Generator 1	
Manufacturer	Agilent Technologies
Name	VGA77P
Model Number	G8475A
Serial Number	MY15330002

Protocol Details

Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ES.02.50	Autosampler Operation
ES.02.50	Instrument Tests
ES.02.50	Preparation

Preparation

Purpose

This test records a status for each preparation task for the Agilent ICP-OES.

Configuration Details

Model/Serial No.:	G8011A	MY15330001

Results

Criteria	Observed Result	Expected Result	Status
Does the plasma igrite successfully in the first three attempts?	Yes	Yes	Pass
Was the detector calibration performed and completed successfully?	Yes	Yes	Pass
Was the instrument calibration performed and completed successfully?	Yes	Yes	Pass

Test Evidence

Image Details: Was the detector calibration performed and completed successfully?

Date and Time: November 28, 2023 12:56:03 PM

Host Name: 5CGC202NQ4

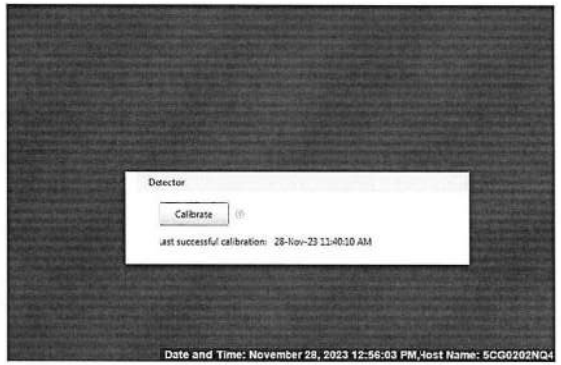
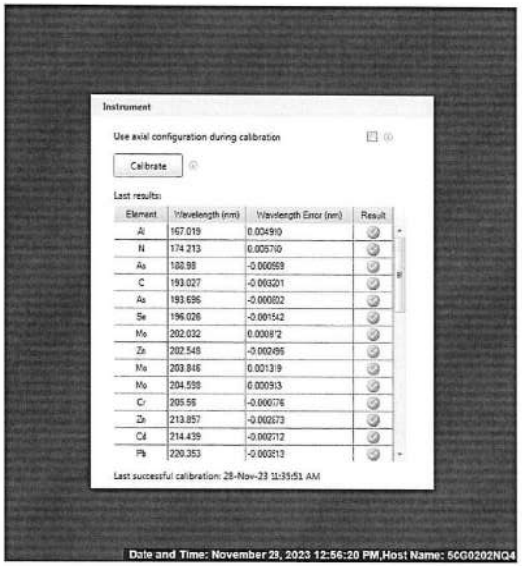


Image Details: Was the instrument calibration performed and completed successfully?

Date and Time: November 28, 2023 12:56:20 PM

Host Name: 5CG0202NQ4



Overall Test Status

Pass	Runs: 1

Instrument Tests

Purpose

This test records a status for each of the automated tests within the Agilent ICP-OES CDS. For detailed test criteria, refer to the attached report.

Configuration Details

Model/Serial No.:	G8011A	MY15330001

Results	Observed Result	Expected Result	Status
Are the Functional Tests results within acceptance criteria?			
Subsystem Communications	Yes	Yes	Pass
Air Flow	Yes	Yes	Pass
Water Flow	Yes	Yes	Pass
Gas Flows	Yes	Yes	Pass
RF Generator	Yes	Yes	Pass
Camera	Yes	Yes	Pass
Optics	Yes	Yes	Pass
Are the Instrument Performance Tests results wthin acceptance criteria?			
Resolution	Yes	Yes	Pass
Sensitivity	Yes	Yes	Pass
Precision	Yes	Yes	Pass

Overall Test Status

Pass	Runs: 1

Autosampler Operation

Purpose

This test verifies that the autosampler operates properly.

Configuration Details

Model/Serial No.:	G8410A	AU15220240

Results

Criteria	Observed Result	Expected Result	Status
Does the autosampler successfully move to the specified location(s)?	Yes	Yes	Pass

Overall Test Status

Pass Runs: 1

Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results. Note: Hardware/software configuration management is the customer's responsibility.

Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-requisite trainings for Data Integrity, General Compliance topics (GMP, GLP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The one certificate encompasses all pre-requisite trainings as documented in the Agilent Learning Management System called Success Factors.

Location	Category	Document Name	Page
EQR	General	Certificate of Qualification for ACE	13
EQR	General	Operator's training certificate and qualifications	14
EQR	General	Operator's training certificate and qualifications	15
EQR	General	Certificate of System Qualification	16
EQR	General	Instrument's Test Report	17
EQR	General	Software Verification	20
EQR	Material	Certificate of Analysis Wavelength calibration solution	21

General

Document Name: Certificate of Qualification for ACE

Agilent Technologies

Agilent Compliance Engine Self Qualification

Date: October 18, 2023 10:19:46 AM

Drive Serial #: 90593EBA **Platform Revision:** ACE 3.12.112

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the concise summary and are structured by the actual algorithms challenged during the process. There is not a one-to-one relationship between algorithms and OQ program tests because some algorithms are used by several tests and across multiple similar hardware components of the qualified systems.

Technique Type	Tests Completed	Result
Atomic Absorption	7	Conforms
Capillary Electrophoresis	10	Conforms
Dissolution	6	Conforms
Emission Spectroscopy	3	Conforms
Gas Chromatography - GCMS	17	Conforms
Gas Chromatography	29	Conforms
Gel Permeation Chromatography	9	Conforms
ICP-MS	6	Conforms
Infrared Spectroscopy	7	Conforms
Liquid Chromatography	17	Conforms
Liquid Chromatography - LCMS	8	Conforms
Microfluidics	18	Conforms
Sample Preparation - Gas Chromatography	9	Conforms
Sample Preparation - Liquid Chromatography	8	Conforms
Supercritical Fluid Chromatography	15	Conforms
Software	6	Conforms
UV-Vis Spectrophotometer	13	Conforms

Overall Qualification Status

Conforms

General

Document Name: Operator's training certificate and qualifications

Agilent Technologies

Certificate of Completion

Learner Name:	Worawit Timakul
Title Of Course:	ANV-CE-ICPOES-2-008-A: Agilent 5100 ICP-OES Support Neophyte Training
Completion Date:	August 25, 2016
Certified By Company:	Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through whichthe service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

General

Document Name: Operator's trairing certificate and qualifications

Agilent Technologies

Certificate of Completion

Learner Name:	Worawit Timakul
Title Of Course:	ANV-CE-ICPOES-2-007-C: CrossLab Compliance Hardware Specific Delivery for Agilent ICP-OES Systems
Completion Date:	October 30, 2020
Certified By Company:	Learning at Agilent

All Serviceand Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, updati training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

General

Document Name: Certificate of System Qualification

Agilent Technologies

Certificate of Completion

Learner Name: Worawit Timakul

Title Of Course: AN-CE-SS-II-030-A: ACE 3.X User Update Training

Completion Date: July 1, 2020

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

General

Document Name: Instrument's Test Report

Report Summary

Instrument Model	Agilent 5100 VDV ICP-OES
Instrument ID	G8011A
Instrument Serial Number	MY15330001
Software Version	7.1.0.6821
Firmware Version	2994
Tested By	Worawit T.
Test Completed On	27-Nov-23 2:23:13 PM

Result Summary

Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass

Resolution Test **Pass**

Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	7.28
As (188.980 nm)	≤ 8.20	6.66
C (193.027 nm)	≤ 11.50	8.01
Mo (202.032 nm)	≤ 8.20	6.71
Cr (206.158 nm)	≤ 13.40	10.27
Zn (213.857 nm)	≤ 8.70	7.56
Pb (220.353 nm)	≤ 9.50	7.70
Co (228.615 nm)	≤ 17.20	10.70
Ba (230.424 nm)	≤ 9.40	8.14
Mn (257.610 nm)	≤ 13.30	9.43
Mn (260.568 nm)	≤ 20.30	15.91
Cr (267.716 nm)	≤ 11.00	9.30
Cu (324.754 nm)	≤ 25.00	17.80
Cu (327.395 nm)	≤ 14.20	12.73
Sr (338.071 nm)	≤ 33.50	27.28
Ba (455.403 nm)	≤ 44.00	31.08
Sr (460.733 nm)	≤ 36.00	21.11
Ba (493.408 nm)	≤ 36.00	29.33
Ba (614.171 nm)	≤ 42.00	32.02
Ar (675.283 nm)	≤ 74.00	64.85
K (766.491 nm)	≤ 80.00	62.51

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Sensitivity Test **Pass**

Radial

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 46.0	SRBR	111.1	1111.0	85.2
Se (196.026 nm)	≥ 41.0	SRBR	68.5	856.2	116.3
Zn (213.857 nm)	≥ 1421.0	SRBR	3583.1	52766.1	215.1
Pb (220.353 nm)	≥ 46.0	SRBR	183.7	2811.8	201.3
Mn (257.610 nm)	≥ 3518.0	SRBR	10286.2	279763.9	735.3
Al (396.152 nm)	≥ 3.4	SBR	8.2	37571.9	4071.0
Ba (493.408 nm)	≥ 34.0	SBR	100.5	1198903.7	11807.1
K (766.491 nm)	≥ 1.8	SBR	3.8	100874.8	20871.5

Axial

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	248.6	3738.6	202.3
Se (196.026 nm)	≥ 159.0	SRBR	163.8	3040.9	283.3
Zn (206.200 nm)	≥ 234.0	SRBR	1402.0	19648.6	192.3
Zn (213.857 nm)	≥ 1743.0	SRBR	8340.9	200514.1	574.5
Cd (214.439 nm)	≥ 4227.0	SRBR	7605.2	156421.5	420.7
Pb (220.353 nm)	≥ 320.0	SRBR	631.4	16069.9	600.3
Mn (257.610 nm)	≥ 10625.0	SRBR	32328.3	1472044.4	2067.5
Cr (267.716 nm)	≥ 1048.0	SRBR	4308.3	155802.6	1286.3
Cu (324.754 nm)	≥ 19.0	SBR	57.8	242584.8	4123.5
Al (396.152 nm)	≥ 6.0	SBR	21.9	239924.8	10474.6
Ba (493.408 nm)	≥ 60.0	SBR	236.0	7235267.3	30527.2
K (766.491 nm)	≥ 24.0	SBR	68.8	3110677.8	44585.8

Precision Test **Pass**

Radial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	0.74
Se (196.026 nm)	≤ 2.60	0.65
Zn (213.857 nm)	≤ 1.50	0.21
Pb (220.353 nm)	≤ 2.60	0.51
Mn (257.610 nm)	≤ 1.50	0.25
Al (396.152 nm)	≤ 1.50	0.30
Ba (493.408 nm)	≤ 1.50	0.60
K (766.491 nm)	≤ 1.50	0.20

Axial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.51
Se (196.026 nm)	≤ 1.50	0.37
Zn (206.200 nm)	≤ 1.50	0.30
Zn (213.857 nm)	≤ 1.50	0.26
Cd (214.439 nm)	≤ 1.50	0.21
Pb (220.353 nm)	≤ 1.50	0.30
Mn (257.610 nm)	≤ 1.50	0.63
Cr (267.716 nm)	≤ 1.50	0.17
Cu (324.754 nm)	≤ 1.50	0.32
Al (396.152 nm)	≤ 1.50	0.30
Ba (493.408 nm)	≤ 1.50	0.48
K (766.491 nm)	≤ 1.50	0.53

General

Document Name: Software Verification

Software Verification Report

Date:	Monday, November 27, 2023	**Time:**	1:58:23 PM [UTC -07:00:00]	**Host Name:**	5100VDV-HP
Windows User Name:	Admin	**Base Revision Number:**	7.0.1	**Product Name :**	ICP Expert
Install Type:	N/A	**Additional Packages:**	NA		

Base Reference File Name : ICPReferencefile.xml

Summary :

Overall Evaluation of Installation Check : PASS

File Report Summary

No missing files or invalid files found

No system file difference found

Files Registration Report Summary

Files Registration check not required for this product

Registry Report Summary

Registry entries check not required for this product

Materials

Document Name: Certificate of Analysis Wavelength calibration solution

Agilent

CERTIFICATE OF ANALYSIS

Agilent Product Name: Wavelength Calibration Solution for ICP-OES & MP-AES, 5 mg/L, 500mL
Agilent Part No: 6610030100
Lot No: 0012990411

Product Specifications

Analyte	Starting Material	CAS #	Certified Conc.	Analyte	Starting Material	CAS #	Certified Conc.
Al	$Al(NO_3)_3$	7784-27-2	5.000 ± 0.025 mg/L	Mn	Mn	7439-96-5	5.000 ± 0.025 mg/L
As	As	7440-38-2	5.000 ± 0.025 mg/L	Mo	$(NH_4)_6Mo_7O_{24}$	13106-76-8	5.000 ± 0.025 mg/L
Ba	$Ba(NO_3)_2$	10022-31-8	5.000 ± 0.025 mg/L	Ni	Ni	7440-02-0	5.000 ± 0.025 mg/L
Cd	Cd	7440-43-9	5.000 ± 0.025 mg/L	Pb	Pb	7439-92-1	5.000 ± 0.025 mg/L
Co	Co	7440-48-4	5.000 ± 0.025 mg/L	Se	Se	7782-49-2	5.000 ± 0.025 mg/L
Cr	$Cr(NO_3)_3$	13548-38-4	5.000 ± 0.025 mg/L	Sr	$Sr(NO_3)_2$	10042-76-9	5.000 ± 0.025 mg/L
Cu	Cu	7440-50-8	5.000 ± 0.025 mg/L	Zn	Zn	7440-66-6	5.000 ± 0.025 mg/L
K	KNO_3	7757-79-1	50.00 ± 0.25 mg/L				

Matrix: 5% HNO_3

Intended Use: This solution is intended for use as a certified reference material or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), atomic absorption spectroscopy (flame AAS or GFAAS), microwave plasma atomic emission spectroscopy (MP-AES), x-ray fluorescence spectroscopy (XRF), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured under a quality management system that is registered to **ISO 9001, ISO 17034** and **ISO/IEC 17025.** This CRM was prepared to the certified concentrations shown above by gravimetric methods using single-element concentrates that were certified using the **"High Performance ICP-OES"** protocol developed by NIST and are directly traceable to the NIST SRMs listed below. This solution was stabilized using high purity nitric acid (HNO_3) and diluted with filtered (0.22µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against NIST SRMs: 3101a, 3103a, 3104a, 3108, 3113, 3112a, 3114, 3141a, 3132, 3134, 3136, 3128, 3148, 3153a, and 3168a. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: Agilent recommends that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy the analyst should: (1) use only pre-cleaned containers and transferware, (2) avoid pipetting directly from the CRM's original container, (3) use a minimum sub-sample size of 500µL, (4) make dilutions using calibrated balances or certified volumetric class A flasks and pipettes, (5) dilute to volume using the same matrix as the original CRM, and (6) never pour used product back into the original container. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or expose to direct sunlight. Minimize exposure to moisture or high humidity.

Page 1 of 3

Agilent

Period of Validity: Agilent ensures the accuracy of this solution until the expiration date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Sample lot approver:

Date of release: 18 October 2022
Date of expiration: 30 April 2024

Chuck Goudreau, Certifying Officer

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Agilent CrossLab Compliance Services

Document Name: Certificate of Analysis Wavelength calibration solution

Agilent

Hazard Information: Refer to the Safety Data Sheet (SDS), which can be obtained at www.agilent.com/chem/sds.

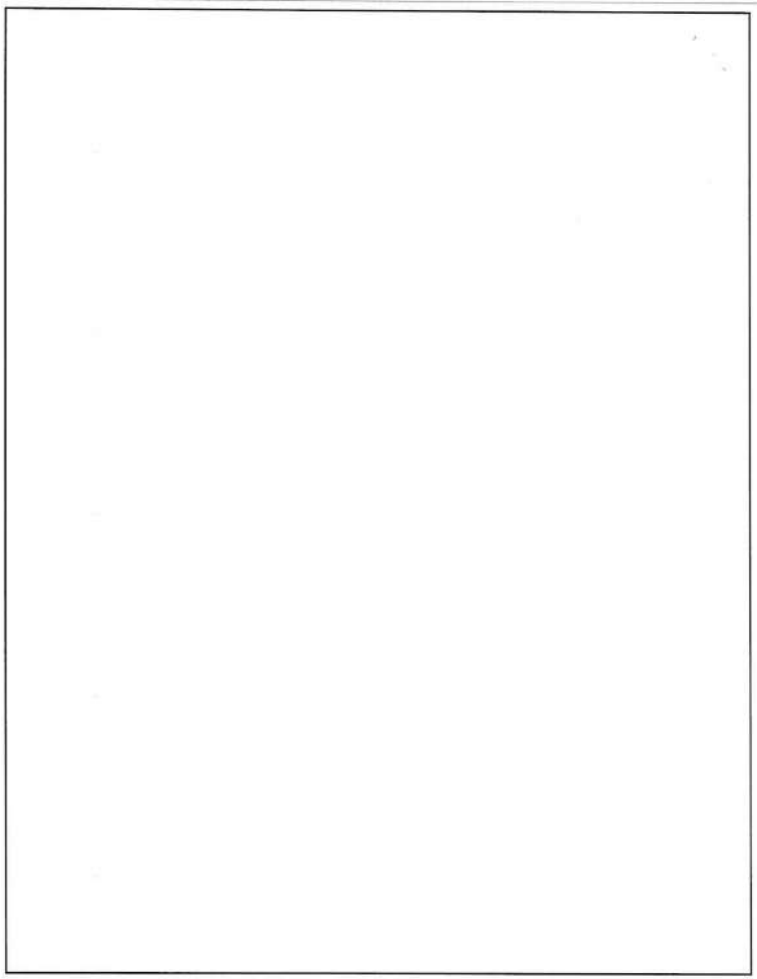
Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO 17034 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with OSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the instructions for Use, as doing so will invalidate the certified values and uncertainties.

Further Information: Please contact Agilent for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is:

- Registered to ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. Reg. No. 44 100 18580231)
- Accredited to ISO 17034– General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
  - ISO 17034references additional requirements specified in ISO Guide 31 and ISO Guide 35.
- Accredited to ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)
- LGC Standards, 316 Abby Rod, Manchester, NH 03103

Document Name: Certificate of Analysis Wavelength calibration solution



Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distirct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defned in your data access and control procedures.)

Details

Full Name of Signer	Worawit Timakul
Logged On User Name:	worawit.timakul@agilent.com
Signature Creation Date:	November 28, 2023
Reason for Signature:	Executed protocol and published this original version of document

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

Warranty

Agilent Technologies makes no warranty of any kind to this material, including but not limited to, the implied warranties or merchantability and fitness for a particular purpose. Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

User Name: worawit.timakul
System Id: MY15330001
Report Generated by Hostname: 5CG0202NQ4
Print Date: November 28, 2023 1:10:41 PM

OQHW ICP 5100 ENvi Research Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 28, 2023 12:54:06 PM	Audit	SessionCreated	Session	None
November 28, 2023 12:54:06 PM	Start	Configuration	Session	None
November 28, 2023 12:54:06 PM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
November 28, 2023 12:54:32 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Es] - File path: [ProtocolPacks/Es/Configurations02.50/Es.02.50.eqp], EQP File Name: [Es02.50.eqp], EQP Name: [AgilentRecommended],Protocol Revision :[Es.02.50]
November 28, 2023 12:54:38 PM	End	Configuration	Session	None
November 28, 2023 12:54:41 PM	Start	Qualification	Session	OQ
November 28, 2023 12:54:41 PM	Start	Execution	Preparation : 5100 VDV: Qualitative Test - No setpoints associated	None
November 28, 2023 12:56:26 PM	End	Execution	Preparation : 5100 VDV: Qualitative Test - No setpoints associated	Run Count : 1
November 28, 2023 12:56:27 PM	Start	Execution	Instrument Tests : 5100 VDV: Qualitative Test - No setpoints associated	None
November 28, 2023 12:56:57 PM	End	Execution	Instrument Tests : 5100 VDV: Qualitative Test - No setpoints associated	Run Count : 1

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Agilent CrossLab Compliance Services

User Name: worawit.timakul
System Id: MY15330001
Report Generated by Hostname: 5CG0202NQ4
Print Date: November 28, 2023 1:10:41 PM

OQHW ICP 5100 ENvi Research Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 28, 2023 12:57:03 PM	Start	Execution	Autosampler Operation : Autosampler 1 - SPS4: Qualitative Test - No setpoints associated	None
November 28, 2023 12:57:08 PM	End	Execution	Autosampler Operation : Autosampler 1 - SPS4: Qualitative Test - No setpoints associated	Run Count : 1
November 28, 2023 12:57:09 PM	End	Qualification	Session	OQ
November 28, 2023 12:57:09 PM	Start	Reporting	Session	None
November 28, 2023 1:04:49 PM	Audit	AceRestarted	Session	None
November 28, 2023 1:04:50 PM	Audit	SessionReloaded	Session	None
November 28, 2023 1:04:58 PM	Start	Qualification	Session	OQ
November 28, 2023 1:08:10 PM	Audit	Reporting	Session	Report Generated : Certificate
November 28, 2023 1:09:28 PM	Audit	Reporting	Session	Report Generated : Report

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User Name: worawit.timakul
Report Generated by Hostname: 5CG0202NQ4

System Id: MY15330001
Print Date: November 28, 2023 1:10:41 PM

OQHW ICP 5100 ENvi Research Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 28, 2023 1:10:31 PM	Audit	Reporting	Session	Report Signed : Certificate PDF Name: OQHW ICP 5100 ENvi Research_20231128_Certificate_1.pdf User Name: worawit.timakul@agilent.com Ful Name of Signer: Worawit Tirrakul Reason for signature: Executed protocol and published this original version of ocument

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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. 0-2717-3000-29 FAX. 0-2719-9484

NSC-TISI-TIS17025
CALIBRATION 0008

Cert.No.: 24CH10
Page.: 1 of 2

Certificate of Calibration

Equipment :	Conductivity Meter
Manufacturer :	HM DIGITAL
Model :	COM-100
Serial No. :	PONPE5863548
ID No. :	NO.4
Condition As-Received:	Used Item
Received Date :	05 January 2024
Calibration Date :	08 January 2024
Reference :	2401-0077DN-6
Submitted by :	Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure:	In -house method : - CP-CH6 : based on direct measurement by using certified referece material (CRM)
Calibrated by :	Walalak Sirithean
Approved by :	[redacted] Approved Signatory

(✓) Saithip Meangmai
( ) Warakorn Lerngagtrakul
( ) Ponpan Paipim

Issue Date : 10 January 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0062387

Cert.No.: 24CH10

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	9549224	130RC003	23I435	10 Apr 2024

- This Certification is traceable to SI Throught Technology Promotion Association (Thailand - Japan)

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 calibration solution, Thermo Scientific (traceable to NIST)

Conductivity Solution	Manufacturer	Lot No.	Exp. date
*100 µS/cm	Thermo Scientific	193/01	11 May 2024
1413.0 µS/cm	CPA Chem	931955	30 Sep 2024

- 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.: PONPE5863548

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
*100 µS/cm	101 µS/cm	99.9 µS/cm	5.1 µS/cm	2.00
1413.0 µS/cm	1445 µS/cm	1410 µS/cm	11 µS/cm	2.00

Remark - UUC* = Unit Under Calibration

- * = Not NSC · ONSC Accredited

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 %.

-o0o-

[redacted]

a 1196383

Calibration Certificate ID
TH3067-066-011524-ACC-TH

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd. Bangna Tai Sub-District
Bangna District, Bangkok 10260
+662 723 0382
MT-TH.ServiceSupport@mt.com

METTLER TOLEDO

NSC-TISI-TIS 17025
CALIBRATION 0062

Accuracy Calibration Certificate

Customer

Company:	Environment Research & Technology Co., Ltd.		
Address:	25/114 Moo 6, Soi Chiraket 1, Ngamwongwan Rd., Toongsonghong		
City:	Laksi	**Contact:**	Ramita Tsengthai
Zip / Postal:	10210		
State / Province:	Bangkok		
Order Number:	0332963611		

Weighing Device

Manufacturer:	Mettler Toledo	**Instrument Type:**	Weighing Instrument
Model:	MS204TS/00	**Asset Number:**	ERTC-L-IN-114
Serial No.:	B547728937	**Terminal Model:**	N/A
Building:	N/A	**Terminal Serial No.:**	N/A
Floor:	5	**Terminal Asset No.:**	N/A
Room:	504		

Range	Max. Capacity	Readability (d)
1	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)

METTLER TOLEDO Work Instruction: CP/W002/20

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 26.9 °C	End: 27.0 °C	Start: 44.5 %	End: 44.6 %

As Found Calibration Date: 15-Jan-2024

As Left Calibration Date: N/A

Issue Date: 15-Jan-2024

Calibrator: [redacted]
Nithit Jongkrod

Approved Signatory: [redacted]
Technical Manager / Head of Calibration Center

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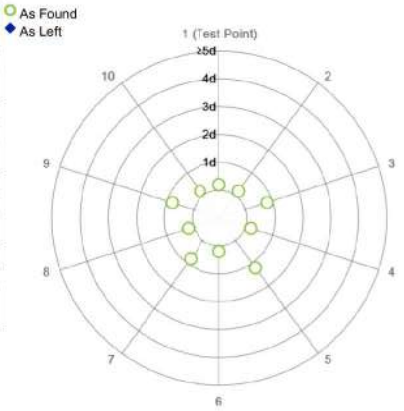
Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	100.0000 g	N/A
2	100.0000 g	N/A
3	100.0001 g	N/A
4	100.0000 g	N/A
5	99.9999 g	N/A
6	100.0000 g	N/A
7	100.0001 g	N/A
8	100.0000 g	N/A
9	100.0001 g	N/A
10	100.0000 g	N/A

Standard Deviation	0.00006 g	N/A



The "d" in the graph represents the readability of the range/interval in which the test was performed.

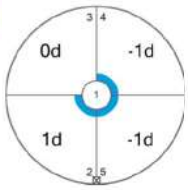
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	100.0001 g	N/A
3	100.0000 g	N/A
4	99.9999 g	N/A
5	99.9999 g	N/A

Maximum Deviation	0.0001 g	N/A



As Found

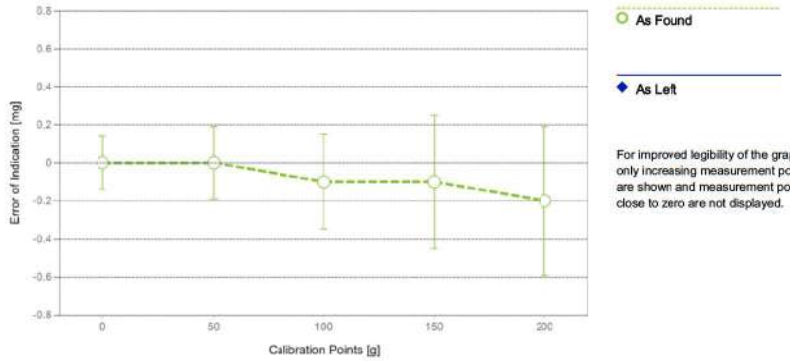
The "d" in the graph represents the readability of the range/interval in which the test was performed.

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Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.14 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.15 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.15 mg	2
4	0.5000 g	0.5001 g	0.0001 g	0.15 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.15 mg	2
6	5.0000 g	5.0001 g	0.0001 g	0.16 mg	2
7	10.0000 g	10.0000 g	0.0000 g	0.16 mg	2
8	50.0000 g	50.0000 g	0.0000 g	0.19 mg	2
9	100.0001 g	100.0000 g	-0.0001 g	0.25 mg	2
10	150.0001 g	150.0000 g	-0.0001 g	0.35 mg	2
11	200.0000 g	199.9998 g	-0.0002 g	0.39 mg	2



For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor *k* – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated. The results of this calibration certificate relate only to the calibrated item.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS52	Date of Issue:	22-Nov-2022
Certificate Number:	182272	Calibration Due Date:	21-May-2024

Thermo Hygrometer

Equipment No.:	IN302	Date of Issue:	11-Oct-2023
Certificate Number:	SG-H-00656/66	Calibration Due Date:	08-Oct-2024

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Remarks

FACT adjustment functionality activated

Equipment condition: Good

Next calibration according to customer's procedure

Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

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Calibration Certificate ID
TH3067-066-011524-ACC-TH

METTLER TOLEDO Service

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $3.0 \cdot 10^{-6}$ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

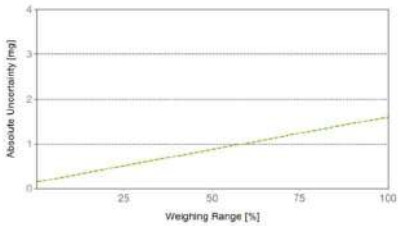
Linearization of Uncertainty Equation

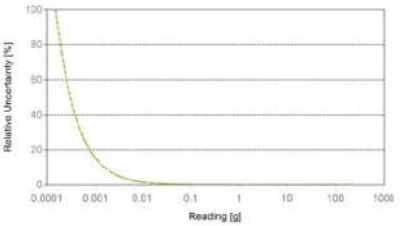
Range			As Found	As Left
	d	Max		
1	0.0001 g	220 g	U_T = 0.15 mg + 0.00663 mg/g · R	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.0220 g	0.15 mg	0.68%	N/A	N/A
0.2200 g	0.15 mg	0.069%	N/A	N/A
2.2000 g	0.16 mg	0.0075%	N/A	N/A
22.0000 g	0.30 mg	0.0013%	N/A	N/A
220.0000 g	1.6 mg	0.00073%	N/A	N/A





As Found

As Left

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GWP®
Certificate

As Found ✓

The weighing device meets the given process requirements.

As Left ✓

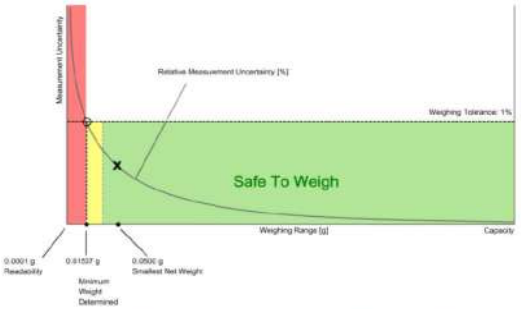
The weighing device meets the given process requirements.

Tests Performed: ☑ As Found ☐ As Left ☑ No adjustments/modifications made. As Left results correspond to As Found.

Process Requirements

Weighing Tolerance: **1%** | Smallest Net Weight: **0.0500 g** | Safety Factor: **2**

Safe Weighing Range



While the values in this graph reflect the actualcalibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

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Attachment to Calibration Certificate:
TH3067-066-011524-ACC-TH
GWP® Certificate

METTLER TOLEDO Service

Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	1	2	3	5	10
0.1%	0.15156 g	0.30515 g	0.46083 g	0.77857 g	1.61241 g
0.2%	0.07553 g	0.15156 g	0.22810 g	0.38273 g	0.77857 g
0.5%	0.03015 g	0.06038 g	0.09069 g	0.15156 g	0.30515 g
1%	0.01507 g	0.03015 g	0.04526 g	0.07553 g	0.15156 g
2%	0.00753 g	0.01507 g	0.02261 g	0.03770 g	0.07553 g
5%	0.00301 g	0.00602 g	0.00904 g	0.01507 g	0.03015 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	1	2	3	5	10
0.1%	0.15156 g	0.30515 g	0.46083 g	0.77857 g	1.61241 g
0.2%	0.07553 g	0.15156 g	0.22810 g	0.38273 g	0.77857 g
0.5%	0.03015 g	0.06038 g	0.09069 g	0.15156 g	0.30515 g
1%	0.01507 g	0.03015 g	0.04526 g	0.07553 g	0.15156 g
2%	0.00753 g	0.01507 g	0.02261 g	0.03770 g	0.07553 g
5%	0.00301 g	0.00602 g	0.00904 g	0.01507 g	0.03015 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is ecual to or less than 1/1 (no safety factor), 1/2 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with k = 2 and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply forfuture measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

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Measurement Results

Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed
✗ = Failed
⚠ = Safety Factor not met

Repeatability

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	N/A	0.00006 g*	N/A	0.00006 g*	N/A
0.2%	0.00005 g		✗		✗
0.5%	0.00013 g		✓		✓
1%	0.00025 g		✓		✓
2%	0.00050 g		✓		✓
5%	0.00125 g		✓		✓

*The calculated standard deviation value is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test and the calculation of the minimum weight.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0001 g	✓	0.0001 g	✓
0.2%	0.1000 g		✓		✓
0.5%	0.2500 g		✓		✓
1%	0.5000 g		✓		✓
2%	1.0000 g		✓		✓
5%	2.5000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

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Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	-0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0002 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	-0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0002 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

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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. 0-2717-3000-29 FAX. 0-2719-9484

Certificate of Calibration

Equipment :	Salinity Meter
Manufacturer :	AZ
Model :	AZ8372
Serial No. :	2103264
ID No. :	-
Condition As-Received:	Used Item
Received Date :	05 January 2024
Calibration Date :	08 January 2024
Reference :	2401-0077DN-9
Submitted by :	Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(65 ± 15) %
Calibration Procedure:	In - house method : based on direct measurement by using Sodium Chloride Solution
Calibrated by :	Walalak Sirithean
Approved by :	[redacted] Approved Signatory

( ) Malee Butkruea
(✓) Saithip Meangmai
( ) Warakorn Lerngagtrakul

Issue Date : 10 January 2024

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

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration and Testing Equipment Services.

Condition of this result of calibration

1. Reference Standard Instruments :
   This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center,Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Thermometer	9549224	130RC003	23I435	10 Apr 2024
2) Thermo-Hygrograph	1103328	130EC010	23H1361	13 June 2024

2. Reference Standard Material :
   - Conductivity calibrated solution, Eutech Instruments Pte Ltd., The measurement results are traceable to SI through ThermoFisher Scientific Water and Lab Products.
   - Calibrated Total Dissolved Solids solution temperature controlled by Water bath at (25 ± 0.1) °C
   - The Total Dissolved Solids has been prepared dilution from
3. This certificate is valid only to the item calibrated on date and place of calibration.

Material	Manufacturer	Lot No.	Exp. Date
25 ppt	Eutech	292/01	22 July 2025

Calibration results **(*) Without Adjustment**

Probe Serial No. : 2103264

Standard NaCl Solution	UUC* Reading	Uncertainty of Measurement (±)
2.50 ppt	2.55 ppt	0.027 ppt
2.84 ppt	2.98 ppt	0.030 ppt

Remark: - UUC* = Unit Under Calibration
- ppt = ppt of NaCl
- ppt = Parts per Thousand

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

-o0o-

[redacted]

Calibration Certificate ID
TH3067-065-011524-ACC-TH

METTLER TOLEDO

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+662 723 0382
MT-TH.ServiceSupport@mt.com

NSC-TISI-TIS 17025
CALIBRATION 0062

Accuracy Calibration Certificate

Customer

Company:	Environment Research & Technology Co., Ltd.		
Address:	25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Toongsonghong		
City:	Laksi	**Contact:**	Ramita Taengthai
Zip / Postal:	10210		
State / Province:	Bangkok		
Order Number:	0332963611		

Weighing Device

Manufacturer:	Mettler Toledo	**Instrument Type:**	Weighing Instrument
Model:	MS204S/01	**Asset Number:**	ERTC-L-IN-088
Serial No.:	B334691537	**Terminal Model:**	N/A
Building:	N/A	**Terminal Serial No.:**	N/A
Floor:	5	**Terminal Asset No.:**	N/A
Room:	504		

Range	Max. Capacity	Readability (d)
1	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CP/W00220

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 27.5 °C	End: 26.9 °C	Start: 44.1 %	End: 44.8 %

As Found Calibration Date: 15-Jan-2024
As Left Calibration Date: N/A
Issue Date: 15-Jan-2024

Calibrator: [redacted]

Approved Signatory: [redacted]
Technical Manager / Head of Calibration Center

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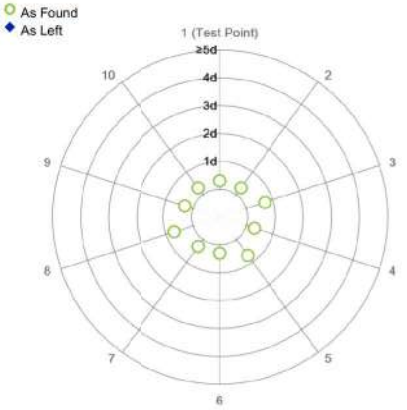
Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	100.0000 g	N/A
2	100.0000 g	N/A
3	99.9999 g	N/A
4	100.0000 g	N/A
5	99.9999 g	N/A
6	100.0000 g	N/A
7	100.0000 g	N/A
8	99.9999 g	N/A
9	100.0000 g	N/A
10	100.0000 g	N/A

Standard Deviation	**0.00005 g**	**N/A**



The "d" in the graph represents the readability of the range/interval in which the test was performed.

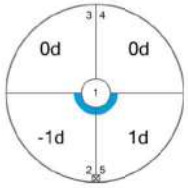
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	99.9999 g	N/A
3	100.0000 g	N/A
4	100.0000 g	N/A
5	100.0001 g	N/A

Maximum Deviation	**0.0001 g**	**N/A**



As Found

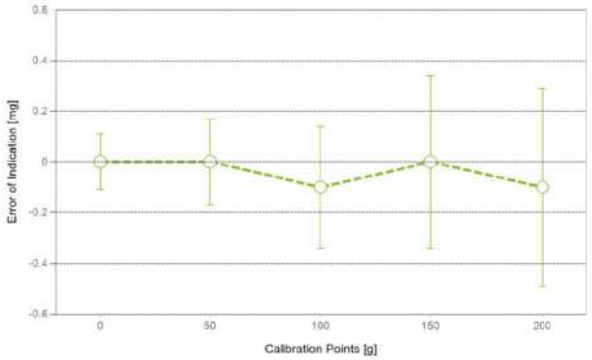
The "d" in the graph represents the readability of the range/interval in which the test was performed.

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Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.11 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.13 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.13 mg	2
4	0.5000 g	0.5000 g	0.0000 g	0.13 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.13 mg	2
6	5.0000 g	5.0000 g	0.0000 g	0.13 mg	2
7	10.0000 g	10.0000 g	0.0000 g	0.14 mg	2
8	50.0000 g	50.0000 g	0.0000 g	0.17 mg	2
9	100.0001 g	100.0000 g	-0.0001 g	0.24 mg	2
10	150.0001 g	150.0001 g	0.0000 g	0.34 mg	2
11	200.0000 g	199.9999 g	-0.0001 g	0.39 mg	2



For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor *k* – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated. The results of this calibration certificate relate only to the calibrated item.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS52	Date of Issue:	22-Nov-2022
Certificate Number:	182272	Calibration Due Date:	21-May-2024

Thermo Hygrometer

Equipment No.:	IN302	Date of Issue:	11-Oct-2023
Certificate Number:	SG-H-00656/66	Calibration Due Date:	08-Oct-2024

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Remarks

FACT adjustment functionality activated

Equipment conditon: Good

Next calibration according to customer's procedure

Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

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Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-6}$ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

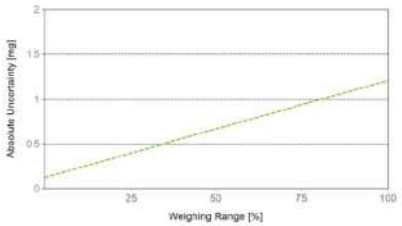
Linearization of Uncertainty Equation

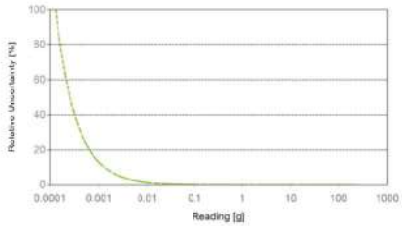
Range			As Found	As Left
	d	Max		
1	0.0001 g	220 g	U_1 = 0.13 mg + 0.00494 mg/g R	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.0220 g	0.13 mg	0.59%	N/A	N/A
0.2200 g	0.13 mg	0.060%	N/A	N/A
2.2000 g	0.14 mg	0.0064%	N/A	N/A
22.0000 g	0.24 mg	0.0011%	N/A	N/A
220.0000 g	1.2 mg	0.00055%	N/A	N/A





As Found — As Left

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GWP® Certificate

As Found ✓

The weighing device meets the given process requirements.

As Left ✓

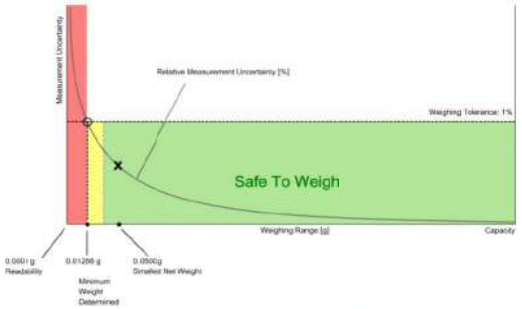
The weighing device meets the given process requirements.

Tests Performed: ☑ As Found ☐ As Left ☑ No adjustments/modifications made. As Left results correspond to As Found.

Process Requirements

Weighing Tolerance: **1%** | Smallest Net Weight: **0.0500 g** | Safety Factor: **2**

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

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Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	1	2	3	5	10
0.1%	0.12712 g	0.25551 g	0.38518 g	0.64847 g	1.33062 g
0.2%	0.06340 g	0.12712 g	0.19115 g	0.32018 g	0.64847 g
0.5%	0.02532 g	0.05070 g	0.07612 g	0.12712 g	0.25551 g
1%	0.01266 g	0.02532 g	0.03800 g	0.06340 g	0.12712 g
2%	0.00633 g	0.01266 g	0.01899 g	0.03166 g	0.06340 g
5%	0.00253 g	0.00506 g	0.00759 g	0.01266 g	0.02532 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	1	2	3	5	10
0.1%	0.12712 g	0.25551 g	0.38518 g	0.64847 g	1.33062 g
0.2%	0.06340 g	0.12712 g	0.19115 g	0.32018 g	0.64847 g
0.5%	0.02532 g	0.05070 g	0.07612 g	0.12712 g	0.25551 g
1%	0.01266 g	0.02532 g	0.03800 g	0.06340 g	0.12712 g
2%	0.00633 g	0.01266 g	0.01899 g	0.03166 g	0.06340 g
5%	0.00253 g	0.00506 g	0.00759 g	0.01266 g	0.02532 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with k = 2 and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

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Attachment to Calibration Certificate:
TH3067-065-011524-ACC-TH
GWP® Certificate

METTLER TOLEDO Service

Measurement Results

Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed
✗ = Failed
⚠ = Safety Factor not met

Repeatability

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	N/A	0.00005 g*	N/A	0.00005 g*	N/A
0.2%	0.00005 g		✓		⚠
0.5%	0.00013 g		✓		✓
1%	0.00025 g		✓		✓
2%	0.00050 g		✓		✓
5%	0.00125 g		✓		✓

*The calculated standard deviation value is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test and the calculation of the minimum weight.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0001 g	✓	0.0001 g	✓
0.2%	0.1000 g		✓		✓
0.5%	0.2500 g		✓		✓
1%	0.5000 g		✓		✓
2%	1.0000 g		✓		✓
5%	2.5000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Software Version: 1.23.2.187
Report Version: 2.17.16
Form Number: F103C

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Attachment to Calibration Certificate:
TH3067-065-011524-ACC-TH
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METTLER TOLEDO Service

Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	0.0000 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	0.0000 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

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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. 0-2717-3000-29 FAX. 0-2719-9484

NSC-TISI-TIS17025
CALIBRATION 0009

Cert. No.: 24TM92
Page : 1 of 3

Certificate of Calibration

Equipment :	Hot Air Oven
Manufacturer :	Binder
Model :	FED 115 E2
Serial No. :	11-22823
ID No. :	ERTC-L-In.-076
Submitted by :	Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
Location :	Laboratory (ERTC)
Received Order :	03 January 2024
Calibration Date :	03 January 2024
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Tawatchai Pama
Approved by :	[redacted] Approved Signatory

( ) Pornthipa Tameyakul
(✓) Ponpan Paipim
( ) Suwit Imjai

Issue Date : 16 January 2024

The Uncertainties are for a confidence probability of approximately 95%

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A 0062471

Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2401-0001ON-2

Cert. No.: 24TM92
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistarce Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard nstrument:-

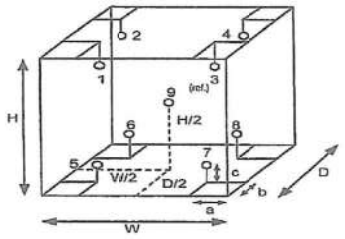
Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013823	23LM66	TPA	25 Mar 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	30	33
REL.Humid. (%)	53	41
AC Supply (Volt)	226	225



Probe Installation Details :

a =	5.0	cm
b =	5.0	cm
c =	5.0	cm

Dimension of Chamber :

D =	0.40	m
W =	0.60	m
H =	0.48	m
Capacity =	0.12	m³

Position :	Ref. Std. ID No.: @ Calibration Point	
	(104) °C	(180) °C
1	21-17RTD-01	22-17TC-01
2	21-17RTD-02	23-17TC-02
3	17RTD-03	19-17TC-03
4	23-17RTD-10	19-17TC-04
5	17RTD-05	19-17TC-05
6	17RTD-06	19-17TC-06
7	17RTD-07	19-17TC-07
8	23-17RTD-08	19-17TC-08
9 (ref.)	23-17RTD-09	19-17TC-09

[redacted]

Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2401-0001ON-2

Cert. No.: 24TM92
Page : 3 of 3

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor *k*
104	104	104	0.10	1.8	2.1	2
180	180	180	0.27	4.4	5.0	2

Calibration Point	Measured Temperature (°C)									Uncertainty
	Position									
(°C)	1	2	3	4	5	6	7	8	9 (ref.)	(±°C)
104	104.379	103.463	103.443	103.893	104.213	103.223	105.222	104.297	103.494	0.77
180	179.045	177.562	181.298	179.300	180.773	177.931	182.136	178.131	178.019	1.6

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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 %.

-o0o-

[redacted]

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

NSC-TISI-TIS17025 CALIBRATION 0008

Cert. No.: 24TM93
Page : 1 of 3

Certificate of Calibration

Equipment :	Hot Air Oven
Manufacturer :	Memmert
Model :	UF 110
Serial No. :	B414.0652
ID No. :	ERTC-L-In.-098
Submitted by :	Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
Location :	Laboratory (ERTC)
Received Order :	03 January 2024
Calibration Date :	03 January 2024
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Tawatchai Pama
Approved by :	[redacted] Approved Signatory

( ) Pornthippa Tameyakul
(V) Ponpan Paipim
( ) Suwit Imjai

Issue Date : 16 January 2024

The Uncertainties are for a confidence probability of approximately 95%

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A 0062472

Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2401-0001ON-3

Cert. No.: 24TM93
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

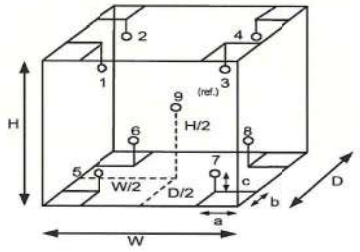
Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013823	23LM66	TPA	25 Mar 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Environment during calibration		
	Beginning	**Finished**
Temp. (°C)	30	30
REL.Humid. (%)	53	53
AC Supply (Volt)	226	225



Probe Installation Details :

a =	5.0	cm
b =	5.0	cm
c =	5.0	cm

Dimension of Chamber :

D =	0.40	m
W =	0.56	m
H =	0.48	m
Capacity =	0.11	m³

Position :	Ref. Std. ID No.: @ Calibration Point	
	(104) °C	(180) °C
1	21-17RTD-01	22-17TC-01
2	21-17RTD-02	23-17TC-02
3	17RTD-03	19-17TC-03
4	23-17RTD-10	19-17TC-04
5	17RTD-05	19-17TC-05
6	17RTD-06	19-17TC-06
7	17RTD-07	19-17TC-07
8	23-17RTD-08	19-17TC-08
9 (ref.)	23-17RTD-09	19-17TC-09

[redacted]

a 1197879

Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2401-0001ON-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM93

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor *k*
104.0	104.0	104.0	0.075	1.2	2.4	2
180.0	180.0	180.0	0.41	3.4	3.9	2

Calibration Point (°C)	Measured Temperature (°C) Position									Uncertainty (±°C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	105.068	102.783	103.239	103.695	104.855	103.867	102.799	103.295	103.959	0.42
180.0	179.954	177.587	177.414	178.118	181.087	179.869	179.584	178.045	180.704	1.3

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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 %.

-o0o-

[redacted]

a 1197878

ระยะผลิตปิโตรเลียม
(การผลิตปิโตรเลียม)

envi research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

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25/114 Mu 6 Soi Chinnakhet 1, Ngam Wong Wan Road,
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Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

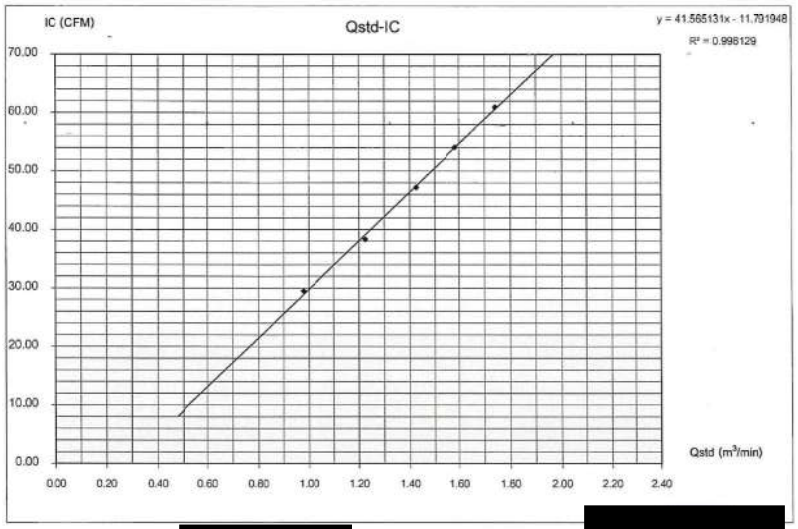
TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00462				*Date*	August 21, 2024
Sampler Location	บ้านหนองไม้ไผ่ฯ1				*Start Time*	5:36 PM
Sampler Number	TSP No.A17	Transfer Standard Type		Orifice	*Stop Time*	5:46 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model		TE-5025A		
Motor Serial Number	HS6000-02	Calibrator Serial Number		2912	*Calibrated By*	Mr. Autapol Areejit
Recorder Serial Number	7366					

Plate No.	(Delta H) Pressure Drop Across Orifice ("H2O) Positive	Negative	ΔH2O	(A) [ΔH2O(Pa/Pstd)(Tstd/Ta)]^1/2	(X) Qstd = (1/m)[(A-b)] (m3/min)	Sample Flow Rate Indicator (ft3/min)	(Y) IC = I[(Pa/Pstd)(Tstd/Ta)]^1/2	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.7	1.7	3.4	1.81365	3.97880	30.0	29.51	306.0	755.0		
7	2.8	2.8	5.6	2.32760	1.22487	39.0	38.35	306.0	755.0		
10	3.9	3.9	7.8	2.74702	1.42506	48.0	47.21	306.0	755.0		
13	4.9	4.9	9.8	3.07912	1.58469	55.0	54.10	306.0	755.0		
18	6.0	6.0	12.0	3.40726	1.74179	62.0	69.98	306.0	755.0		
Linear Regression Y ON X : Y= mX + b							Average	306.0	755.0		
1	Slope (m)			2.08863	Linear Equation			r²	0.998129	Pstd(mmHg)	760.0
2	Intercept (b)			-0.23070	Set Point Flow Rate (X) (m3/min)		1.133	r	0.9990641	Tstp	298.0
3	Correlation Coefficient (r)			0.99990	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.96744926	
Result							C=(Pa/Psd)*(Tstd/Ta)^0.5			0.983589986	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
(Mr.Panupon Podang)
Environmental Scientist

envi research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

Environment Research & Technology Company Limited
25/114 Mu 6 Soi Chinnakhet 1, Ngam Wong Wan Road,
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Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
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Head Office/Tax ID 0105 542 064 981

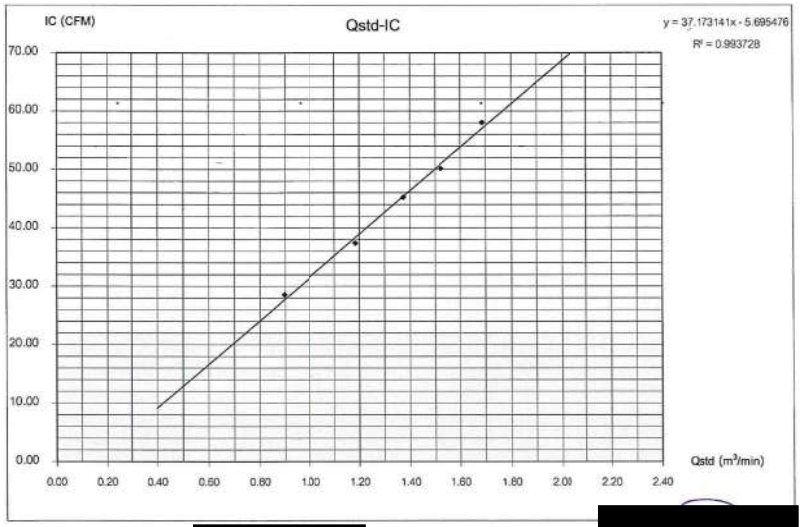
PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00462				*Date*	August 21, 2024
Sampler Location	บ้านหนองไม้ไผ่ฯ1				*Start Time*	5:46 PM
Sampler Number	PM-10 No.21	Transfer Standard Type		Orifice	*Stop Time*	5:56 PM
Instrument Model	HIVOL-BMSBE	Calibrator Model		TE-5025A		
Motor Serial Number	2131	Calibrator Serial Number		2912	*Calibrated By*	Mr. Autapol Areejit
Recorder Serial Number	2392					

Plate No.	(Delta H) Pressure Drop Across Orifice ("H2O) Positive	Negative	ΔH2O	(A) [ΔH2O(Pa/Pstd)(Tstd/Ta)]^1/2	(X) Qstd = (1/m)[(A-b)] (m3/min)	Sample Flow Rate Indicator (ft3/min)	(Y) IC = I[(Pa/Pstd)(Tstd/Ta)]^1/2	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.4	1.4	2.8	1.64586	0.89846	29.0	28.52	306.0	755.0		
7	2.6	2.6	5.2	2.24293	1.18433	38.0	37.38	306.0	755.0		
10	3.6	3.6	7.2	2.63925	1.37408	46.0	45.25	306.0	755.0		
13	4.5	4.5	9.0	2.95077	1.52323	51.0	50.16	306.0	755.0		
18	5.6	5.6	11.2	3.29172	1.68647	59.0	58.03	306.0	755.0		
Linear Regression Y ON X : Y= mX + b							Average	306.0	755.0		
1	Slope (m)			2.08863	Linear Equation			r²	0.993728	Pstd(mmHg)	760.0
2	Intercept (b)			-0.23070	Set Point Flow Rate (X) (m3/min)		1.133	r	0.9968591	Tstp	298.0
3	Correlation Coefficient (r)			0.99990	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.96744926	
Result							C=(Pa/Psd)*(Tstd/Ta)^0.5			0.983589986	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
(Mr.Panupon Podang)
Environmental Scientist

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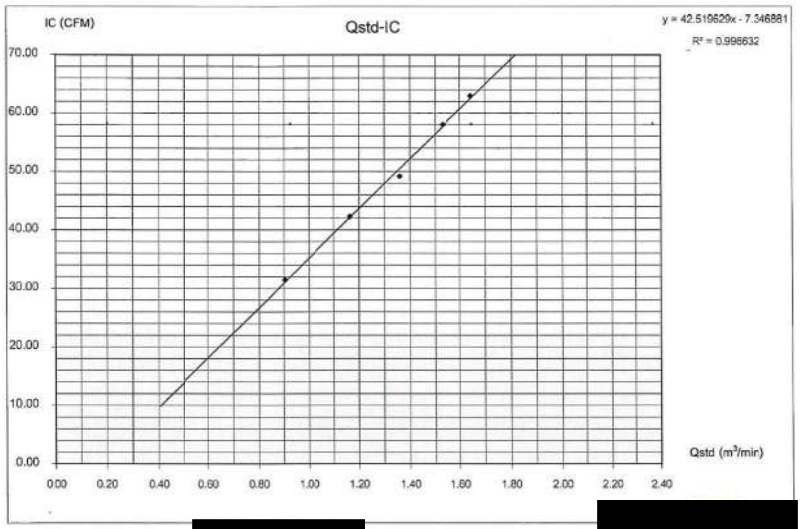
TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00462			*Date*	August 21, 2024
Sampler Location	บ้านหนองไม้ตาย2			*Start Time*	6:12 PM
Sampler Number	TSP No.A30	Transfer Standard Type	Orifice	*Stop Time*	6:22 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A		
Motor Serial Number	2213	Calibrator Serial Number	2912	*Calibrated By*	Mr. Auttapol Areejit
Recorder Serial Number	2136				

Plate No.	(Delta H) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) Sample Flow Rate Indicator (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temperature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.8	1.8	3.6	1.86623	0.90456	32.0	31.47	306.0	755.0		
7	3.0	3.0	6.0	2.40929	1.16457	43.0	42.29	306.0	755.0		
10	4.1	4.1	8.2	2.81657	1.35957	50.0	49.18	306.0	755.0		
13	5.2	5.2	10.4	3.17198	1.52974	59.0	58.03	306.0	755.0		
18	6.0	6.0	12.0	3.40726	1.64238	64.0	62.95	306.0	755.0		
Linear Regresstion Y ON X : Y= mX + b							Average	306.0	755.0		
1	Slope (m)			2.08863	Linear Equation			r^2	0.996632	Pstd(mmHg)	760.0
2	Intercept (b)			-0.02307	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9983146	T_{STP}	298.0
3	Correlation Coefficient (r)			0.99990	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.96744926	
Result								C=(Pa/Psd)*(Tstd/Ta)^0.5		0.983589986	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
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Environmental Scientist

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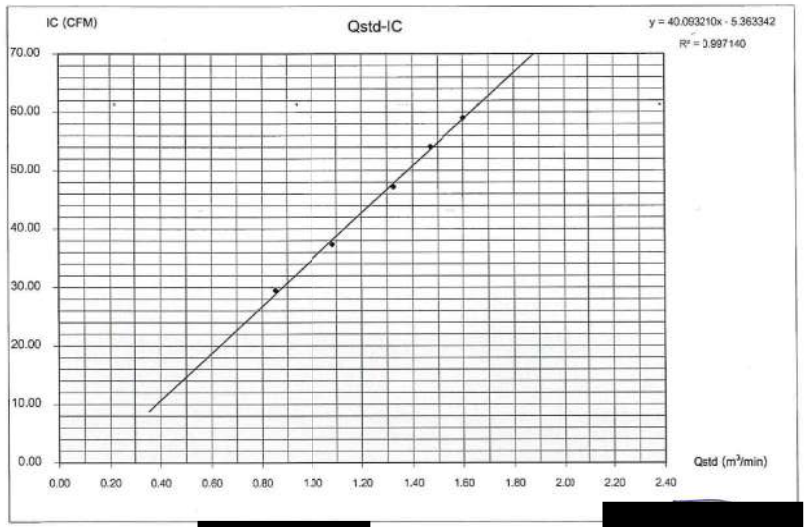
PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00462			*Date*	August 21, 2024
Sampler Location	บ้านหนองไม้ตาย2			*Start Time*	6:23 PM
Sampler Number	PM-10 No.5	Transfer Standard Type	Orifice	*Stop Time*	6:33 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A		
Motor Serial Number	2015-5	Calibrator Serial Number	2912	*Calibrated By*	Mr. Auttapol Areejit
Recorder Serial Number	R-C21				

Plate No.	(Delta H) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) Sample Flow Rate Indicator (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temperature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.6	1.6	3.2	1.75950	0.85346	30.0	29.51	306.0	755.0		
7	2.6	2.6	5.2	2.24293	1.08492	38.0	37.38	306.0	755.0		
10	3.9	3.9	7.8	2.74702	1.32827	48.0	47.21	306.0	755.0		
13	4.8	4.8	9.6	3.04754	1.47016	55.0	54.10	306.0	755.0		
18	5.7	5.7	11.4	3.32098	1.60107	60.0	59.02	306.0	755.0		
Linear Regresstion Y ON X : Y= mX + b							Average	306.0	755.0		
1	Slope (m)			2.08863	Linear Equation			r^2	0.99714	Pstd(mmHg)	760.0
2	Intercept (b)			-0.02307	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.998569	T_{STP}	298.0
3	Correlation Coefficient (r)			0.99990	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.96744926	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.983589986	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

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Environmental Scientist

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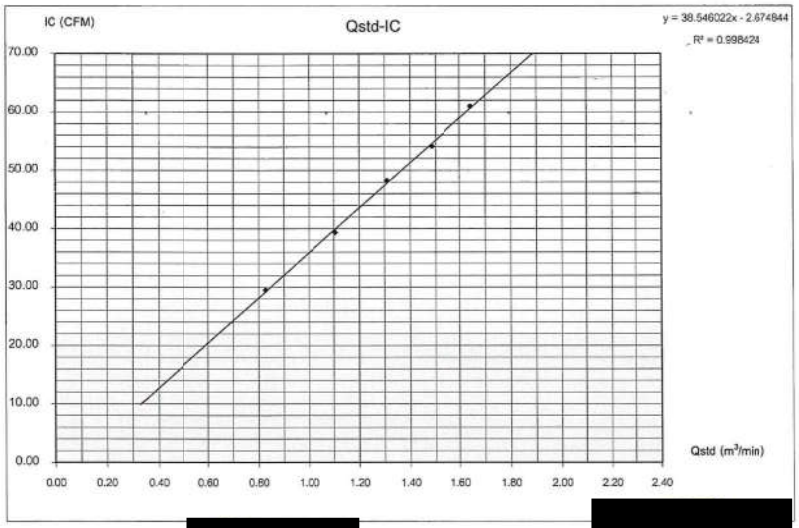
TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00460, 2024-00462			*Date*	August 21, 2024
Sampler Location	บ้านไผ่ล้านนัคดี			*Start Time*	4:14 PM
Sampler Number	TSP No.A9	Transfer Standard Type	Orifice	*Stop Time*	4:24 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr. Auttapol Areejit
Motor Serial Number	16119	Calibrator Serial Number	2912		
Recorder Serial Number	7137				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)]	simple Flow Rate Indicator (ft³/min)	(Y) IC = ([(Pa/P_std)(T_std/Ta)]^1/2)	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.5	1.5	3.0	1.70383	0.82671	30.0	29.51	306.0	755.0		
7	2.7	2.7	5.4	2.26586	1.10538	40.0	39.34	306.0	755.0		
10	3.8	3.8	7.6	2.71157	1.30930	49.0	48.20	306.0	755.0		
13	4.9	4.9	9.8	3.07912	1.48528	55.0	54.10	306.0	755.0		
18	6.0	6.0	12.0	3.40726	1.64238	62.0	60.98	306.0	755.0		
Linear Regresstion Y ON X : Y= mX + b							Average	306.0	755.0		
1	Slope (m)			2.08883	Linear Equation			r^2	0.998424	Pstd(mmHg)	760.0
2	Intercept (b)			-0.02307	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9992117	T_{NTP}	298.0
3	Correlation Coefficient (r)			0.99990	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.9674929	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.983569986	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

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Environmental Scientist

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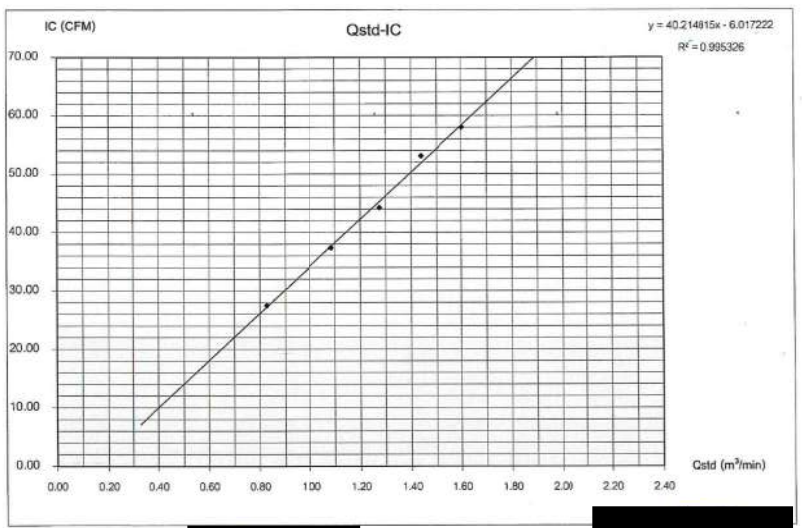
PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00460, 2024-00462			*Date*	August 21, 2024
Sampler Location	บ้านไผ่ล้านนัคดี			*Start Time*	4:24 PM
Sampler Number	PM-10 No.10	Transfer Standard Type	Orifice	*Stop Time*	4:34 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr. Auttapol Areejit
Motor Serial Number	PM-10 No.10	Calibrator Serial Number	2912		
Recorder Serial Number	102940701				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)]	simple Flow Rate Indicator (ft³/min)	(Y) IC = ([(Pa/P_std)(T_std/Ta)]^1/2)	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.5	1.5	3.0	1.70383	0.82671	28.0	27.54	306.0	755.0		
7	2.6	2.6	5.2	2.24293	1.08492	38.0	37.38	306.0	755.0		
10	3.6	3.6	7.2	2.63925	1.27487	45.0	44.26	306.0	755.0		
13	4.6	4.6	9.2	2.98338	1.43943	54.0	53.11	306.0	755.0		
18	5.7	5.7	11.4	3.32099	1.60107	59.0	58.03	306.0	755.0		
Linear Regresstion Y ON X : Y= mX + b							Average	306.0	755.0		
1	Slope (m)			2.08863	Linear Equation			r^2	0.995326	Pstd(mmHg)	760.0
2	Intercept (b)			-0.02307	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9976603	T_{NTP}	298.0
3	Correlation Coefficient (r)			0.99990	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.96744926	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.983569986	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
(Mr.Panupon Podang)
Environmental Scientist

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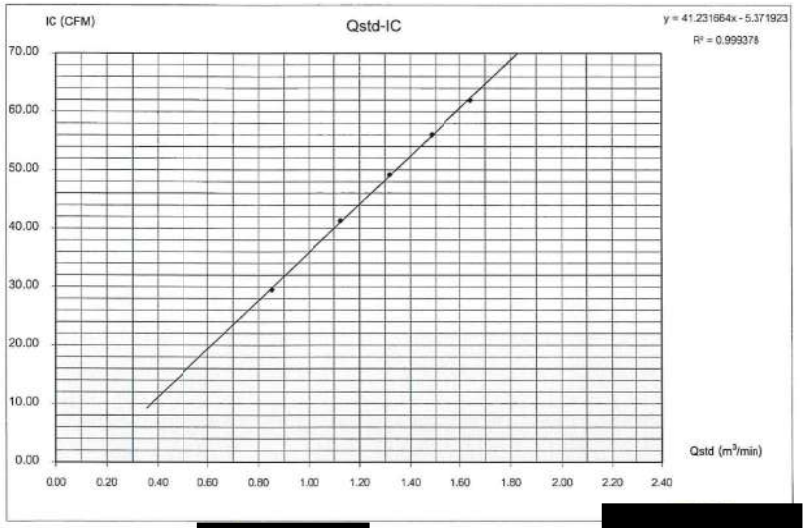
TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00460, 2024-00462				*Date*	August 21, 2024
Sampler Location	โรงเรียนบ้านมิ่งมาลย์				*Start Time*	1:36 PM
Sampler Number	TSP No.A20	Transfer Standard Type		Orifice	*Stop Time*	1:46 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model		TE-5025A		
Motor Serial Number	2142	Calibrator Serial Number		2912	*Calibrated By*	Mr. Auttapol Areejit
Recorder Serial Number	2397					

Plate No.	(Delta H) Pressure Drop Across Orifice ($in H_2O$) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) Sample Flow Rate Indicator (ft^3/min)	(Y) IC = $[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temperature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.6	1.6	3.2	1.75950	0.85346	30.0	29.51	306.0	755.0		
7	2.8	2.8	5.6	2.32760	1.12546	42.0	41.31	306.0	755.0		
10	3.8	3.9	7.7	2.72935	1.31781	50.0	49.18	306.0	755.0		
13	4.0	4.9	9.8	3.07912	1.48528	57.0	56.06	306.0	755.0		
18	6.0	6.0	12.0	3.40726	1.64238	63.0	61.97	306.0	755.0		
Linear Regression Y ON X : Y= mX + b							Average	306.0	755.0		
1	Slope (m)			2.08863	Linear Equation			r^2	0.999378	Pstd(mmHg)	760.0
2	Intercept (b)			-0.02307	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.999689	T_{STP}	298.0
3	Correlation Coefficient (r)			0.99990	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.9674926	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.983589986	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
(Mr.Panupon Podang)
Environmental Scientist

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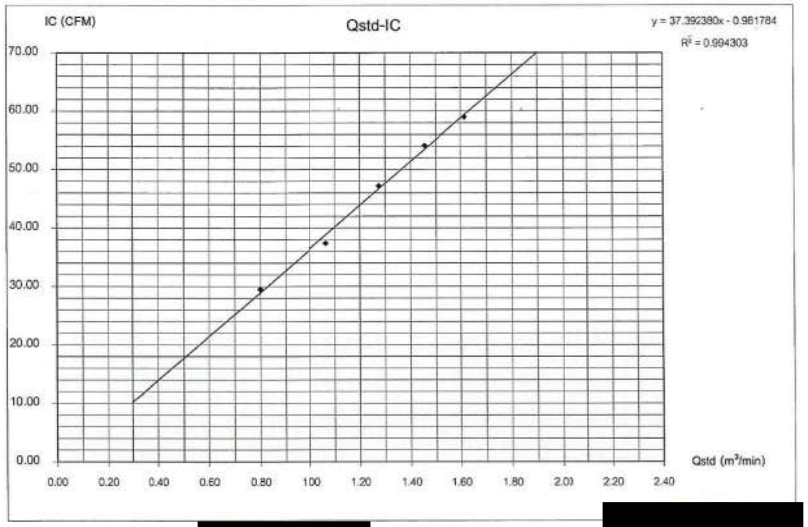
PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Quotation	2024-00460, 2024-00462				*Date*	August 21, 2024
Sampler Location	โรงเรียนบ้านมิ่งมาลย์				*Start Time*	1:26 PM
Sampler Number	PM-10 No.26	Transfer Standard Type		Orifice	*Stop Time*	1:36 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model		TE-5025A		
Motor Serial Number	2211	Calibrator Serial Number		2912	*Calibrated By*	Mr. Auttapol Areejit
Recorder Serial Number	2610					

Plate No.	(Delta H) Pressure Drop Across Orifice ($in H_2O$) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) Sample Flow Rate Indicator (ft^3/min)	(Y) IC = $[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temperature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.4	1.4	2.8	1.64586	0.79906	30.0	29.51	306.0	755.0		
7	2.5	2.5	5.0	2.19937	1.06407	38.0	37.38	306.0	755.0		
10	3.6	3.6	7.2	2.63925	1.27457	48.0	47.21	306.0	755.0		
13	4.7	4.7	9.4	3.01563	1.45488	55.0	54.10	306.0	755.0		
18	5.8	5.8	11.6	3.34999	1.61406	60.0	59.02	306.0	755.0		
Linear Regression Y ON X : Y= mX + b							Average	306.0	755.0		
1	Slope (m)			2.08663	Linear Equation			r^2	0.994303	Pstd(mmHg)	760.0
2	Intercept (b)			-0.02307	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9971474	T_{STP}	298.0
3	Correlation Coefficient (r)			0.99990	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.96744926	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.983589986	

COMMENT

Andersen Instruments, Inc.



Checked By [redacted]
(Mr. Prayun Detkla)
Technician

Approved By [redacted]
(Mr.Panupon Podang)
Environmental Scientist

JIRANATEE ASSOCIATES CO.,LTD.

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Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TISI-TIS 17025
CALIBRATION 0367

Flow measurement laboratory
Calibration services department.

NSC – TISI – TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. : **COF-021-67**

MEASUREMENT ITEM : Top Load Orifice
MANUFACTURER : TISCH
MODEL/TYPE : TE-5025A
SERIAL NUMBER : 2912
ID NUMBER : -
CONDITION AS-RECEIVED : Used item
CUSTOMER : Environment Research & Technology Co., Ltd.
25/114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210

RECEIVED DATE : 26 Jun 2024
MEASUREMENT DATE : 26 Jun 2024
ISSUE DATE : 27 Jun 2024

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:

Temperature	: 23.0 ± 3.0	°C
Relative Humidity	: 55.0 ± 15.0	%RH
Atmospheric Pressure	: 1010 ± 10	hPa

CALIBRATION CONDITION:
Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurementare 23.2 °C and 52.0 %RH.

NOTED: *The certificate is valid only to the item calibrated on date and place of calibration.*

TABULATION OF RESULTS:
The table on next page give the measured values.

Calibration procedure:
The Orifice gas flow device was calibrated against Standard Rotary Displacement Meter (Roots Meter) Model G65/IMC/W2-dp. The WI-CL-004 was used as a calibration guideline.

Traceability:
This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MW-0063-23.

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'

Calibrated by:
☐ Mr. Sorawit Thachalad
☑ Miss Jittraporn Lertsomphol

Approved signatory: [redacted]
Mr. Parinya Booncharoen
Calibration Department Manager

THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

JIRANATEE ASSOCIATES CO.,LTD.

Continuation of Certificate of Calibration Number COF-021-67

MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roots Meter). The Humid air was usedas a medium in the system. The standard conditions are 25°C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of Q Standard calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_meter mmHg	Δp_Orifice inH_2O	Y	Standard Flow [Q_s] m^3/min
1	0.705	751.990	23.18	22.54	54.902	1.808	1.341	0.652
2	1.008	751.892	23.34	22.78	59.350	3.618	1.897	0.921
3	1.124	751.798	23.56	23.02	42.179	4.788	2.182	1.057
4	1.167	751.706	23.67	23.23	30.570	5.346	2.305	1.114
5	1.409	751.685	23.75	23.28	29.576	7.845	2.791	1.346

Slope (m): **2.08863**
Intercept (b): **-0.02307**
Correlation coefficient (r): **0.99990**
Uncertainty (k=2): **0.015** m^3/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_meter mmHg	Δp_Orifice inH_2O	Y	Standard Flow [Q_a] m^3/min
1	0.705	751.990	23.18	22.54	54.902	1.808	0.844	0.655
2	1.008	751.892	23.34	22.78	59.350	3.618	1.194	0.926
3	1.124	751.798	23.56	23.02	42.179	4.788	1.375	1.063
4	1.167	751.706	23.67	23.23	30.570	5.346	1.453	1.122
5	1.409	751.685	23.75	23.28	29.576	7.845	1.760	1.356

Slope (m): **1.30815**
Intercept (b): **-0.01449**
Correlation coefficient (r): **0.99990**
Uncertainty (k = 2): **0.015** m^3/min

End of Certificate of Calibration

Jiranatee Associates Co., Ltd.

Calibration Certificate ID
TH3067-067-011524-ACC-TH

METTLER TOLEDO

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+662 723 0382
MT-TH.ServiceSupport@mt.com

NSC-TISI-TIS 17025
CALIBRATION 0062

Accuracy Calibration Certificate

Customer

Company:	Environment Research & Technology Co., Ltd.		
Address:	25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Toongsonghong		
City:	Laksi	**Contact:**	Ramita Taengthai
Zip / Postal:	10210		
State / Province:	Bangkok		
Order Number:	0332963611		

Weighing Device

Manufacturer:	Mettler Toledo	**Instrument Type:**	Weighing Instrument
Model:	AE204-S	**Asset Number:**	ERTC-L-IN-0048
Serial No.:	1123103723	**Terminal Model:**	N/A
Building:	N/A	**Terminal Serial No.:**	N/A
Floor:	4	**Terminal Asset No.:**	N/A
Room:	406		

Range	Max. Capacity	Readability (d)
1	220 g	0.0001 g

Procedure

Calibration Guideline:	EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction:	CP/W00220

This calibration certificate contains measurements for As Found and As Left calibrations.

The sensitivity/span of the weighing instrument was adjusted before As Found and As Left calibrations with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 25.4 °C	End: 25.3 °C	Start: 36.4 %	End: 34.9 %
As Left	Start: 25.3 °C	End: 25.2 °C	Start: 34.9 %	End: 34.1 %

As Found Calibration Date:	15-Jan-2024	**Calibrator:**	[redacted]
As Left Calibration Date:	15-Jan-2024		Nithit Jongkrod
Issue Date:	15-Jan-2024	**Approved Signatory:**	[redacted]
			Technical Manager / Head of Calibration Center

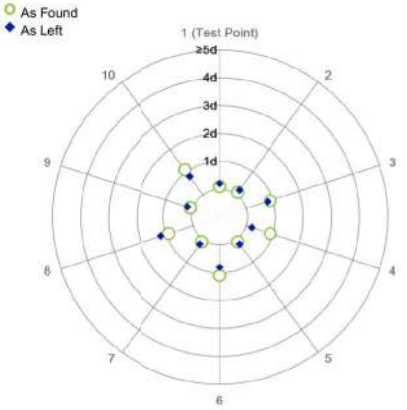
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Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	99.9993 g	100.0002 g
2	99.9993 g	100.0002 g
3	99.9992 g	100.0003 g
4	99.9992 g	100.0002 g
5	99.9993 g	100.0002 g
6	99.9994 g	100.0003 g
7	99.9993 g	100.0002 g
8	99.9992 g	100.0001 g
9	99.9993 g	100.0002 g
10	99.9994 g	100.0003 g
Standard Deviation	**0.00007 g**	**0.00006 g**



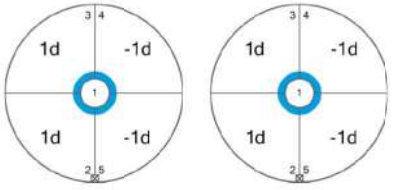
The "d" in the graph represents the readability of the range/interval in which the test was performed.

The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9993 g	100.0002 g
2	99.9994 g	100.0003 g
3	99.9994 g	100.0003 g
4	99.9992 g	100.0001 g
5	99.9992 g	100.0001 g
Maximum Deviation	**0.0001 g**	**0.0001 g**



As Found **As Left**

The "d" in the graph represents the readability of the range/interval in which the test was performed.

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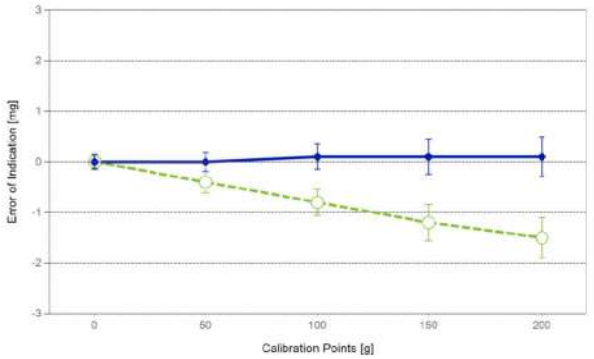
Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.16 mg	2
2	0.0500 g	0.0501 g	0.0001 g	0.17 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.17 mg	2
4	0.5000 g	0.5001 g	0.0001 g	0.17 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.17 mg	2
6	5.0000 g	4.9999 g	-0.0001 g	0.17 mg	2
7	10.0000 g	9.9998 g	-0.0002 g	0.18 mg	2
8	50.0000 g	49.9996 g	-0.0004 g	0.21 mg	2
9	100.0001 g	99.9993 g	-0.0008 g	0.26 mg	2
10	150.0001 g	149.9989 g	-0.0012 g	0.36 mg	2
11	200.0000 g	199.9985 g	-0.0015 g	0.40 mg	2

As Left

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.14 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.15 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.15 mg	2
4	0.5000 g	0.5000 g	0.0000 g	0.15 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.15 mg	2
6	5.0000 g	5.0000 g	0.0000 g	0.16 mg	2
7	10.0000 g	10.0000 g	0.0000 g	0.16 mg	2
8	50.0000 g	50.0000 g	0.0000 g	0.19 mg	2
9	100.0001 g	100.0002 g	0.0001 g	0.25 mg	2
10	150.0001 g	150.0002 g	0.0001 g	0.35 mg	2
11	200.0000 g	200.0001 g	0.0001 g	0.39 mg	2



As Found

As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor *k* – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated. The results of this calibration certificate relate only to the calibrated item.

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Calibration Certificate ID
TH3067-067-011524-ACC-TH

METTLER TOLEDO Service

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS52	Date of Issue:	22-Nov-2022
Certificate Number:	182272	Calibration Due Date:	21-May-2024

Thermo Hygrometer

Equipment No.:	IN302	Date of Issue:	11-Oct-2023
Certificate Number:	SG-H-00656/66	Calibration Due Date:	08-Oct-2024

Remarks

Value of the built-in weight adjusted

Equipment conditon: Good

Next calibration according to customer's procedure

Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Software Version: 1.23.2.187
Report Version: 2.17.16
Form Number: F103C

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Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $3.0 \cdot 10^{-6}$ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

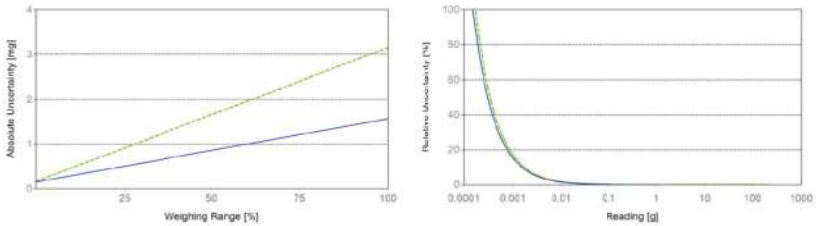
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.0001 g	220 g	U_1 = 0.17 mg + 0.0136 mg/g · R	U_1 = 0.15 mg + 0.00644 mg/g · R

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.0220 g	0.17 mg	0.77%	0.15 mg	0.68%
0.2200 g	0.17 mg	0.079%	0.15 mg	0.069%
2.2000 g	0.20 mg	0.0091%	0.16 mg	0.0075%
22.0000 g	0.47 mg	0.0021%	0.29 mg	0.0013%
220.0000 g	3.2 mg	0.0014%	1.6 mg	0.00071%



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GWP® Certificate

As Found ✓

The weighing device meets the given process requirements.

As Left ✓

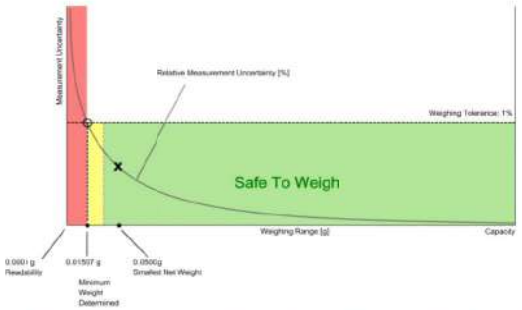
The weighing device meets the given process requirements.

Tests Performed: ☑ As Found ☑ As Left

Process Requirements

Weighing Tolerance: **1%** | Smallest Net Weight: **0.0500 g** | Safety Factor: **2**

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

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Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	1	2	3	5	10
0.1%	0.17097 g	0.34671 g	0.52742 g	0.90460 g	1.95110 g
0.2%	0.08490 g	0.17097 g	0.25823 g	0.43643 g	0.90460 g
0.5%	0.03382 g	0.05783 g	0.10202 g	0.17097 g	0.34671 g
1%	0.01689 g	0.03382 g	0.05080 g	0.08490 g	0.17097 g
2%	0.00844 g	0.01689 g	0.02535 g	0.04231 g	0.08490 g
5%	0.00337 g	0.00675 g	0.01013 g	0.01689 g	0.03382 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	1	2	3	5	10
0.1%	0.15153 g	0.30504 g	0.46056 g	0.77780 g	1.60910 g
0.2%	0.07552 g	0.15153 g	0.22803 g	0.38254 g	0.77780 g
0.5%	0.03015 g	0.05038 g	0.09068 g	0.15153 g	0.30504 g
1%	0.01507 g	0.03015 g	0.04525 g	0.07552 g	0.15153 g
2%	0.00753 g	0.01507 g	0.02261 g	0.03770 g	0.07552 g
5%	0.00301 g	0.00602 g	0.00904 g	0.01507 g	0.03015 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with k = 2 and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

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Attachment to Calibration Certificate:
TH3067-067-011524-ACC-TH
GWP® Certificate

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Measurement Results

Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed
✗ = Failed
⚠ = Safety Factor not met

Repeatability

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	N/A	0.00007 g*	N/A	0.00006 g*	N/A
0.2%	0.00005 g		✗		✗
0.5%	0.00013 g		✓		✓
1%	0.00025 g		✓		✓
2%	0.00050 g		✓		✓
5%	0.00125 g		✓		✓

*The calculated standard deviation value is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test and the calculation of the minimum weight.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0001 g	✓	0.0001 g	✓
0.2%	0.1000 g		✓		✓
0.5%	0.2500 g		✓		✓
1%	0.5000 g		✓		✓
2%	1.0000 g		✓		✓
5%	2.5000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

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METTLER TOLEDO Service

Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	-0.0004 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	-0.0008 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	-0.0012 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0015 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0001 g	0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

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envi research
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Environment Research & Technology Company Limited
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Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@envisearch.co.th
www.envisearch.co.th
Head Office/Tax ID 0105 542 064 981

Calibration Data of NOx Analyzer

Analyzer Performance Test

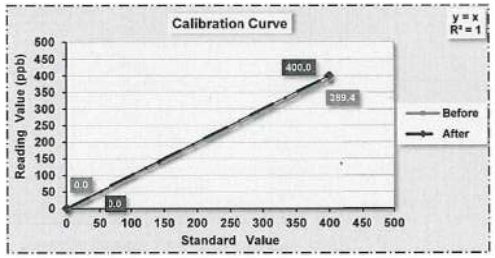
Equipment	Gas Analyzer (NOx)	**Customer Name**	Vision E
Manufacture	HORIBA	**Location**	Envi Research
Model	APNA-370	**Quatation**	2024-00462
Serial No.	S581UWS0	**Calibration Date**	August 1, 2024
Analyzer Unit	ppb		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	303	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value								% Abs Error
		NO_x (ppb)		NO (ppb)		NO_2 (ppb)		Stability		
		Before	After	Before	After	Before	After	Before	After	
Zero	0	-0.2	0.0	0.0	0.0	-0.2	0.0	-	-	-
Span	400	388.8	400.0	389.4	400.0	-0.6	0.0	-	-	2.7



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	0.8	0.9	Voltage of the measured NO value
Signal NOx	mV	19.5	20.0	Voltage of the measured NOx value
Detector	°C	40.8	40.9	43 °C ± 5 °C
Ambient	kPa	101.8	101.4	Current atmospheric pressure
DC 24V	V	23.8	23.8	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.98714	0.98725	0.50000 - 2.0000
NOx Slope	-	0.98573	0.98647	0.50000 - 2.0000

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 1, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
August 1, 2024

envi research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

Environment Research & Technology Company Limited
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Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

Calibration Data of NOx Analyzer

Analyzer Performance Test

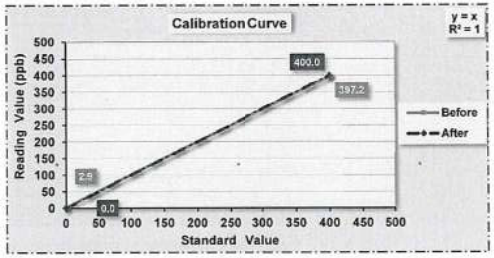
Equipment	Gas Analyzer (NOx)	Customer Name	Vision E
Manufacture	HORIBA	Location	Envi Research
Model	APNA-370	Quatation	2024-00462
Serial No.	KPACV8NA	Calibration Date	August 8, 2024
Analyzer Unit	ppb		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value								% Abs Error
		NO_x (ppb)		NO (ppb)		NO_2 (ppb)		Stability		
		Before	After	Before	After	Before	After	Before	After	
Zero	0	2.2	0.0	2.9	0.0	-0.7	0.0	-	-	-
Span	400	396.6	400.0	397.2	400.0	-0.6	0.0	-	-	0.7



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	0.9	1.1	Voltage of the measured NO value
Signal NOx	mV	9.7	9.9	Voltage of the measured NOx value
Detector	°C	41.9	41.9	43 °C ± 5 °C
Ambient	kPa	101.0	101.0	Current atmospheric pressure
DC 24V	V	23.5	23.0	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.83010	0.83450	0.50000 - 2.0000
NOx Slope	-	0.82450	0.82650	0.50000 - 2.0000

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 8, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
August 8, 2024

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Tel 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

Calibration Data of NOx Analyzer

Analyzer Performance Test

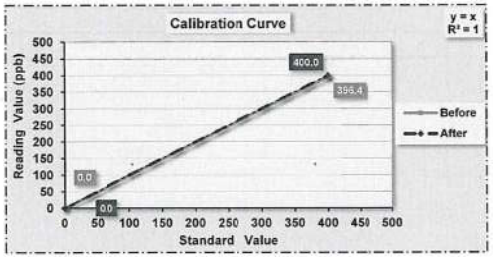
Equipment	Gas Analyzer (NOx)	Customer Name	Vision E
Manufacture	HORIBA	Location	Envi Research
Model	APNA-370	Quatation	2024-00462
Serial No.	J6GUBA4N	Calibration Date	August 8, 2024
Analyzer Unit	ppb		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value								% Abs Error
		NO_x (ppb)		NO (ppb)		NO_2 (ppb)		Stability		
		Before	After	Before	After	Before	After	Before	After	
Zero	0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Span	400	394.9	400.0	396.4	400.0	-1.5	0.0	-	-	0.9



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	2.2	1.6	Voltage of the measured NO value
Signal NOx	mV	20.3	17.2	Voltage of the measured NOx value
Detector	°C	41.5	41.5	43 °C ± 5 °C
Ambient	kPa	101.6	101.5	Current atmospheric pressure
DC 24V	V	23.7	23.7	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.78260	0.79540	0.50000 - 2.0000
NOx Slope	-	0.76210	0.76840	0.50000 - 2.0000

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 8, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
August 8, 2024

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Calibration Data of NOx Analyzer

Analyzer Performance Test

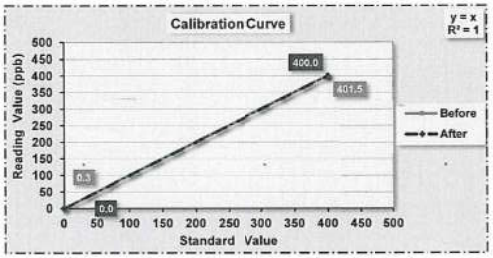
Equipment	Gas Analyzer (NOx)	Customer Name	Vision E
Manufacture	HORIBA	Location	Envi Research
Model	APNA-370	Quatation	2024-00462
Serial No.	4VWFEBUK	Calibration Date	August 13, 2024
Analyzer Unit	ppb		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Corrponents	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value						Stability		% Abs Error
		NO_x (ppb)		NO (ppb)		NO_2 (ppb)				
		Before	After	Before	After	Before	After	Before	After	
Zero	0	0.3	0.0	0.3	0.0	0.0	0.0	-	-	-
Span	400	401.8	400.0	401.5	400.0	0.3	0.0	-	-	0.4



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	1.4	0.3	Voltage of the measured NO value
Signal NOx	mV	7.2	7.9	Voltage of the measured NOx value
Detector	°C	41.0	41.0	43 °C ± 5 °C
Ambient	kPa	100.3	100.2	Current atmospheric pressure
DC 24V	V	23.5	23.2	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	1.32560	1.32540	0.50000 - 2.0000
NOx Slope	-	1.14810	1.14750	0.50000 - 2.0000

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 13, 2024

Checked By : [redacted]
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August 13, 2024

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

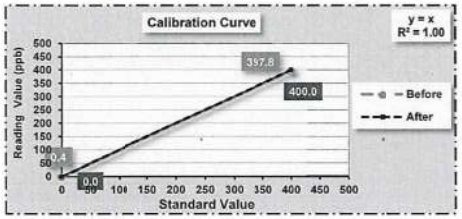
Equipment	Gas Analyzer (SO_2)	Customer Name	Vision E
Manufacture	Horiba	Location	Envi Research
Model	APSA-370	Quatation	2024-00462
Serial No.	X7L602W6	Calibration Date	August 1, 2024
Analyzer Unit	ppb		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppb)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.4	0.0	-	-	-
Span	400	397.8	400.0	-	-	0.5



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL APSA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal (SO_2)	mV	25.3	25.1	Voltage of the measured SO2 value
LAMP	mV	324.9	324.8	200 mV - 1200 mV
CELL	°C	31.1	31.0	Ambient temperature + 5 °C - 15 °C
PUMP	Kpa	39.4	39.0	65 kPa or less
AMBIENT	kPa	100.9	100.8	Current atmospheric pressure
DC 24V	V	24.0	24.0	24 V ±0.5 V
DC 5V	V	5.0	5.0	5 V ±0.5 V

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 1, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
August 1, 2024

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

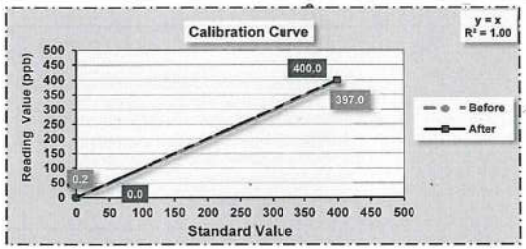
Equipment	Gas Analyzer (SO_2)	**Customer Name**	Vision E
Manufacture	Thermo	**Location**	Envi Research
Model	43i-BNSAA	**Quatation**	2024-00462
Serial No.	CM14430005	**Calibration Date**	August 13, 2024
Analyzer Unit	ppb		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppb)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.2	0.0	-	-	-
Span	400	397.0	400.0	-	-	0.8



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL 43i-BNSAA

Parameter	Display As	Unit	Observed Value		Nominal Range
			Before Adjust	After Adjust	
Range	RANGE	ppb	500	500	0 - 500 standard
Internal Temperature	INTERNAL	°c	32.4	32.4	8.0 °C to 45.0 °C
Chamber Temp	CHAMBER	°c	45.1	45.0	43.0 °C to 47.0 °C
Pressure	PRESSURE	mmHg	730.7	730.8	400.0 to 1,000
Sample Flow	SAMP FLOW	LPM	0.447	0.472	0.350 to 0.750
Lamp Intensity	LAMP INTENSITY	%	71	72	20 to 100
Lamp Voltage	LAMP VOLTAGE	V	848	848	500 to 1200
SO2 Concentration	SO2 CONCENTRATION	ppb	3.4	2	0 to 10,000
Motherboard Status	MOTHERBOARD STATUS	-	OK	OK	OK
Interface Status	[redacted]TUS	-	OK	OK	[redacted]

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 13, 2024

Checked By : [redacted]
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August 13, 2024

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

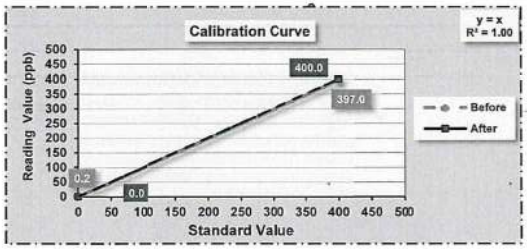
Equipment	Gas Analyzer (SO_2)	**Customer Name**	Vision E
Manufacture	Thermo	**Location**	Envi Research
Model	43i-BNSAA	**Quatation**	2024-00462
Serial No.	CM14430002	**Calibration Date**	August 15, 2024
Analyzer Unit	ppb		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppb)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.2	0.0	-	-	-
Span	400	397.0	400.0	-	-	0.8



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL 43i-BNSAA

Parameter	Display As	Unit	Observed Value		Nominal Range
			Before Adjust	After Adjust	
Range	RANGE	ppb	500	500	0 - 500 standard
Internal Temperature	INTERNAL	°c	32.8	32.4	8.0 °C to 45.0 °C
Chamber Temp	CHAMBER	°c	45.1	45.0	43.0 °C to 47.0 °C
Pressure	PRESSURE	mmHg	732.2	730.8	400.0 to 1,000
Sample Flow	SAMP FLOW	LPM	0.352	0.472	0.350 to 0.750
Lamp Intensity	LAMP INTENSITY	%	92	92	20 to 100
Lamp Voltage	LAMP VOLTAGE	V	379	848	500 to 1200
SO2 Concentration	SO2 CONCENTRATION	ppb	2.9	2	0 to 10,000
Motherboard Status	MOTHERBOARD STATUS	-	OK	OK	OK
Interface Status	INTERFACE STATUS	-	OK	OK	OK

Calibrate By : [redacted]
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August 15, 2024

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

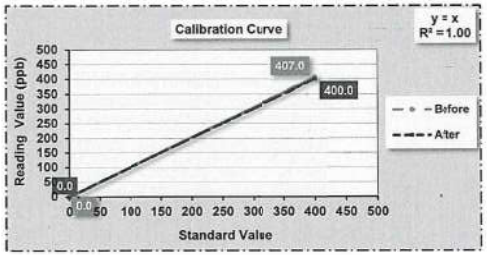
Equipment	Gas Analyzer (SO_2)	**Costomer Name**	Vision E
Manufacture	Thermo	**Location**	Envi Research
Model	43C	**Quatation**	2024-00462
Serial No.	0611116460	**Calibration Date**	August 8, 2024
Analyzer Unit	ppb		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppb)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.0	0.0	-	-	-
Span	400	407.0	400.0	-	-	1.8



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL 43C

Parameter	Display As	Unit	Observed Value		Nominal Range
			Before Adjust	After Adjust	
Range	RANGE	ppb	500	500	0 - 500 standard
Internal Temperature	INTERNAL	°c	30.6	30.6	8.0 °C to 47.0 °C
Chamber Temp	CHAMBER	°c	44.4	44.3	43.0 °C to 47.0 °C
Pressure	PRESSURE	mmHg	735.3	735.3	400.0 to 1,000
Sample Flow	SAMP FLOW	LPM	0.941	0.941	0.350 to 1.000
Lamp Intensity	INTENSITY	Hz	23,804	23,362	20,000 to 50,000
Lamp Voltage	LAMP VOLTAGE	V	857	857	750 to 1,200
SO2 Concentration	SO2 CONCENTRATION	ppb	1.6	1.8	0 to 10,000
Motherboard Status	MOTHERBOARD STATUS	-	OK	OK	OK
Interface Status	INTERFACE STATUS	-	OK	OK	OK

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 8, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
August 8, 2024

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Head Office/Tax ID 0105 542 064 981

Calibration Data of CO Analyzer

Analyzer Performance Test

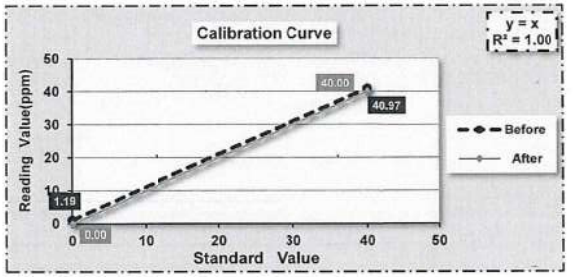
Equipment	Gas Analyzer (CO)	**Customer Name**	Vision E
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Quatation**	2024-00462
Serial No.	XRP3Y7LA	**Calibration Date**	August 1, 2024
Analyzer Unit	ppm		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4.487 ppm		
Cylinder No : EB0123013	NO = 46.1 ppm		
Expire Date : Oct 22, 2027	SO_2 = 46.0 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	1.19	0.00	-	-	-
Span	40	40.97	40.00	-	-	2.43



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	1.8	0.9	Voltage of the measured CO Value
SIGNAL (COMP)	mV	0.4	0.1	Voltage of the interference component Value
CELL	°C	30.5	30.4	Ambient + (5 to 10 C)
PUMP	kpa	40.9	40.8	less than 65
AMBIENT	kpa	101.5	101.4	Atmospheric pressure
DC 24V	mV	23.9	23.9	24+/- 0.5 V
DC 5V	mV	5.0	5.0	5+/- 0.5 V

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 1, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
August 1, 2024

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Calibration Data of CO Analyzer

Analyzer Performance Test

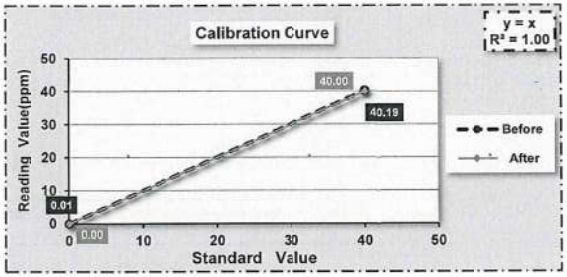
Equipment	Gas Analyzer (CO)	**Customer Name**	Vision E
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Quatation**	2024-00462
Serial No.	SFB4TS99	**Calibration Date**	August 8, 2024
Analyzer Unit	ppm		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.01	0.00	-	-	-
Span	40	40.19	40.00	-	-	0.47



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	4.0	4.1	Voltage of the measured CO Value
SIGNAL (COMP)	mV	0.7	0.8	Voltage of the interference component Value
CELL	°C	29.4	29.5	Ambient + (5 to 10 C)
PUMP	kpa	39.2	39.3	less than 65
AMBIENT	kpa	101.6	101.7	Atmospheric pressure
DC 24V	mV	23.6	23.5	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 8, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
August 8, 2024

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Calibration Data of CO Analyzer

Analyzer Performance Test

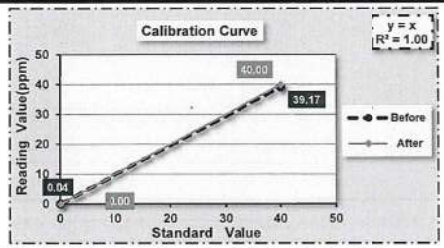
Equipment	Gas Analyzer (CO)	**Customer Name**	Vision E
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-360 CE	**Quatation**	2024-00462
Serial No.	576876072	**Calibration Date**	August 14, 2024
Analyzer Unit	ppm		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.04	0.00	-	-	-
Span	40	39.17	40.00	-	-	2.08



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-360CE

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL (MAIN)	mV	1.7	1.2	Voltage of the measured CO Value
SIGNALI (COMP)	mV	0	0.6	Voltage of the interference component Value
CELL	°C	35.7	35.2	Ambient + (5 to 15 °C)
SAMPLE	L/min	1.1	1.0	1 L/min to 2 L/min
OVER FLOW	LPM	0.0	0.0	< 1.2

Calibrate By : [redacted]
(MR.PANUPON PODANG)
August 14, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
August 14, 2024

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Calibration Data of CO Analyzer

Analyzer Performance Test

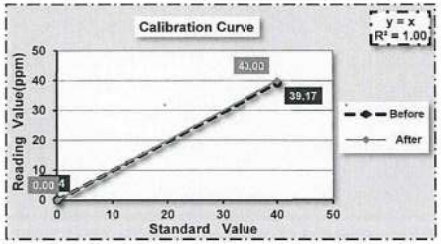
Equipment	Gas Analyzer (CO)	Customer Name	Vision E
Manufacture	HORIBA	Location	Envi Research
Model	APMA-360 CE	Quatation	2024-00462
Serial No.	41346760054	Calibration Date	July 18, 2024
Analyzer Unit	ppm		

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.04	0.00	-	-	-
Span	40	39.17	40.00	-	-	2.08



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-360CE

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL (MAIN)	mV	6.7	1.2	Voltage of the measured CO Value
SIGNALI (COMP)	mV	0.0	0.6	Voltage of the interference component Value
CELL	°C	35.7	35.8	Ambient + (5 to 15 °C)
SAMPLE	L/min	1.1	1.0	1 L/min to 2 L/min
OVER FLOW	LPM	0.0	0.0	< 1.2

Calibrate By : [redacted]
(MR.PANUPON PODANG)
July 18, 2024

Checked By : [redacted]
(MS.SUTATIP IM-NOI)
July 18, 2024

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an Air Liquide company

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6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI99E15A0292	Reference Number:	160-401604495-1
Cylinder Number:	EB0123013	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12019	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Oct 22, 2019

Expiration Date: Oct 22, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytcal uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	55.00 PPM	55.27 PPM	G1	+/- 0.8% NIST Traceable	10/14/2019, 10/22/2019
NITRIC OXIDE	55.00 PPM	55.27 PPM	G1	+/- 0.8% NIST Traceable	10/14/2019, 10/22/2019
SULFUR DIOXIDE	55.00 PPM	54.93 PPM	G1	+/- 0.8% NIST Traceable	10/14/2019, 10/22/2019
CARBON MONOXIDE	4500 PPM	4516 PPM	G1	+/- 0.6% NIST Traceable	10/14/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13010429	KAL004123	57.6 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Jul 23, 2025
NTRM	13010429	KAL004123	57.6 PPM NOx/NITROGEN	+/- 0.8%	Jul 23, 2025
NTRM	16010235	KAL004419	57.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Dec 23, 2021
NTRM	08012318	KAL004620	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR - CO - 000928781	FTIR	Sep 26, 2019
MKS FTIR - NO - 000928781	FTIR	Oct 18, 2019
MKS FTIR - NOx - 000928781	FTIR	Oct 18, 2019
MKS FTIR - SO2 - 000928781	FTIR	Oct 03, 2019

Triad Data Available Upon Request

NOTES: Gross Weigh: 28.0 Kg, Net Weight: 4.6 Kg.

[redacted]
Approved for Release

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 11 August, 2023 Certification No. 284/23

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WC20516A58 ID No. : No.13

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.5 hPa

NATIONAL STANDARD WIND TUNNEL :
: Thermal Anemometer 642 S/N 91563
: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023
N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : [redacted]
Mr. Watcharapol Subwat
Mechanical Engineer

Signed [redacted]
Mr. Pisood Hongsut
(Authorised Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 284/23

11 August, 2023

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Preisure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.5	0.50
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.7	0.31
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.7	0.32

Wind Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : [redacted]
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 26 December, 2023 Certification No. 458/23

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WC20318A71 ID No. : No.18

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinakel 1, Ngamwongwan Roac,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1017.6 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : [redacted] Signed [redacted]

Mr. Watcharapol Subwat Mr. Pisood Promsut

Mechanical Engineer

(Authorised Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 458/23

26 December, 2023

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.8	0.22

Wind Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : [redacted]

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 13 August, 2024 Certification No. 290/24

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WC80813A59 ID No. : No.12

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.3 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : [redacted]

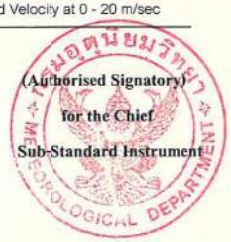
Mr. Watcharapol Subwat

Mechanical Engineer

Sign[redacted]

Mr.[redacted]

(Authorised Signatory)
for the Chief
Sub-Standard Instrument



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 290/24

13 August, 2024

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.7	0.31
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Wind Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : [redacted]

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 13 August, 2024 Certification No. 289/24

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WE91016A20 ID No. : No.10

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.1 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Thedoor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : [redacted] Sign[redacted]

Mr. Watcharapol Subwat Mr. Pisood Promsut

Mechanical Engineer

(Authorised Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 289/24

13 August, 2024

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.5	0.50
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.7	0.31
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.8	0.22

Wind Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : [redacted]

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

NSC-TISI-TIS17025
CALIBRATION 0008

Cert.No.: 24CH17
Page.: 1 of 2

Certificate of Calibration

Equipment :	pH Meter
Manufacturer :	Water Proof
Model :	pHTestr 30
Serial No. :	3066320
ID No. :	-
Condition As-Received:	Used Item
Received Date :	05 January 2024
Calibration Date :	09 January 2024
Reference :	2401-0077DN-3
Submitted by :	Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinakat 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
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)

Calibrated by : Walalak Sirithean

Approved by : [redacted]
Approved Signatory

(✓) Saithip Meangmai
( ) Warakorn Lerngagtrakul
( ) Ponpan Paipim

Issue Date : 10 January 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

Condition of this calibration result

1. 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	940102	27 Nov 2025
pH 6.986	CPA chem	931959	01 Oct 2024
pH 9.997	CPA chem	940106	02 Nov 2024

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

Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor *k*
pH Electrode	4.008	4.01	N/A	0.0071	2.00
S/N.: 3066320	6.986	7.00	N/A	0.0093	2.00
	9.997	10.00	N/A	0.0095	2.00

Remark - pH meter does not have voltage mode.
- Can not connect the BNC because the plug does not match with the socket.
- N/A = Not Available

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 %

-o0o-

Saithip

PerkinElmer
For the Better

PinAAcle 900Z
Preventive Maintenance Report

Company Name: ENVIRONMENT RESEARCH

Instrument Location: 25/114 M.6, THANON NGAMWONGWAN

THUNGSONGHONG, LAKSI, BANGKOK, 10210

Instrument Serial No.: PZAS19031401

Date: 23-Jul-2024

PinAAcle 900Z Preventive Maintenance (PM)

Company Name:	ENVIRONMENT RESEARCH		
Address (Instrument Location):	25/114 M.6, THANON NGAMWONGWAN, THUNGSONGHONG, LAKSI, BANGK		
Serial Number:	PZAS19031401	**PM Number:**	1/2
Customer Name (if applicable):	K. RAIWIN	**Telephone Number:**	099-182-9241
Customer Support Engineer Name:	Khwanchai	**Service Order Number:**	WO-02879967
Date PM Performed: (DD-MMM-YYYY)	23-Jul-2024	**Next PM Due Date:** (DD-MMM-YYY)	23-Jan-2025
Standard Labor Hours to Complete PM :		**5 hours**	

Part Number	Release	Publication Date
09370144 Rev.9	A	January 2018

Scope
The purpose of this PM is to ensure the continued functionality of the PinAAcle 900Z by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.
The customer should save their method before the PM begins.

General Instructions:
The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM.
Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files.
The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer.
Update the PM sticker and instrument logbook as required.

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Component List

Component / Specific Model	Serial #	Configuration Notes

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	**Description**	**Quantity**
B0501696	Fan Filters	2
B3002013	THGA Contact Cylinders	1
B3141064	Glycerol for THGA Cooling	N/A

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	**Description**	**Quality**	**Batch/Lot #**	**Expired Date (MM/YY)**
N9300244	GFAAS Mixed Standard	AR	60-004CRY1	Feb-2025

Additional Reagents and Standards Required for PM (Customer Support Solution)				
Part Number (if applicable)	**Description**	**Quantity**	**Batch/Lot #**	**Expiration Date (MM/YY)**
N/A	DI Water	250 ml.	AR	AR
N/A	0.5% HNO_3	250 ml.	AR	AR

Additional Tools Required for PM			
Part Number (if applicable)	**Description**	**Quantity**	**Serial #**
B3100652 Or N9307029	Electronic Flow Meter	1	NA
B0505495	Test Jig	1	NA
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050121	Cu Lumina HCL	1	092216-010130
N3050109	Ba Lumina HCL	1	102416-040160
N3050139	K Lumina HCL	1	110716-010060
N3050152	Ni Lumina HCL	1	100516-030190
N3050119	Cr Lumina HCL	1	091911-020150

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. **General:**

   ☑ Review the instrument performance with the customer and document any recent problems.
   ☑ Inspect the customer log book and make any appropriate PM entries.
   ☑ Perform general inspection of system for cleanliness.

2. **PC Instrument Software:**

   ☑ Instrument Software user files/databases archived, packed, and/or deleted as needed.

3. **Mechanical:**

   ☑ Inspect and clean all fans and filters. Replace filters if necessary
   ☑ Inspect all gas and water lines for leaks and/or wear. Replace if needed. Thoroughly inspect all quick connects. Replace the Y connector, P/N 09921079, if needed.
   ☑ Clean exterior of the instrument.
   ☑ Check the drain system for signs of wear. Replace worn or damaged parts.
   ☑ Inspect the pole pieces and clean where the pole pieces contact the furnace. Replace the pole piece p-rings as needed, P/N's B0501018 & B0501250. Grease the O-rings as needed with Apiezon L grease, P/N 09905148
   ☑ Inspect the four insulation pads on the front contact housing of the THGA in furnace. If the pads are missing replace the THGA furnace or replace the insulator pads on the furnace.
   ☑ Inspect the graphite tube and clean the contact cylinders. Replace if necessary.
   ☑ Check internal and external gas flows with the Electronic Gas Flow Meter and the Gas Flow Test Probe as described in the Service Manual. Correct if necessary.
   ☑ Check furnace open/close function.
   ☑ Verify the operation of the GFTV Camera for proper operation and viewing alignment in the furnace camera Tube View window. Align if needed.
   ☑ Check the operation of the Halogen Light ASSY for the GFTV Camera. Replace if needed.
   ☑ Check the water level/quality in the recirculation (if applicable). Add distilled water if necessary.
   ☑ Check the cooling system fluid flow rate with the FCS In-Line Flow Meter for proper levels if needed. Refer to SDB# COSY008.STN
   ☑ Perform Cooling System maintenance if needed per SDB# COSY005.STN.
   ☑ Check auto sampler operation.
   ☐ Perform an auto sampler check valve test as described in the Service Manual.
   ☑ Lubricate the spindles of the auto sampler pumps and all moving parts of the tray mechanics as described in the Service Manual.
   ☑ Inspect the auto sampler sampling capillary as described in the Service Manual. Replace if necessary.
   ☑ Inspect the four insulation pads on the front contact housing of the THGA in furnace. If the pads are missing replace the THGA furnace or replace the insulator pads on the furnace.
   ☑ Inspect the graphite tube and clean the contact cylinders. Replace if necessary.
   ☑ Check internal and external gas flows with the Electronic Gas Flow Meter and the Gas Flow Test Probe as described in the Service Manual. Correct if necessary.
   ☑ Check furnace open/close function

4. **Electrical:**

   ☑ Inspect PC boards. Clean if necessary.
   ☑ Check instrument firmware revisions upgrade to current levels (if necessary)
   ☑ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

5. **Optics:**

   ☑ Inspect and clean the sample compartment windows, if needed.
   ☑ Inspect and clean the furnace windows, if needed.
   ☑ Inspect and clean the GFTV camera lens, if needed.
   ☑ Inspect optics. Clean or replace if necessary,

6. **Gasses:**

   ☑ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-installation Checklist SDB.
   ☑ Verify that the air filter element is dry. Replace if necessary.

7. **After PM Performance tests [THGA]:**

7.1 Furnace Gas Flows

Description: Ensures the flow rates are within specification.

Parameter	Specification	Test Results	Pass/Fail
Internal Flow Rate	250 mL/min ± 25 mL/min	208	Passed
External Flow Rate	100 mL/min ± 10 mL/min	101	Passed

7.2 Chromium Baseline Noise

Description: Signal to noise check.

Parameter	Specification	Results	Pass/Fail
Baseline Noise	≤ 0.005 Abs.	-0.0002	Passed
Standard Deviation	≤ 0.005	0.0001	Passed

7.3 Chromium Characteristic Mass and Precision

Description: Calculate the characteristic mass using the characteristic mass tool and precision from the integrated absorbance values.

Parameter	Specification	Results	Pass/Fail
Cr m_0 Results	≤ 70 pg/0.0044 A-s	5.6	Passed
Precision	≤ 2.0 %	1.68	Passed

7.4 Copper Characteristic Mass and Zeeman Ratio

Description: Calculate the characteristic mass using the characteristic mass tool and check the Zeeman Ratio.

Parameter	Specification	Results	Pass/Fail
Cu m_0 Result	≤ 16.5 pg/0.0044 A-s	16.3	Passed
Zeeman Ratio	0.52 ± 0.04	0.53	Passed

8. Review:

☑ Review with the customer PM work performed.
☑ Review with the customer routine maintenance procedures.
☑ Discuss recommended customer supplied materials to have on hand.
☑ Attach PM sticker.

Additional Comments

Additional Comments Regarding the PM
Zeeman Ratio $= \frac{Atomic\ Signal\ (Peak\ area)}{Atomic\ Signal\ (Peak\ area) + Background\ Signal\ (Peak\ area)}$ $= \frac{0.1375}{0.1375+0.1198}$ $= 0.53$

Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900Z have been completed.

This PinAAcle 900Z Passes ☑ Fails ☐ the preventive maintenance.

Review of Preventive Maintenance:	
Authorized PerkinElmer Representati [redacted]	Date: 23-Jul-2024 (DD-MMM-YYYY)
Authorized Customer Representative: [redacted]	Date: 23-Jul-2024 (DD-MMM-YYYY)

EQUIPMENT QUALIFICATION REPORT (EQR)

Agilent CrossLab Compliance Services



Agilent CrossLab

From Insight to Outcome

Agilent CrossLab Compliance

Qualification Type:	ES-OQ
System ID:	MY15330001
EQP Name:	AgilentRecommended
EQP Revision:	ES.02.50
EQP Publish Date:	March 2020
Date:	November 28, 2023 1:10:31 PM
Report Type:	Report
Org. Name:	Environment Research & Technology Co.,Ltd
Org. Location:	25/114 Moo 6 Soi Chinaket, Ngamwongwan Rd., Bangkok 10210

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Test Summary

Purpose

This section includes the Overall Qualification Status and details for each test that meets at least one of the following criteria: (1) was not scheduled; (2) was scheduled but not run; (3) was processed more than once; (4) passed recommended limits only when dual limits were selected; (5) required deviation(s) or comment(s); (6) required integration event change(s). Tests that pass and do not meet any criteria above are not included.

For a complete list of scheduled tests, see the table of contents. For supporting documentation, refer to the Attachments section.

NOTE: A Pass for the Overall Qualification Status indicates that all scheduled tests were run and passed; R, I, D, and C are blank if not applicable for that specific test.

R: runs
I: integration event changes
D: number of deviations submitted
C: number of comments submitted
Status: NS (not scheduled); NR (scheduled but not run); NC (unlocked but not completed)

Details

Test	Status			
	R	I	D	C

There were no repeated or re-integrated tests. All test resulted in a pass status.

Overall Qualification Status

Pass

Service Details

Purpose

This section includes local contact and delivery details for this service.

General Details

Service Order No./Request:	6006377416
EQP Name:	AgilentRecommended
EQP Revision:	ES.02.50
Report Type:	Report

Organization Details

Name:	Environment Research & Technology Co.,Ltd
Location:	25/114 Moo 6 Soi Chinaket, Ngamwongwan Rd., Bangkok 10210

Local Contact Details

Name:	K Relwin Posit
Job Title:	Supervisor Scientist
Qualification Location:	ICPOES Room

Operator Details

Name:	Worawit Timakul
Job Title:	Fielc Service Engineer

Data Acquisition Details

Acquisition Software Name:	ICP Expert
Acquisition Software Revision:	7.1.0.6821
Customer Data System (CDS):	Es: ICP Expert

Instrument Details

Purpose

This section describes the as found system configuration.

Details

Spectrometer 1

Manufacturer	Agilent Technologies
Name	5100 VDV
Model Number	G8011A
Sample Introduction	Double pass glass cyclonic spraychamber and seaspray nebulizer
Serial Number	MY15330001
Firmware Revision	2994

Chiller 1

Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G8481A
Serial Number	1A1560387

Autosampler 1

Manufacturer	Agilent Technologies
Name	SPS4
Model Number	G8410A
Serial Number	AU15220240

Vapor Generator 1

Manufacturer	Agilent Technologies
Name	VGA77P
Model Number	G8475A
Serial Number	MY15330002

Protocol Details

Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ES.02.50	Autosampler Operation
ES.02.50	Instrument Tests
ES.02.50	Preparation

Preparation

Purpose

This test records a status for each preparation task for the Agilent ICP-OES.

Configuration Details

Model/Serial No.:	G8011A	MY15330001

Results

Criteria	Observed Result	Expected Result	Status
Does the plasma ignite successfully in the first three attempts?	Yes	Yes	Pass
Was the detector calibration performed and completed successfully?	Yes	Yes	Pass
Was the instrument calibration performed and completed successfully?	Yes	Yes	Pass

Test Evidence

Image Details: Was the detector calibration performed and completed successfully?

Date and Time: November 28, 2023 12:56:03 PM

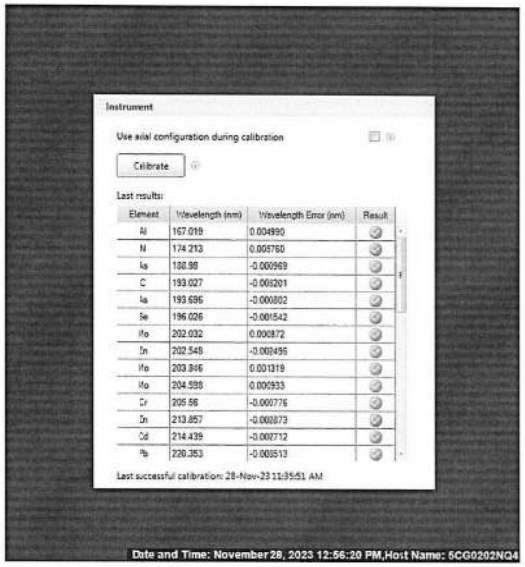
Host Name: 5CG0202NQ4



Image Details: Was the instrument calibration performed and completed successfully?

Date and Time: November 28, 2023 12:56:20 PM

Host Name: 5CG0202NQ4



Overall Test Status

Pass	Runs: 1

Instrument Tests

Purpose

This test records a status for each of the automated tests within the Agilent ICP-OES CDS. For detailed test criteria, refer to the attached report.

Configuration Details

Model/Serial No.:	G8011A	MY15330001

Results

	Observed Result	Expected Result	Status
Are the Functional Tests results within acceptance criteria?			
Subsystem Communications	Yes	Yes	Pass
Air Flow	Yes	Yes	Pass
Water Flow	Yes	Yes	Pass
Gas Flows	Yes	Yes	Pass
RF Generator	Yes	Yes	Pass
Camera	Yes	Yes	Pass
Optics	Yes	Yes	Pass
Are the Instrument Performance Tests results within acceptance criteria?			
Resolution	Yes	Yes	Pass
Sensitivity	Yes	Yes	Pass
Precision	Yes	Yes	Pass

Overall Test Status

Pass Runs: 1

Autosampler Operation

Purpose

This test verifies that the autosampler operates properly.

Configuration Details

Model/Serial No.:	G8410A	AU15220240

Results

Criteria	Observed Result	Expected Result	Status
Does the autosampler successfully move to the specified location(s)?	Yes	Yes	Pass

Overall Test Status

Pass Runs: 1

Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results. Note: Hardware/software configuration management is the customer's responsibility.

Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-requisite trainings for Data Integrity, General Compliance topics (GMP, GLP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The one certificate encompasses all pre-requisite trainings as documented in the Agilent Learning Management System called Success Factors.

Location	Category	Document Name	Page
EQR	General	Certificate of Qualification for ACE	13
EQR	General	Operator's training certificate and qualifications	14
EQR	General	Operator's training certificate and qualifications	15
EQR	General	Certificate of System Qualification	16
EQR	General	Instrument's Test Report	17
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EQR	Material	Certificate of Analysis Wavelength calibration solution	21

General

Document Name: Certificate of Qualification for ACE

Agilent Technologies

Agilent Compliance Engine Self Qualification

Date: October 18, 2023 10:19:46 AM

Drive Serial #: 90593EBA **Platform Revision:** ACE 3.12.112

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the concise summary and are structured by the actual algorithms challenged during the process. There is not a one-to-one relationship between algorithms and OQ program tests because some algorithms are used by several tests and across multiple similar hardware components of the qualified systems.

Technique Type	Tests Completed	Result
Atomic Absorption	7	Conforms
Capillary Electrophoresis	10	Conforms
Dissolution	6	Conforms
Emission Spectroscopy	3	Conforms
Gas Chromatography - GCMS	17	Conforms
Gas Chromatography	29	Conforms
Gel Permeation Chromatography	9	Conforms
ICP-MS	6	Conforms
Infrared Spectroscopy	7	Conforms
Liquid Chromatography	17	Conforms
Liquid Chromatography - LCMS	8	Conforms
Microfluidics	18	Conforms
Sample Preparation - Gas Chromatography	9	Conforms
Sample Preparation - Liquid Chromatography	8	Conforms
Supercritical Fluid Chromatography	15	Conforms
Software	6	Conforms
UV-Vis Spectrophotometer	13	Conforms

Overall Qualification Status

Conforms

General

Document Name: Operator's training certificate and qualifications

Agilent Technologies

Certificate of Completion

Learner Name: Worawit Timakul

Title Of Course: ANV-CE-ICPOES-2-008-A: Agilent 5100 ICP-OES Support Neophyte Training

Completion Date: August 25, 2016

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, intranet technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

General

Document Name: Operator's training certificate and qualifications

Agilent Technologies

Certificate of Completion

Learner Name:	Worawit Timakul
Title Of Course:	ANV-CE-ICPOES-2-007-C: CrossLab Compliance Hardware Specific Delivery for Agilent ICP-OES Systems
Completion Date:	October 30, 2020
Certified By Company:	Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

General

Document Name: Certificate of System Qualification

Agilent Technologies

Certificate of Completion

Learner Name:	Worawit Timakul
Title Of Course:	AN-CE-SS-II-030-A: ACE 3.X User Update Training
Completion Date:	July 1, 2020
Certified By Company:	Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

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General

Document Name: Instrument's Test Report

Report Summary

Instrument Model	Agilent 5100 VDV ICP-OES
Instrument ID	G8011A
Instrument Serial Number	MY15330001
Software Version	7.1.0.6821
Firmware Version	2994
Tested By	Worawit T.
Test Completed On	27-Nov-23 2:23:13 PM

Result Summary

Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass

Resolution Test Pass

Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	7.28
As (188.980 nm)	≤ 8.20	6.66
C (193.027 nm)	≤ 11.50	8.01
Mo (202.032 nm)	≤ 8.20	6.71
Cr (206.158 nm)	≤ 13.40	10.27
Zn (213.857 nm)	≤ 8.70	7.56
Pb (220.353 nm)	≤ 9.50	7.70
Co (228.615 nm)	≤ 17.20	10.70
Ba (230.424 nm)	≤ 9.40	8.14
Mn (257.610 nm)	≤ 13.30	9.43
Mn (260.568 nm)	≤ 20.30	15.91
Cr (267.716 nm)	≤ 11.00	9.30
Cu (324.754 nm)	≤ 25.00	17.80
Cu (327.395 nm)	≤ 14.20	12.73
Sr (338.071 nm)	≤ 33.50	27.28
Ba (455.403 nm)	≤ 44.00	31.08
Sr (460.733 nm)	≤ 36.00	21.11
Ba (493.408 nm)	≤ 36.00	29.33
Ba (614.171 nm)	≤ 42.00	32.02
Ar (675.283 nm)	≤ 74.00	64.85
K (766.491 nm)	≤ 80.00	62.51

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Agilent CrossLab Compliance Services

Document Name: Instrument's Test Report

Sensitivity Test Pass

Radial

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 46.0	SRBR	111.1	1111.0	85.2
Se (196.026 nm)	≥ 41.0	SRBR	68.5	856.2	116.6
Zn (213.857 nm)	≥ 1421.0	SRBR	3583.1	52766.1	215.1
Pb (220.353 nm)	≥ 46.0	SRBR	183.7	2811.8	201.8
Mn (257.610 nm)	≥ 3518.0	SRBR	10286.2	279763.9	735.8
Al (396.152 nm)	≥ 3.4	SBR	8.2	37571.9	4071.0
Ba (493.408 nm)	≥ 34.0	SBR	100.5	1198903.7	11807.1
K (766.491 nm)	≥ 1.8	SBR	3.8	100874.8	20871.5

Axial

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	248.6	3738.6	202.3
Se (196.026 nm)	≥ 159.0	SRBR	163.8	3040.9	283.3
Zn (206.200 nm)	≥ 234.0	SRBR	1402.0	19648.6	192.6
Zn (213.857 nm)	≥ 1743.0	SRBR	8340.9	200514.1	574.6
Cd (214.439 nm)	≥ 4227.0	SRBR	7606.2	156421.5	420.7
Pb (220.353 nm)	≥ 320.0	SRBR	631.4	16069.9	600.3
Mn (257.610 nm)	≥ 10625.0	SRBR	32328.3	1472044.4	2067.5
Cr (267.716 nm)	≥ 1048.0	SRBR	4308.3	1558026	1286.3
Cu (324.754 nm)	≥ 19.0	SBR	57.8	242584.8	4123.5
Al (396.152 nm)	≥ 6.0	SBR	21.9	239924.8	10474.6
Ba (493.408 nm)	≥ 60.0	SBR	236.0	7235267.3	30527.2
K (766.491 nm)	≥ 24.0	SBR	68.8	3110677.8	44585.8

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Date: November 28, 2023 1:10:31 PM
System ID: MY15330001

Document Name: Instrument's Test Report

Precision Test **Pass**

Radial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	0.74
Se (196.026 nm)	≤ 2.60	0.65
Zn (213.857 nm)	≤ 1.50	0.21
Pb (220.353 nm)	≤ 2.60	0.51
Mn (257.610 nm)	≤ 1.50	0.25
Al (396.152 nm)	≤ 1.50	0.30
Ba (493.408 nm)	≤ 1.50	0.60
K (766.491 nm)	≤ 1.50	0.20

Axial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.51
Se (196.026 nm)	≤ 1.50	0.37
Zn (206.200 nm)	≤ 1.50	0.30
Zn (213.857 nm)	≤ 1.50	0.26
Cd (214.439 nm)	≤ 1.50	0.21
Pb (220.353 nm)	≤ 1.50	0.30
Mn (257.610 nm)	≤ 1.50	0.63
Cr (267.716 nm)	≤ 1.50	0.17
Cu (324.754 nm)	≤ 1.50	0.32
Al (396.152 nm)	≤ 1.50	0.30
Ba (493.408 nm)	≤ 1.50	0.48
K (766.491 nm)	≤ 1.50	0.53

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General

Document Name: Software Verifcation

Software Verification Report

Date:	Monday, November 27, 2023	**Time:**	2:58:23 PM [UTC +07:00:00]	**Host Name:**	5100VDV-HP
Windows User Name :	Admin	**Base Revision Number:**	7.0.1	**Product Name :**	ICP Expert
Install Type:	N/A	**Additional Packages:**	NA		

Base Reference File Name : ICPReferenefile.xml

Summary :

Overall Evaluation of Installation Check : PASS

File Report Summary

No missing files or invalid files found

No system file difference found

Files Registration Report Summary

Files Registration check not required for this product

Registry Report Summary

Registry entries check not required for this product

Materials

Document Name: Certificate of Analysis Wavelength calibration solution

Agilent

CERTIFICATE OF ANALYSIS

Agilent Product Name: Wavelength Calibration Solution for ICP-OES & MP-AES, 5 mg/L, 500mL

Agilent Part No: 6610030100

Lot No: 0012990411

Product Specifications

Analyte	Starting Material	CAS #	Certified Conc.	Analyte	Starting Material	CAS #	Certified Conc.
Al	$Al(NO_3)_3$	7784-27-2	5.000 ± 0.025 mg/L	Mn	Mn	7439-96-5	5.000 ± 0.025 mg/L
As	As	7440-38-2	5.000 ± 0.025 mg/L	Mo	$(NH_4)_6Mo_7O_{24}$	13106-76-8	5.000 ± 0.025 mg/L
Ba	$Ba(NO_3)_2$	10022-31-8	5.000 ± 0.025 mg/L	Ni	Ni	7440-02-0	5.000 ± 0.025 mg/L
Cd	Cd	7440-43-9	5.000 ± 0.025 mg/L	Pb	Pb	7439-92-1	5.000 ± 0.025 mg/L
Co	Co	7440-48-4	5.000 ± 0.025 mg/L	Se	Se	7782-49-2	5.000 ± 0.025 mg/L
Cr	$Cr(NO_3)_3$	13548-38-4	5.000 ± 0.025 mg/L	Sr	$Sr(NO_3)_2$	10042-76-9	5.000 ± 0.025 mg/L
Cu	Cu	7440-50-8	5.000 ± 0.025 mg/L	Zn	Zn	7440-66-6	5.000 ± 0.025 mg/L
K	KNO_3	7757-79-1	50.00 ± 0.25 mg/L				

Matrix: 5% HNO_3

Intended Use: This solution is intended for use as a certified reference material or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), atomic absorption spectroscopy (flame AAS or GFAAS), microwave plasma atomic emission spectroscopy (MP-AES), x-ray fluorescence spectroscopy (XRF), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured under a quality management system that is agitated to **ISO 9001, ISO 17034 and ISO/IEC 17025.** This CRM was prepared to the certified concentrations shown above by gravimetric methods using single-element concentrates that were certified using the **"High Performance ICP-OES"** protocol developed by NIST and are directly traceable to the NIST SRMs listed below. This solution was stabilized using high purity nitric acid (HNO_3) and diluted with filtered (0.22µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against NIST SRMs: 3101a, 3103a, 3104a, 3108, 3113, 3112a, 3114, 3141a, 3132, 3134, 3136, 3128, 3149, 3153a, and 3168a. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: Agilent recommends that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy the analyst should: (1) use only pre-cleaned containers and transferware, (2) avoid pipetting directly from the CRM's original container, (3) use a minimum sub-sample size of 500µL, (4) make dilutions using calibrated balances or certified volumetric class A flasks and pipettes, (5) dilute to volume using the same matrix as the original CRM, and (6) never pour used product back into the original container. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or expose to direct sunlight. Minimize exposure to moisture or high humidity.

Page 1 of 3

Document Name: Certificate of Analysis Wavelength calibration solution

Agilent

Period of Validity: Agilent insures the accuracy of this solution until the expiration date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Sample lot approver:

[redacted]

Date of release: 18 October 2022
Date of expiration: 30 April 2024

Chuck Goudreau, Certifying Officer

Page 2 of 3

Agilent

Hazard Information: Refer to the Safety Data Sheet (SDS), which can be obtained at www.agilent.com/chem/sds.

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO 17034 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP I-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Further Information: Please contact Agilent for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is:

- Registered to ISO 9001 – Quality Management Systems – Requirements (TUV NORD Cert. Reg.No. 44 100 18592231)
- Accredited to ISO 17034– General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2846.02)
  - ISO 17034 references additional requirements specified in ISO Guide 31 and ISO Guide 35.
- Accredited to ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2846.01)
- LGC Standards, 2N Abby Road, Manchester, NH (2103)

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Agilent CrossLab Compliance Services

Document Name: Certificate of Analysis Wavelength calibration solution

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identifcation components: unique username and personal password. The Agilent representative who has deliverec this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Worawit Timakul
Logged On User Name:	worawit.timakul@agilent.com
Signature Creation Date:	November 28, 2023
Reason for Signature:	Executed protocol and published this original version of document

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

Warranty

Agilent Technologies makes no warranty of any kind to this material, including but not limited to, the implied warranties or merchantability and fitness for a particular purpose. Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

User Name: worawit.timakul
Report Generated by Hostname: 5CG0202NQ4

System Id: MY15330001
Print Date: November 28, 2023 1:10:41 PM

OQHW ICP 5100 ENvi Research Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 28, 2023 12:54:08 PM	Audit	SessionCreated	Session	None
November 28, 2023 12:54:08 PM	Start	Configuration	Session	None
November 28, 2023 12:54:08 PM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
November 28, 2023 12:54:32 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Es] - File path: [ProtocolPacks/Es/Configurations/02.50/Es.02.50.eqp], EQP File Name: [Es.02.50.eqp], EQP Name: [AgilentRecommended],Protocol Revision :[Es.02.50]
November 28, 2023 12:54:38 PM	End	Configuration	Session	None
November 28, 2023 12:54:41 PM	Start	Qualification	Session	OQ
November 28, 2023 12:54:41 PM	Start	Execution	Preparation : 5100 VDV: Qualitative Test - No setpoints associated	None
November 28, 2023 12:56:26 PM	End	Execution	Preparation : 5100 VDV: Qualitative Test - No setpoints associated	Run Count : 1
November 28, 2023 12:56:27 PM	Start	Execution	Instrument Tests : 5100 VDV: Qualitative Test - No setpoints associated	None
November 28, 2023 12:56:57 PM	End	Execution	Instrument Tests : 5100 VDV: Qualitative Test - No setpoints associated	Run Count : 1

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User Name: worawit.timakul
Report Genrated by Hostname: 5CG0202NQ4

System Id: MY15330001
Print Date: November 28, 2023 1:10:41 PM

OQHW ICP5100 ENvi Research Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 28, 2023 12:57:03 PM	Start	Execution	Autosampler Operation : Autosampler 1 - SPS4: Qualitative Test - No setpoints associated	None
November 28, 2023 12:57:08 PM	End	Execution	Autosampler Operation : Autosampler 1 - SPS4: Qualitative Test - No setpoints associated	Run Count : 1
November 28, 2023 12:57:09 PM	End	Qualification	Session	OQ
November 28, 2023 12:57:09 PM	Start	Reporting	Session	None
November 28, 2023 1:04:49 PM	Audit	AceRestarted	Session	None
November 28, 2023 1:04:50 PM	Audit	SessionReloaded	Session	None
November 28, 2023 1:04:58 PM	Start	Qualification	Session	OQ
November 28, 2023 1:08:10 PM	Audit	Reporting	Session	Report Generated : Certificate
November 28, 2023 1:09:28 PM	Audit	Reporting	Session	Report Generated : Report

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User Name: worawit.timakul
Report Generated by Hostname: 5CG0202NQ4

System Id: MY15330001
Print Date: November 28, 2023 1:10:41 PM

OQHW ICP 5100 ENvi Research Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 28, 2023 1:10:31 PM	Audit	Reporting	Session	Report Signed : Certificate PDF Name: OQHW ICP 5100 ENvi Research_20231128_Certificate_1.pdf User Name: worawit.timakul@agilent.com Full Name of Signer: Worawit Timakul Reason for signature: Executed protocol and published this original version of document

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Agilent CrossLab
From Insight to Outcome

Agilent CrossLab Start Up Services

Agilent 8890 Gas Chromatograph

Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments 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. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Agilent

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- 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 extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about *Agilent Technologies services*, please visit our website using the following URL: http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit https://community.agilent.com/welcome.
- To access **Agilent University**, visit http://www.agilent.com/crosslab/university/ to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: https://www.agilent.com/en-us/agilentresources.
- Need technical support, FAQs, supplies? – visit our **Support Home page** http://www.agilent.com/search/support.
- Videos about specific preparation requirements for your instrument can be found by searching the *Agilent YouTube* channel at https://www.youtube.com/user/agilent.

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Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check **"Section not applicable"** check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Complete the total number of pages field in the Service Completion section
- ***Ask the customer to sign the Service Completion section including the customer's and your signature.***

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

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System Information

☐ Check this box if an instrument configuration report is attached instead of completing the table below.

Instrument System Name and ID	ERTC - L-in-175 / US2125A011
Instrument System Site and Location	Environment Research & Technology Co., Ltd / GC ECD

List System Component Product Numbers	List the Serial Numbers of each Component
1. G3540A	US2125A011
2. G4513A	CN21195125
3. G4514A	CN21207024
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Preparation

- ☑ Discuss any specific issues with the customer before starting.
- ☑ Review the instrument logbook for recorded problems and comments.
- ☑ Save instrument control settings before starting the procedure.
- ☑ Perform a general inspection of the system for cleanliness.
- ☑ Check for proper installation of parts, assemblies, sensors etc.
- ☑ Check system for required installation of components, settings as defined by current Service Notes.
- ☑ Check for required firmware updates and verify with customers if they would like them installed.
- ☑ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

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Preventive Maintenance Procedure

Clean and inspect GC

- ☑ Unplug power cord from the power source.
- ☑ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ☑ Inspect internal connectors for proper contact and placement.
- ☑ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ☑ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ☑ Verify operation of all other fans - the inlet and EPC cooling fans.
- ☑ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

Inlet and detector consumable replacement

- ☑ Replace the split vent trap cartridge filter using the Maintenance procedure from either the Browser User interfaces on units with these inlets: Split/Splitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiles Interface (VI).
- ☑ If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ☑ For the inlets installed, perform inlet maintenance using the Maintenance procedure from the Browser User interfaces. Record the results. (Leak and Restriction Test)
- ☑ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination – clean as necessary.

Zero Sensors and Leak test

- ☑ Zero all pressure sensors using the Browser interface.
- ☑ Perform inlet pressure decay test(s) from the diagnostics screen on the Browser User interface. Record if test passed or failed in the results table.

Note: If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.

ALS Maintenance

- ☐ **Section NOT applicable**
- ☑ Check all cabling and configuration settings between GC, tray, and injectors.
- ☑ Vacuum or remove any dust, especially around fans.
- ☑ Check operation of all fans.
- ☑ Check syringe for smooth plunger operation.
- ☑ Check for smooth operation of the needle support – clean if necessary

Restore Instrument

- ☑ Restore the normal operating conditions or customer method using the Browser interface or Data System.
- ☑ Purge the system with carrier flow for 15 minutes
- ☑ Bake out the system, then restore the normal operating conditions
- ☑ After equilibration, check and record the post PM detector signal output values. Results should be similar or lower than the detector outputs recorded prior to PM.
- ☑ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Note: 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.

PM Parts List Table

Note: The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	8890 GC	GA 2
SSL Capillary Inlet PM kit, Split	5188-6496	8890 GC	GA N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	8890 GC	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	8890 GC	N/A
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	8890 GC	N/A
PP Inlet PM kit	5188-6498	8890 GC	N/A
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	8890 GC	N/A
MMI Cleaning Kit	G3510-60820	8890 GC	N/A
PTV Septumless Head Rebuild Kit	5182-9747	8890 GC	N/A
PTV Septumless Head Teflon Guide	5182-9748	8890 GC	N/A
Ignitor (glow plug) assembly with O-ring	19231-60680	8890 GC	1
FID Collector Rebuild/Cleaning Kit	G1531-67000	8890 GC	N/A
FID Collector Replacement Kit	G1531-67001	8890 GC	N/A
Standard .011-inch FID Jet	5200-0176	8890 GC	N/A
Universal .018-inch FID Jet	5200-0177	8890 GC	N/A

Signature Page

Service Review

- ☑ Attach available reports/printouts of all tests to this documentation.
- ☑ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☑ Update/reset instrument maintenance counters as appropriate.
- ☑ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☑ Complete the Service Engineer Comments section if there are additional comments.
- ☑ Review with the customer this service, parts replaced, and test results obtained.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☐ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

PM Test Results Table

Test description	Before PM Service	After PM Service
Front detector output	N/A	155.4
Back detector output	N/A	11.5
AUX 1 detector output	N/A	[redacted]2.0
AUX 2 detector output	N/A	
Test description	**Expected test result**	**Actual test result**
Leak and Restriction Test after front inlet maintenance	Pass	Passed
Leak and Restriction Test after back inlet maintenance	Pass	Passed
Leak and Restriction Test after front inlet Split Vent Trap replacement	Pass	Passed
Leak and Restriction Test after back inlet Split Vent Trap replacement	Pass	Passed
Front inlet pressure decay test	Pass	Passed
Back inlet pressure decay test	Pass	Passed

Agilent CrossLab
from insight to outcome

Agilent 8890 GC Preventive Maintenance Checklist

Service Engineer Comments

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

Completed, All Result passed.

Service Completion

Service request number 6006787701 [redacted]

Date service completed 05 JUN 2024

Agilent signature [redacted]

Customer signature [redacted]

Total number of pages in this document 9

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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. 0-2717-3000-29 FAX. 0-2719-9484

ilac-MRA

NSC-TISI-TIS17025
CALIBRATION 0008

Cert.No.: 24CH10
Page.: 1 of 2

Certificate of Calibration

Equipment :	Conductivity Meter
Manufacturer :	HM DIGITAL
Model :	COM-100
Serial No. :	PONPE5863548
ID No. :	NO.4
Condition As-Received:	Used Item
Received Date :	05 January 2024
Calibration Date :	08 January 2024
Reference :	2401-0077DN-6
Submitted by :	Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure:	In -house method : - CP-CH6 : based on direct measurement by using certified referece material (CRM)
Calibrated by :	Walalak Sirithean
Approved by :	[redacted] Approved Signatory

(✓) Saithip Meangmai
( ) Warakorn Lerngagtrakul
( ) Ponpan Paipim

Issue Date : 10 January 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0062387

Cert.No.: 24CH10

Condition of this result of calibration

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	9549224	130RC003	23I435	10 Apr 2024

- This Certification is traceable to SI Throught Technology Promotion Association (Thailand - Japan)

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 calibration solution, Thermo Scientific (traceable to NIST)

Conductivity Solution	Manufacturer	Lot No.	Exp. date
*100 µS/cm	Thermo Scientific	193/01	11 May 2024
1413.0 µS/cm	CPA Chem	931955	30 Sep 2024

- 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.: PONPE5863548

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
*100 µS/cm	101 µS/cm	99.9 µS/cm	5.1 µS/cm	2.00
1413.0 µS/cm	1445 µS/cm	1410 µS/cm	11 µS/cm	2.00

Remark - UUC* = Unit Under Calibration

- * = Not NSC - ONSC Accredited

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 %.

-o0o-

a 1196383

Request No. 22-67 / 0196

MTC No. PSL-H 0054 / 67

Certificate of Calibration

Customer : Environment Research & Technology Company Limited
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok

Item : Thermo-Hygrometer (Thermal Environment Monitor)

Model /Type : hs-32

Serial Number : MCB030005

Manufacturer : METROSONICS

Date of Request : 12 December 2023

Date of Calibration : 3 January 2024

The certifies the above equipment was calibrated in accordance with the recognised International Standard ISO/IEC 17025:2017 and the operation according to procedure no. WI.CP.18.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %.

Calibrated by : [redacted]

(Ms. Panit Thummasri)

Approved by [redacted]

(Mr. Kamchai Singhapiwat)
Director
Photometry and Temperature Standards Laboratory

Ref. No : 20122661212048870O1

Issued Date : 10 January 2024

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Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

Request No. 22-67 / 0196 **MTC No.** PSL-H 0054 / 67

Description of Unit Under Calibration :

Customer :	Environment Research & Techrology Company Limited
Address :	25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok
Item :	Thermo-Hygrometer (Thermal Environment Monitor)
Serial Number :	MCB030005
Calibration Required :	Temperature at (30, 35, 40) °C
Ambient Condition :	Ambient temperature (23 ± 3) °C
	Relative humidity (55 ± 20) %
Laboratory Address :	Photometry and Temperature Standards Laboratory
	Soi 1, Bangpoo Industrial Estate, Sukhumvit Rd., Samutprakan

Reference Standard :

Digital Thermometer with Sensor, Model : F250H, S/N : 9345 008 2331, Sensor RTD Probe No. RTD-01 and RTD-02 which was calibrated by Industrial Metrology and Testing Service Centre, Certificate No. PSL-T 0976/66.

The temperature scale in use of this laboratory is the International Temperature Scale of 1990.

Calibration Procedure :

The certifies the above equipment was calibrated according to procedure no. WI.CP.18.

Support Equipment :

Temperature & Humidity Controlled Chamber, Model : 9141-5110, S/N : 1205101

Adjustments : NONE

PT.

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Request No. 22-67 / 0196 **MTC No.** PSL-H 0054 / 67

Results of Calibration :- (√) Without Adjustment ( ) After Adjustment

Table : Temperature Measurement @ Wet Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.9	0.1	0.50
35.0	35.0	0.0	0.50
40.0	39.9	0.1	0.50

Table : Temperature Measurement @ Dry Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.9	0.1	0.50
35.0	35.0	0.0	0.50
40.0	40.0	0.0	0.50

PT.

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Request No. 22-67 / 0196 **MTC No.** PSL-H 0054 / 67

Results of Calibration :-

Table : Temperature Measurement @ Globe Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.9	0.1	0.50
35.0	34.9	0.1	0.50
40.0	39.8	0.2	0.50

Note :

1. This calibration was done without removing reservoir cover, white plates and blackened copper sphere of the instrument.
2. The calibration data for instrument in this report is reported within the condition existing at the time of measurement only.

...end of certificate...

P.T.

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Request No. 22-66 / 0758 **MTC No.** PSL-H 0348 / 66

Certificate of Calibration

Customer : Environment Research & Technology Company Limited
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok
Item : Thermo-Hygrometer (Area Heat Stress Monitor)
Model /Type : hs-32
Serial Number : MCB110008
Manufacturer : METROSONICS
Date of Request : 16 August 2023
Date of Calibration : 4 September 2023

The certifies the above equipment was calibrated in accordance with the recognised International Standard ISO/IEC 17025:2017 and the operation according to procedure no. WI.CP.18.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %.

Calibrated by : [redacted]
(Ms. Panit Thummasri)

Approved by [redacted]
(Mr. Kamchai Singhapiwat)
Director
Photometry and Temperature Standards Laboratory

Ref. No : 20122660816031810O2
Issued Date : 12 September 2023

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Request No. 22-66 / 0758 **MTC No.** PSL-H 0348 / 66

Description of Unit Under Calibration :

Customer :	Environment Research & Technology Company Limited
Address :	25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok
Item :	Thermo-Hygrometer (Area Heat Stress Monitor)
Serial Number :	MCB110008
Calibration Required :	Temperature at (30, 35, 40) °C
Ambient Condition :	Ambient temperature (23 ± 3) °C
	Relative humidity (55 ± 20) %
Laboratory Address :	Photometry and Temperature Standards Laboratory
	Soi 1, Bangpoo Industrial Estate, Sukhumvit Rd., Samutprakan

Reference Standard :

Digital Thermometer with Sensor, Model : F250H, S/N : 9345 008 2331, Sensor RTD Probe No. RTD-01 and RTD-02 which was calibrated by Industrial Metrology and Testing Service Centre, Certificate No. PSL-T 0976/66.

The temperature scale in use of this laboratory is the International Temperature Scale of 1990.

Calibration Procedure :

The certifies the above equipment was calibrated according to procedure no. WI.CP.18.

Support Equipment :

Temperature & Humidity Controlled Chamber, Model : 9141-5110, S/N : 1205101

Adjustments : NONE

P.T.

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Request No. 22-66 / 0758 **MTC No.** PSL-H 0348 / 66

Results of Calibration :- (/) Without Adjustment ( ) After Adjustment

Table : Temperature Measurement @ Wet Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	30.6	-0.6	0.50
35.0	35.1	-0.1	0.50
40.0	40.2	-0.2	0.50

Table : Temperature Measurement @ Dry Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	30.6	-0.6	0.50
35.0	35.1	-0.1	0.50
40.0	40.3	-0.3	0.50

P.T.

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E-mail : sumalee@tistr.or.th

Request No. 22-66 / 0758 **MTC No.** PSL-H 0348 / 66

Results of Calibration :-

Table : Temperature Measurement @ Globe Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	30.7	-0.7	0.50
35.0	35.1	-0.1	0.50
40.0	40.2	-0.2	0.50

Note :

1. This calibration was done without removing reservoir cover, white plates and blackened copper sphere of the instrument.
2. The calibration data for instrument in this report is reported within the condition existing at the time of measurement only.

...end of certificate...

The results relate only to the items tested/calibrated or value assigned.
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Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

Request No. 22-66 / 0841 **MTC No.** PSL-H 0380 / 66

Certificate of Calibration

Customer : Environment Research & Technology Company Limited
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok
Item : Thermo-Hygrometer (Thermal Environment Monitor)
Model /Type : hs-32
Serial Number : MCD070019
Manufacturer : METROSONICS
Date of Request : 20 September 2023
Date of Calibration : 27 September 2023

The certifies the above equipment was calibrated in accordance with the recognised International Standard ISO/IEC 17025:2017 and the operation according to procedure no. WI.CP.18.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %.

Calibrated by : [redacted]
(Ms. Panit Thummasri)

Approved by [redacted]
(Mr. Kamchai Singhapiwat)
Director
Photometry and Temperature Standards Laboratory

Ref. No : 20122660920037210O2
Issued Date : 17 October 2023

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Request No. 22-66 / 0841 **MTC No.** PSL-H 0380 / 66

Description of Unit Under Calibration :

Customer :	Environment Research & Technology Company Limited
Address :	25/114 Moo 6, Soi Chinakat 1, Ngamwongwan Rd., Laksi, Bangkok
Item :	Thermo-Hygrometer (Thermal Environment Monitor)
Serial Number :	MCD070019
Calibration Required :	Temperature at (30, 35, 40) °C
Ambient Condition :	Ambient temperature (23 ± 3) °C
	Relative humidity (55 ± 20) %
Laboratory Address :	Photometry and Temperature Standards Laboratory
	Soi 1, Bangpoo Industrial Estate, Sukhumvit Rd., Samutprakan

Reference Standard :

Digital Thermometer with Sensor, Model : F250H, S/N : 9345 008 2331, Sensor RTD Probe No. RTD-01 and RTD-02 which was calibrated by Industrial Metrology and Testing Service Centre, Certificate No. PSL-T 0976/66.

The temperature scale in use of this laboratory is the International Temperature Scale of 1990.

Calibration Procedure :

The certifies the above equipment was calibrated according to procedure no. WI.CP.18.

Support Equipment :

Temperature & Humidity Controlled Chamber, Model : 9141-5110, S/N : 1205101

Adjustments : NONE

P.T.

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Request No. 22-66 / 0841 **MTC No.** PSL-H 0380 / 66

Results of Calibration :- (/) Without Adjustment ( ) After Adjustment

Table : Temperature Measurement @ Wet Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.7	0.3	0.50
35.0	34.6	0.4	0.50
40.0	39.4	0.6	0.50

Table : Temperature Measurement @ Dry Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.9	0.1	0.50
35.0	34.9	0.1	0.50
40.0	39.7	0.3	0.50

P.T.

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Request No. 22-66 / 0841 **MTC No.** PSL-H 0380 / 66

Results of Calibration :-

Table : Temperature Measurement @ Globe Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.8	0.2	0.50
35.0	34.8	0.2	0.53
40.0	39.6	0.4	0.50

Note :

1. This calibration was done without removing reservoir cover, white plates and blackened copper sphere of the instrument.
2. The calibration data for instrument in this report is reported within the condition existing at the time of measurement only.

...end of certificate...

The results relate only to the items tested/calibrated or value assigned.
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Request No. 22-66 / 0758 **MTC No.** PSL-H 0349 / 66

Certificate of Calibration

Customer : Environment Research & Technology Company Limited
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok

Item : Thermo-Hygrometer (Area Heat Stress Monitor)

Model /Type : hs-32

Serial Number : MCH110038

Manufacturer : METROSONICS

Date of Request : 16 August 2023

Date of Calibration : 4 September 2023

The certifies the above equipment was calibrated in accordance with the recognised International Standard ISO/IEC 17025:2017 and the operation according to procedure no. WI.CP.18.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %.

Calibrated by : [redacted]

(Ms. Panit Thummasri)

Approved b [redacted]

(Mr. Kamchai Singhapiwat)
Director
Photometry and Temperature Standards Laboratory

Ref. No : 20122660816031810O3

Issued Date : 12 September 2023

The results relate only to the items tested/calibrated or value assigned.
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Request No. 22-66 / 0758 **MTC No.** PSL-H 0349 / 66

Description of Unit Under Calibration :

Customer :	Environment Research & Technology Company Limited
Address :	25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok
Item :	Thermo-Hygrometer (Area Heat Stress Monitor)
Serial Number :	MCH110038
Calibration Required :	Temperature at (30, 35, 40) °C
Ambient Condition :	Ambient temperature (23 ± 3) °C
	Relative humidity (55 ± 20) %
Laboratory Address :	Photometry and Temperature Standards Laboratory
	Soi 1, Bangpoo Industrial Estate, Sukhumvit Rd., Samutprakan

Reference Standard :

Digital Thermometer with Sensor, Model : F250H, S/N : 9345 008 2331, Sensor RTD Probe No. RTD-01 and RTD-02 which was calibrated by Industrial Metrology and Testing Service Centre, Certificate No. PSL-T 0976/66.

The temperature scale in use of this laboratory is the International Temperature Scale of 1990.

Calibration Procedure :

The certifies the above equipment was calibrated according to procedure no. WI.CP.18.

Support Equipment :

Temperature & Humidity Controlled Chamber, Model : 9141-5110, S/N : 1205101

Adjustments : NONE

P.T.

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Request No. 22-66 / 0758 **MTC No.** PSL-H 0349 / 66

Results of Calibration :- (/) Without Adjustment ( ) After Adjustment

Table : Temperature Measurement @ Wet Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	30.6	-0.6	0.50
35.0	35.3	-0.3	0.50
40.0	40.4	-0.4	0.50

Table : Temperature Measurement @ Dry Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	30.5	-0.5	0.50
35.0	35.3	-0.3	0.50
40.0	40.3	-0.3	0.50

P.T.

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Request No. 22-66 / 0758 **MTC No.** PSL-H 0349 / 66

Results of Calibration :-

Table : Temperature Measurement @ Globe Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	30.4	-0.4	0.50
35.0	35.1	-0.1	0.50
40.0	40.2	-0.2	0.50

Note :

1. This calibration was done without removing reservoir cover, white plates and blackened copper sphere of the instrument.
2. The calibration data for instrument in this report is reported within the condition existing at the time of measurement only.

...end of certificate...

PT

The results relate only to the items tested/calibrated or value assigned.
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Request No. 22-67 / 0070 **MTC No.** PSL-H 0018 / 67

Certificate of Calibration

Customer : Environment Research & Technology Company Limited
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok
Item : Thermo-Hygrometer (Thermal Environment Monitor)
Model /Type : QUESTemp°32
Serial Number : TPG030012
Manufacturer : 3M, QUEST Technologies
Date of Request : 30 October 2023
Date of Calibration : 13 November 2023

The certifies the above equipment was calibrated in accordance with the recognised International Standard ISO/IEC 17025:2017 and the operation according to procedure no. WI.CP.18.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %.

Calibrated by : [redacted]
(Ms. Panit Thummasri)

Approved b [redacted]
(Mr. Kamchai Singhapiwat)
Director
Photometry and Temperature Standards Laboratory

Ref. No : 2012266103004306002
Issued Date : 1 December 2023

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E-mail : sumalee@tistr.or.th

Request No. 22-67 / 0070 **MTC No.** PSL-H 0018 / 67

Description of Unit Under Calibration :

Customer :	Environment Research & Technology Company Limited
Address :	25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Laksi, Bangkok
Item :	Thermo-Hygrometer (Thermal Environment Monitor)
Serial Number :	TPG030012
Calibration Required :	Temperature at (30, 35, 40) °C
Ambient Condition :	Ambient temperature (23 ± 3) °C
	Relative humidity (55 ± 20) %
Laboratory Address :	Photometry and Temperature Standards Laboratory
	Soi 1, Bangpoo Industrial Estate, Sukhumvit Rd., Samutprakan

Reference Standard :

Digital Thermometer with Sensor, Model : F250H, S/N : 9345 008 2331, Sensor RTD Probe No. RTD-01 and RTD-02 which was calibrated by Industrial Metrology and Testing Service Centre, Certificate No. FSL-T 0976/66.

The temperature scale in use of this laboratory is the International Temperature Scale of 1990.

Calibration Procedure :

The certifies the above equipment was calibrated according to procedure no. WI.CP.18.

Support Equipment :

Temperature & Humidity Controlled Chamber, Model : 9141-5110, S/N : 1205101

Adjustments : NONE

The results relate only to the items tested/calibrated or value assigned.
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Request No. 22-67 / 0070 **MTC No.** PSL-H 0018 / 67

Results of Calibration :- (√) Without Adjustment ( ) After Adjustment

Table : Temperature Measurement @ Wet Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.4	0.6	0.50
35.0	34.3	0.7	0.50
40.0	39.2	0.8	0.51

Table : Temperature Measurement @ Dry Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.4	0.6	0.50
35.0	34.4	0.6	0.50
40.0	39.3	0.7	0.50

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Request No. 22-67 / 0070 MTC No. PSL-H 0018 / 67

Results of Calibration :-

Table : Temperature Measurement @ Globe Bulb

Average Measured Temperature (°C)	Average Displayed of UUC (°C)	Correction Measured of UUC (°C)	Expanded Uncertainty of Measurement (± °C)
30.0	29.6	0.4	0.50
35.0	34.4	0.6	0.50
40.0	39.3	0.7	0.50

Note :
1. This calibration was done without removing reservoir cover, white plates and blackened copper sphere of the instrument.
2. The calibration data for instrument in this report is reported within the condition existing at the time of measurement only.

...end of certificate...

PT

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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. 0-2717-3000-24 FAX. 0-2719-9484

Certificate of Calibration

Certificate No. : 23PH655

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

Equipment : Lux Meter
Manufacturer: Digicon
Model : LX-73
Serial No.: Q961815
ID No.: -
Condition As-Received: Used Item
Received Date: 13 December 2023
Calibration Date: 15 December 2023

Reference: 2312-0251DN
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %

Submitted by: Environment Research & Technology Company Limited.
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210

Procedure used: Calibration were conducted using calibration procedure No. CP-PH01 based on inverse square law technique.

Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Photometry & Encorder	LMguide 9,6 m	120RC303	DL-0064-22	20 Jul 2025
2) High-accuracy Irradiance Standard	OL-FEL-U	F-1473	TP-1026-23	14 Feb 2024

2.This result of calibration was made on requested at the point specified by customer.
3.Test Equipment : Programmable Voltage/Current Source (Model : OL83A, S/N : 16221394).
4.Test Equipment : Illuminance Meter (Model : 51002, S/N : 080129).
5.The certificate is valid only to the item calibrated on date and place of calibration.
6.This Certification is traceable to the International System of Unit maintained through:-
-National Institute of Metrology Thailand (NIMT)
-National Institute of Metrology (Thailand), NSC-ONSC Accredited No. Calibration 0144

Calibrated by : Nivat Nitas
Issue Date : 18 December 2023

Approved Signatory : [redacted]
[ ] Phalinee Prabpaipal
[ ] Chatchawan Khunpiluek
[✓] Nuntawat Khamchai

B 0331113

Cert. No.: 23PH655
Page.: 2 of 2

Result of calibration:- (*) Without adjustment ( ) After adjustment

Function : Illuminance Measurement **Range :** 40 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
0	0.00	0.00	-
15	14.89	-0.11	0.20
20	19.78	-0.22	0.26
28	27.57	-0.43	0.37
36	35.46	-0.54	0.47

Function : Illuminance Measurement **Range :** 400 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
40	39.8	-0.2	0.52
120	119.6	-0.4	1.6
200	200.7	0.7	2.6
280	278.5	-1.5	3.7
360	356.1	-3.9	4.7

Function : Illuminance Measurement **Range :** 4000 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
400	396	-4	5.2
1200	1207	7	16
2000	2027	27	26
2800	2804	4	37
3600	3593	-7	47

Function : Illuminance Measurement **Range :** 40000 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
4000	3970	-30	52
5000	5020	20	65

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

UUC* = Unit Under Calibration.

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envi research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

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Sound Level Meter Calibration Report

Support Equipment Type	:	Sound Level Calibrator
Manufacture	:	Larson Davis
Model	:	CAL200
Serial No.	:	3605
Range of Calibrator		
- Support Equipment Type	:	93.8
- Frequency	:	1,000 Hz.
Calibrated By	:	Mr.Nitad Sirichad
Calibration Date	:	August 21, 2024
Customer Name	:	Vision E. Consultants Co., Ltd. : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิต บึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัด สุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)

Item	Equipment			Actual Reading (dB(A))		Status
	Brand	Model	Serial Number	Before Adjustment	After Adjustment	
1	Scarlet Tech	ST-11D	820966	93.8	93.8	Pass
2	Scarlet Tech	ST-11D	820934	93.8	93.8	Pass
3	Scarlet Tech	ST-11D	820870	94.1	93.8	Pass
4	RION	NL-31	00593653	94.2	93.8	Pass

Checked By [redacted]
Mr.Prayun Detkla
Technician

Approved By [redacted]
Ms.Sutatip Im-noi
Environmental Scientist

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Sound Level Meter Calibration Report

Support Equipment Type	:	Sound Level Calibrator
Manufacture	:	BSWA Technology
Model	:	CA115
Serial No.	:	470196
Range of Calibrator		
- Support Equipment Type	:	113.9
- Frequency	:	1,000 Hz.
Calibrated By	:	Mr.Wadcharapong Phunkhetkit
Calibration Date	:	August 22, 2024
Customer Name	:	Vision E. Consultants Co., Ltd. : โครงการผลิตปิโตรเลียมพื้นที่ผลิต L1/64 บึงหญ้า แปลงสำรวจบนบกหมายเลข L1/64 พื้นที่ผลิตบึงหญ้าตะวันตก-หนองสระ และพื้นที่ผลิต บึงหญ้าตะวันตก-หนองสระส่วนขยาย แปลงสำรวจบนบกหมายเลข L21/43 จังหวัด สุโขทัย และจังหวัดกำแพงเพชร (ระยะผลิตผ่านฐานและผ่านท่อลำเลียง)

Item	Equipment			Actual Reading (dB(A))		Status
	Brand	Model	Serial Number	Before Adjustment	After Adjustment	
1	RION	NL-42	01085956	113.8	113.9	Pass
2	RION	NL-42	00221384	113.7	113.9	Pass
3	EXTECH	SL400	170400043	113.8	113.9	Pass
4	EXTECH	SL400	190800276	113.7	113.9	Pass
5	EXTECH	SL400	190800266	113.7	113.9	Pass
6	EXTECH	SL400	190600234	113.9	113.9	Pass

Checked By [redacted]
Mr.Prayun Detkla
Technician

Approved By [redacted]
Ms.Sutatip Im-noi
Environmental Scientist

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

NSC-TISI-TIS 17025
CALIBRATION 0037

Request No. 21-67/0190 **MTC No.** EEL. BP. 95/0167

CALIBRATION CERTIFICATE

Submitted by : Environment Research & Technology Co.,Ltd.
Address : 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok, 10210.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre. Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Precision Acoustic Calibrator
Manufacturer : Larson Davis
Model : CAL200
Serial No. : 3605

Ambient Environment

Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.500) kPa

Standards used :
1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone B&K 4180 S/N 2889871

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 8 Jan. 2024
Date of Calibration : 10 Jan. 2024

[redacted]

The results relate only to the items tested/calibrated or value assigned.
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Request No. 21-67/0190 **MTC No.** EEL. BP. 95/0167

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20µPa at 1000 Hz

Acoustic Output in dB re 20µPa , Corrected to Reference Conditions : 101.325 kPa , 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer4180	93.85	-0.15	± 0.10	±0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer4180	1000.3	0.3	± 1.5	±1.0%

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer4180	0.32	± 0.50	±3.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was included at level of 0.26 dB from manual.

Date of Calibration : 10 Jan. 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0190 **MTC No.** EEL. BP. 95/0167

Nominal Output of Unit Under Test = 114 dB re 20µPa at 1000 Hz

Acoustic Output in dB re 20µPa , Corrected to Reference Conditions : 101.325 kPa , 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	113.80	-0.20	± 0.10	±0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	999.8	-0.2	± 1.5	±1.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	0.38	± 0.50	±3.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was included at level of 0.26 dB from manual.

Calibrated by : [redacted]

(Mr.Weerachai Deechaiyae)

Approved by : [redacted]

(Mr.Prawate Kluaypa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 10 Jan. 2024

Date of Issue : 11 Jan. 2024

Ref : 2011267010800067006

End of Certificate

The results relate only to the items tested/calibrated or value assigned.
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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0241 **MTC No.** EEL. BP. 188/0167

CALIBRATION CERTIFICATE

Submitted by : Environment Research & Technology Co.,Ltd

Address : 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok, 10210.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre. Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : BSWA

Model : CA115

Serial No. : 470196

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.500) kPa

Standards used :

1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Keithley 2015-P S/N4106455.
7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 30 Jan. 2024

Date of Calibration : 6 Feb. 2024

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

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NSC-TISI-TIS 17025
CALIBRATION 0037

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0241 **MTC No.** EEL. BP. 188/0167

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 114 dB re 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa, Corrected to Reference Conditions: 101.325 kPa, 23.0 °C and 50 %RH.

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	113.88	-0.12	±0.10	±0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1000.7	0.7	± 1.5	±2.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	0.44	± 0.50	±4.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by : [redacted]

(Mr.Weerachai Deechaiyae)

Approved by :

(Mr.[redacted]pa)

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 6 Feb. 2024

Date of Issue : 8 Feb. 2024

Ref : 2011267013000419001

End of Certificate

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