เอกสารแนบ 16

เอกสารอนุญาตห้องปฏิบัติการ

สิ่งที่ส่งมาด้วย ๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด เลขทะเบียน ว-๑๕๒
ที่ อก ๐๓๑๐(๑)/ ๑๓๗๖๘ ลงวันที่ ๒๖ กันยายน ๒๕๖๕

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๓๒ ราย

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กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๖ กันยายน ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๘ พฤษภาคม ๒๕๖๕

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๓๒ ราย
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๕ ราย
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม

ตามหนังสือที่อ้างถึง บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๕๒ สถานที่ตั้งเลขที่ ๖ ซอยงามวงศ์วาน ๕ ตำบลบางเขน อำเภอเมืองนนทบุรี จังหวัดนนทบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๓๒ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๕ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๕ กรกฎาคม ๒๕๖๘ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

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

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เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด เลขทะเบียน ว-๑๕๒
ที่ อก ๐๓๑๐(๑)/ ๑๓๗๖๘ ลงวันที่ ๒๖ กันยายน ๒๕๖๕

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๐๐ รายการ

น้ำเสีย จำนวน 27 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
2	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
3	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method[4] 2) 5-Day BOD Test, Membrane Electrode Method[4]
4	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
5	Chemical Oxygen Demand	1) Open Reflux, Titrimetric Method[4] 2) Closed Reflux, Titrimetric Method[4]
6	Chromium	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
7	Color	ADMI Weighted-Ordinate Spectrophotometric Method[4]
8	Copper	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
9	Cyanide	Distillation, Colorimetric Method[4]
10	Formaldehyde	Distillation, Colorimetric Method[3]
11	Free Chlorine	DPD Colorimetric Method[4]
12	Hexavalent Chromium	Colorimetric Method[4]
13	Lead	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
14	Manganese	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
15	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4]
16	Nickel	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
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ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๕ ราย

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
4	Beryllium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
5	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
6	Chromium	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
7	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation[4] 3) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[4]
8	Chromium (VI)	Colorimetric Method[4]
9	Lead	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
10	Manganese	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method[4] 2) Soxhlet Extraction Method[4]
18	pH	Electrometric Method[4]
19	Phenols	Distillation, Direct Photometric Method[4]
20	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
21	Sulfide	1) Iodometric Method[4] 2) Methylene Blue Method[4]
22	Temperature	Laboratory and Field Methods[4]
23	Total Dissolved Solids	Dried at 180 °C[4]
24	Total Kjeldahl Nitrogen	1) Macro-Kjeldahl Method[4] 2) Semi-Micro-Kjeldahl Method[4]
25	Total Suspended Solids	Dried at 103-105 °C[4]
26	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation[4] 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[4]
27	Zinc	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]

<u>น้ำใต้ดิน จำนวน 16 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4]
12	Nickel	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
13	pH	Electrometric Method[4]
14	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
15	Silver	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]
16	Zinc	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method[4] 3) Digestion, Inductively Coupled Plasma Method[4]

<u>อากาศเสีย (ปล่องระบาย) จำนวน 25 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[5] 3) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
2	Arsenic	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5] 2) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[5] 3) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Beryllium	1) Isokinetic Sampling, Digestion, Direct Nitrous Oxide-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
4	Cadmium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[5] 3) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
5	Carbon Monoxide	Instrumental Analyzer Method[5]
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method 2) Isokinetic Sampling, Ion Chromatographic Method[5]
7	Chromium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
8	Cobalt	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[5] 3) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
9	Copper	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
10	Cresol	Absorption Sampling, Gas Chromatographic Method[5]
11	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method 2) Isokinetic Sampling, Ion Chromatographic Method[5]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Tin	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
24	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method[5]
25	Xylene	Adsorption Sampling, Gas Chromatographic Method[5]

<u>สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 17 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
2	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method [1,6,13] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[7,13] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method[5] 2) Isokinetic Sampling, Ion Chromatographic Method[5]
13	Hydrogen Sulfide	Absorption Sampling, Iodometric Method[5]
14	Lead	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5]. 2) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[5] 3) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
15	Manganese	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
16	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[5]
17	Nickel	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
18	Opacity	Ringelmann's Method[2]
19	Oxides of Nitrogen	Instrumental Analyzer Method[5]
20	Selenium	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5] 2) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[5] 3) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
21	Sulfur Dioxide	1) Isokinetic Sampling, Barium-Thorin Titrimetric Method[5] 2) Instrumental Analyzer Method[5]
22	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method[5]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
7	Chromium (III)	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation[1,6,9,11,14] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation[1,6,9,12,14] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation[1,6,9,10,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation[7,9,11,14] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation[7,9,12,14] 6) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation[7,9,10,14]
8	Chromium (VI)	1) Waste Extraction, Colorimetric Method[1,14] 2) Alkaline Digestion, Colorimetric Method[9,14]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Barium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
4	Beryllium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
5	Cadmium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[1,15] 2) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[16]
13	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
14	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[1,6,17] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[7,17] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
15	Silver	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Cobalt	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
10	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
11	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Barium	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
4	Beryllium	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
5	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
6	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
7	Chromium (III)	1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation[7,9,11,14] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation[7,9,12,14] 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation[7,9,10,14]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
		4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]
16	Trichloroethylene	Headspace, Gas chromatographic Method[8,18]
17	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method[1,6,11] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[1,6,12] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 6) Digestion, Inductively Coupled Plasma Method[7,10]

<u>ดิน จำนวน 15 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[7,13] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
8	Chromium (VI)	Alkaline Digestion, Colorimetric Method[9,14]
9	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
10	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
11	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[16]
12	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
13	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[7,17] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]
14	Silver	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method[7,11] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method[7,12] 3) Digestion, Inductively Coupled Plasma Method[7,10]

<u>เอกสารอ้างอิง</u>

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ที่ อก ๐๓๑๐(๑)/ ๑๑๖๗๖

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๐ สิงหาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๓๑ กรกฎาคม ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๕๒ สถานที่ตั้งเลขที่ ๖ ซอยงามวงศ์วาน ๕ ตำบลบางเขน อำเภอเมืองนนทบุรี จังหวัดนนทบุรี ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย ได้แก่

๑)

๒)

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน คือในวันที่ ๕ กรกฎาคม ๒๕๖๘ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์ กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาราชการแทน
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
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แบบ กภ.บญ
นิติบุคคล

กรมสวัสดิการและคุ้มครองแรงงาน

ใบอนุญาต

เป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตราย

ในบรรยากาศของสถานที่ทำงานและสถานที่เก็บรักษาสารเคมีอันตราย

ใบอนุญาตเลขที่ ๐๒๐๑-๐๓-๒๕๖๕-๐๐๕๒

อนุญาตให้ บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด

เลขทะเบียนนิติบุคคล ๐๑๐๕๕๓๙๐๐๗๙๓๙

ตั้งอยู่ เลขที่ ๖ ซอยงามวงศ์วาน ๕ ตำบลบางเขน อำเภอเมืองนนทบุรี จังหวัดนนทบุรี

เป็นนิติบุคคลผู้ให้บริการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน ตามกฎกระทรวงกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับสารเคมีอันตราย พ.ศ. ๒๕๕๖ ในการเป็นผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงานและสถานที่เก็บรักษาสารเคมีอันตราย ประกอบกับกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ แห่งพระราชบัญญัติความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๕๔ โดยมีบุคลากร จำนวน ๔๔ ราย ดังรายชื่อแนบท้ายใบอนุญาตนี้

ทั้งนี้ ตั้งแต่วันที่ ๑๕ มิถุนายน พ.ศ. ๒๕๖๕ ถึงวันที่ ๑๓ มิถุนายน พ.ศ. ๒๕๖๘

ให้ไว้ ณ วันที่ ๑๕ มิถุนายน พ.ศ. ๒๕๖๕

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

น.16/11

ที่ รง ๐๕๐๔/๔๗๕๐

กรมสวัสดิการและคุ้มครองแรงงาน
ถนนมิตรไมตรี ดินแดง กรุงเทพฯ ๑๐๔๐๐

๑๕ มิถุนายน ๒๕๖๕

เรื่อง การขออนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ

เรียน กรรมการผู้จัดการบริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด

อ้างถึง แบบคำขอและรับคำขอใบอนุญาตฯ ของบริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด

สิ่งที่ส่งมาด้วย ๑. ใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ และรายชื่อบุคลากรแนบท้ายใบอนุญาต ลงวันที่ ๑๕ มิถุนายน พ.ศ. ๒๕๖๕ จำนวน ๑ ฉบับ
๒. ใบอนุญาตเป็นนิติบุคคลผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ และรายชื่อบุคลากรแนบท้ายใบอนุญาต ลงวันที่ ๑๕ มิถุนายน พ.ศ. ๒๕๖๕ จำนวน ๑ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด ได้ยื่นแบบคำขอและรับคำขอใบอนุญาต แบบ กภ.บญ.๑๑ (นิติบุคคล) เป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงานและสถานที่เก็บรักษาสารเคมีอันตราย ตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ เพื่อให้กรมสวัสดิการและคุ้มครองแรงงานพิจารณา ความละเอียดแจ้งแล้ว นั้น

กรมสวัสดิการและคุ้มครองแรงงาน ได้พิจารณาแล้วเห็นว่าการยื่นแบบคำขอและรับคำขอใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ ของบริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด เป็นไปตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัยฯ ประกอบกับกฎกระทรวงกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับสารเคมีอันตราย พ.ศ. ๒๕๕๖ จึงออกใบอนุญาตให้บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด เป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ พร้อมบุคลากร จำนวน ๔๔ ราย โดยมีใบอนุญาตเลขที่ ๐๒๐๑-๐๓-๒๕๖๕-๐๐๕๒ และเป็นผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ พร้อมบุคลากร จำนวน ๕๕ ราย โดยมีใบอนุญาตเลขที่ ๐๒๐๒-๐๓-๒๕๖๕-๐๐๓๗ รายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย ทั้งนี้ ขอให้บริษัทฯ ปฏิบัติตามกฎกระทรวงการขึ้นทะเบียน และการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัยฯ อย่างเคร่งครัด

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

กองความปลอดภัยแรงงาน
โทรศัพท์ ๐ ๒๔๔๘ ๙๑๒๘ - ๓๙ ต่อ ๗๐๓
โทรสาร ๐ ๒๔๔๘ ๙๑๔๓

รายชื่อบุคลากรแนบท้ายใบอนุญาต
เป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงาน
และสถานที่เก็บรักษาสารเคมีอันตราย
ของบริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด
ใบอนุญาตเลขที่ ๐๒๐๑-๐๓-๒๕๖๕-๐๐๕๒

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เลขทะเบียนควบคุม

(ลงนาม)..... นายทะเบียน)

ผู้อำนวยการกองความปลอดภัยแรงงาน

แบบ กภ.บญ
นิติบุคคล

กรมสวัสดิการและคุ้มครองแรงงาน

ใบอนุญาต

เป็นนิติบุคคลผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตราย
ในบรรยากาศของสถานที่ทำงานและสถานที่เก็บรักษาสารเคมีอันตราย

ใบอนุญาตเลขที่ ๐๒๐๒-๐๓-๒๕๖๕-๐๐๓๗

อนุญาตให้ บริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด
เลขทะเบียนนิติบุคคล ๐๑๐๕๕๓๙๐๐๗๙๓๙
ตั้งอยู่ เลขที่ ๖ ซอยงามวงศ์วาน ๕ ตำบลบางเขน อำเภอเมืองนนทบุรี จังหวัดนนทบุรี
เป็นนิติบุคคลผู้ให้บริการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน ตามกฎกระทรวงกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับสารเคมีอันตราย พ.ศ. ๒๕๕๖ ในการเป็นผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงานและสถานที่เก็บรักษาสารเคมีอันตราย ประกอบกับกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ แห่งพระราชบัญญัติความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๕๔ โดยมีบุคลากร จำนวน ๕๕ ราย ดังรายชื่อแนบท้ายใบอนุญาตนี้

ทั้งนี้ ตั้งแต่วันที่ ๑๔ มิถุนายน พ.ศ. ๒๕๖๕ ถึงวันที่ ๑๓ มิถุนายน พ.ศ. ๒๕๖๘

ให้ไว้ ณ วันที่ ๑๔ มิถุนายน พ.ศ. ๒๕๖๕

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

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ทั้งนี้ ตั้งแต่วันที่ ๑๔ มิถุนายน พ.ศ. ๒๕๖๕ ถึงวันที่ ๑๓ มิถุนายน พ.ศ. ๒๕๖๘

ให้ไว้ ณ วันที่ ๑๔ มิถุนายน พ.ศ. ๒๕๖๕

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากรแนบท้ายใบอนุญาต
เป็นนิติบุคคลผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงาน
และสถานที่เก็บรักษาสารเคมีอันตราย
ของบริษัท เฮลธ์ แอนด์ เอ็นไวเทค จำกัด
ใบอนุญาตเลขที่ ๐๒๐๒-๐๓-๒๕๖๕-๐๐๓๗

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เลขทะเบียนควบคุม

(ลงนาม)..... (นายทะเบียน)

ผู้อำนวยการกองความปลอดภัยแรงงาน

ENVIR SERVICE CO., LTD.

42 RAMINTHRA 14 YEAK 9, THA RAENG, BANGKHEN, BANGKOK 10230
TAX ID 0105555170865
TEL 029435814-5 FAX 02-9438201

CALIBRATION CERTIFICATE

Certificate No. : 202211001

Date of issue : 10-Nov.-22

Instrument Description	:	Air Quality Monitor
Instrument Model	:	aq-5000 pro
Instrument Serial No.	:	1527
Manufacture	:	QUEST TECHNOLOGIES
Customer Name	:	Health & Envitech Co., Ltd. 6 Soi Ngamwongwan 5, Bang Khen, Nonthaburi, Nonthaburi 11000
Total Page of Certificate	:	2 Pages
Receiving Date	:	10-Nov.-22
Parameter of Calibration	:	Gas Calibration (Nitrogen (Zero) (ppm), Carbon monoxide 45 (ppm) Carbon dioxide 850 (ppm))
Condition Place	:	42 Raminthra 14 Yeak 9, Tha Raeng, Bangkhen, Bangkok 10230
Date of Calibration	:	10-Nov.-22

Calibration by

Technician

Approve by

Technician Manager

น.16/15

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ทั้งนี้ ตั้งแต่วันที่ ๑๔ มิถุนายน พ.ศ. ๒๕๖๕ ถึงวันที่ ๑๓ มิถุนายน พ.ศ. ๒๕๖๘

ให้ไว้ ณ วันที่ ๑๔ มิถุนายน พ.ศ. ๒๕๖๕

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

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. # 3884.01
ISO/IEC 17025

Certificate of Calibration

Certificate No. : MT22-6000
Page : 1 of 2

Customer : Health & Envitech Co.,Ltd.
Address : 77/11 M.2 Ngamwongwan Rd., Soi 5, T.Bangkhen, A.Muang Nontaburi 11000

Description : Hot Air Oven
Manufacturer : Memmert
Model : UNB400
Serial No. : C410.0346
Identification No. : LB-HE-030
Calibration Place : Laboratory 2

Order No. : 3167/22
Received date : Nov 01, 2022
Calibration date : Nov 01, 2022
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 Euramet 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	MY49028922	MT21-6790	Nov 25, 2022

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 INCTECH METROLOGICAL CENTER CO.,LTD. IMC

Calibrated by : _____
Issue date : Nov 04, 2022

Approved by : _

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ENVIR SERVICE CO., LTD.
42 RAMINTHRA 14 YEAK 9, THA RAENG, BANGKHEN, BANGKOK 10230
TAX ID 0105555170865
TEL 029435814-5 FAX 02-9438201

ENVIR SERVICE
บริษัท เอ็นไวร์ เซอร์วิส จำกัด
ENVIR SERVICE CO., LTD.

CALIBRATION CERTIFICATE

Certificate No. : 202211001

Date of issue : 10-Nov.-22

Standard References

Standard	Reference No.	Due Date
Nitrogen (Zero) (ppm)	8241	20-Apr.-27
Carbon monoxide 45 (ppm)	EB0129027	29-Oct.-27
Carbon dioxide 850 (ppm)	3805/21	31-Aug.-25

Measured room conditions

Temperature : 25 °C Humidity : 51 %RH Pressure : 1010 mbra.

Calibration conditions

Gas Temperature : 25 °C

Calibration Results (Before Adjustment)

Parameter of Standard	Standard Values	Mean of UUC	Drift	Drift%
Nitrogen (Zero) (ppm)	0.0	0.6	0.6	0.6
Carbon monoxide 45 (ppm)	45.0	45.2	0.2	0.4
Carbon dioxide 850 (ppm)	850.0	864.0	14.0	1.6

Calibration Results (After Adjustment)

Parameter of Standard	Standard Values	Mean of UUC	Drift	Drift%
Nitrogen (Zero) (ppm)	0.0	0.0	0.0	0.0
Carbon monoxide 45 (ppm)	45.0	45.0	0.0	0.0
Carbon dioxide 850 (ppm)	850.0	852.0	2.0	0.2

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Saimai, Bangkok 10220, Thailand
Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com

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

Certificate of Calibration

Certificate No. : MP22-3299-R1
Page : 1 of 2

Supplement to Calibration Report Cert No.MP22-3299

Customer : Health & Envitech Co.,Ltd.
Address : 6 Ngamwongwan Rd., Soi 5, T.Bangkhen, A.Muang Nontaburi 11000

Description : Barometer
Manufacturer : Barigo
Model : 960-1070 hPa
Serial No. : N/A
Identification No. : LB-HE-049
Calibration Place : Mechanical Laboratory

Order No. : 3486/22
Received date : Nov 28, 2022
Calibration date : Nov 28, 2022
Environment Condition :
Temperature : (23+/-3) °C
Humidity : (50+/-15) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure *CP-MP-001*.
According to comparison with Primary Pressure Indicator.
The calibration methods based on DKD-R6-1/03:2014

Reference Standard Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
Primary Pressure Calibrator	PACE 1000	4318561	MP-0068-22	Apr 22, 2023

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 · INCTECH METROLOGICAL CENTER CO.,LTD · IMC

Calibrated by : _____
Issue date : Jan 06, 2023

Approved by :

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Saimai, Bangkok 10220, Thailand
Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com

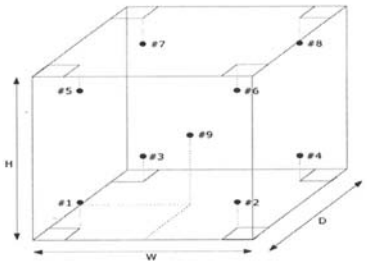
ilac-MRA ACCREDITED Calibration Cert. # 3884.01 ISO/IEC 17025

Certificate No. : MT22-6000
Page : 2 of 2

Function : Temperature measurement
Calibration point : 104, 150, 180 °C
Result : Without adjustment
Resolution : 0.5 °C

Calibration point (°C)	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	
104	103.575	103.640	103.599	103.733	103.749	103.876	103.928	103.965	104.220	0.49
150	149.590	149.851	149.906	149.846	149.924	149.835	149.983	150.198	150.042	0.45
180	179.608	179.845	179.863	179.864	179.951	179.917	180.096	180.175	180.151	0.46

Setting temperature (°C)	Indicating Temperature (°C)	Measured stability (+/- °C)	Measured uniformity (°C)	Overall variation (°C)
104.0	104.0	0.24	1.1	1.2
150.0	150.0	0.23	0.81	1.1
180.0	180.0	0.23	0.90	1.1



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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น.16/17

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. # 3884.01
ISO/IEC 17025

Certificate of Calibration

Certificate No. : MT22-6449-R1
Page : 1 of 2

Supplement to Calibration Report Cert.No.MT22-6449

Customer : Health & Envitech Co.,Ltd.
Address : 6 Ngamwongwan Rd., Soi 5, T.Bangkhen, A.Muang Nontaburi 11000

Description : Digital Thermo & Hygrometer
Manufacturer : Brannan
Model : N/A
Serial No. : N/A
Identification No. : LB-HE-078
Calibration Place : Temperature & Humidity Laboratory

Order No. : 3486/22
Received date : Nov 28, 2022
Calibration date : Nov 29, 2022
Environment Condition :
Temperature : (23+/-3) °C
Humidity : (50+/-15) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure *CP-MT-007* According to comparison with Standard Temperature & Humidity into Environmental Stability Chamber.

Reference Standard Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
Standard Digital Hygrometer	One-TH	0x0000158D000E121E	SG-H-00987/65	Nov 10, 2023
Standard Digital Thermometer with Probe	UM RTD	2002Z A21 0181A	MT22-4301	Jul 18, 2023

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 INCTECH METROLOGICAL CENTER CO.,LTD. IMC

Calibrated by : Miss Jarunee Tubsay
Issue date : Jan 06, 2023
Approved by : _

This calibration certificate shall not be reproduced other than in full except with the prior written approval of Inctech Metrological Center Co.,Ltd

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. # 3884.01
ISO/IEC 17025

Function : Measurement
Reference Level : Vertical
Range : 960 to 1070 hPa

Calibration Result : Without Adjustment
Pressure Medium : Air
Resolution : 1 hPa

	UUC* Value (hPa)	Standard Reading (hPa)	UUC* Error (hPa)	Uncertainty of Measurement (+/- hPa)
Increasing :				
	960	960.24	-0.24	0.6
	980	980.33	-0.33	0.6
	1000	1000.44	-0.44	0.6
	1020	1020.50	-0.50	0.6
	1040	1040.82	-0.82	0.6
	1060	1060.79	-0.79	0.6

UUC* = Unit Under Calibration

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น.16/18

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-66/0272

MTC.No.23-66/0272

Number of page(s) 2

CALIBRATION CERTIFICATE

Nomenclature : DRYCAL DC-LITE PRIMARY FLOWMETER

Manufacturer : BIOS International Corporation, USA.

Serial No.: DC-L 2046

Model : DCL-M 12K

Scale range : 100 ml/min to 7 L/min

Subdivision : (0.1, 1) ml/min

Submitted by : HEALTH & ENVITECH CO.,LTD,

6 Ngamwongwan Rd., Soi 5, Bangkhen,

Mueang, Nontaburi 11000, Thailand.

Received date : 24 February 2023 **Condition of measured item :** Normal

Calibration date : 10 March 2023

Standard :

Standard	Certificate No.	Date due	Traceability
RTD Thermometer	PSL-T 643/65	1-Jun-24	TISTR
Primary Flow Calibrator S/N 119521	MW-0012-21	31-Mar-23	NIMT

Calibrated by : ..... **Approved by :**

( )

Director

Mechanical Engineering Standards Laboratory

Ref. 2013266022400813001

Issued Date 13 March 2023

The results relate only to the items tested/calibrated or value assigned.
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FM.BL.MTC.002 Rev.4

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Office
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Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

Inctech Metrological Center Co.Ltd.
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Saimai, Bangkok 10220, Thailand
Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com

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

Result : Without adjustment
Function : Temperature measurement
Calibration point : 20, 25, 30 °C
Resolution : 0.1 °C
Standard Humidity reading : 50.15 %RH

Test point (°C)	Standard reading (°C)	UUC* reading (°C)	UUC* correction (°C)	Uncertainty of measurement (+/- °C)
20	20.04	19.6	0.44	0.36
25	25.02	24.5	0.52	0.36
30	30.02	29.5	0.52	0.36

Result : Without adjustment
Function : Humidity measurement
Calibration point : 20, 50, 90 %RH
Resolution : 1 %RH
Standard Temperature reading : 25.05 °C

Test point (%RH)	Standard reading (%RH)	UUC* reading (%RH)	UUC* correction (%RH)	Uncertainty of measurement (+/- %RH)
20	20.08	16	4.08	2.3
50	50.14	46	4.14	2.3
90	90.09	88	2.09	2.3

UUC* = Unit under calibration

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42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นไวร์ เซอร์วิส จำกัด ENVIR SERVICE CO., LTD.
42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 26 June 2023

Instruments Information

Analyzer Type: CO Analyzer	**Manufacturer** Thermo Environmental
Model: 48C	**S/N:** 48CHL-63257-339

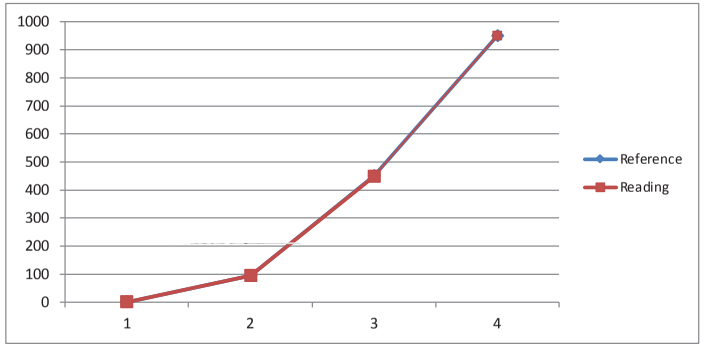
Calibration System

Calibrator Unit	*Standard Gas*
Dilutor Model Dasibi Model 5008	**NO Conc** 957.2 PPM
S/N: 705	**SO2 Conc** 960.7 PPM
ZERO AIR Genearator API MODEL 701	**CO Conc** 960.4 PPM
S/N: 1924	**Expire Date:** 29-Oct-27

Environment: Temperature 25.5 °C Humidity: 51 %RH

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	Reference	Reading	ERROR	%ERROR
ZERO	0	0	0.00	0.00
1	95	95.02	0.02	0.02
2	450	448.6	-1.40	-0.31
3	950	950	0.00	0.00
				0.07



Calibrate By :
Mr.

น.16/20

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-66/0272 **2/2** MTC.No.23-66/0272

Calibration point : (200, 500, 1000, 2500, 5000) ml/min

Ambient condition : Temperature (23 ± 3) °C , Relative humidity (55 ± 15) %

Atmospheric pressure (1010±13) hPa

Calibration method : The flowmeter (UUC) was calibrated by comparison method with standard flowmeter according to CP-370.01.

The reported value is the value that converted to value at reference condition within pressure and temperature of the actual gas entering the UUC

Measurement data :

UUC Value (ml/min)	Standard Value (ml/min)	Temperature (°C)	Pressure (hPa)	Deviation (%)	Uncertainty (%)
200.4	198.84	24.684	1011.42	+0.78	0.89
501.7	500.64	24.659	1011.60	+0.21	0.86
1006	1006.3	24.694	1011.83	-0.03	0.86
2511	2512.1	24.632	1012.43	-0.06	0.86
5027	5031.2	24.619	1013.42	-0.09	0.86

The reported expanded uncertainties are based on standard uncertainties multiplied by a coverage factor k=2, which provides a level of confidence of approximately 95%.

The end of calibration 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

สรุปผลการทดสอบ

ค่า bias เริ่มต้นของระบบ (Initial system bias check; SB_i)

☑	ผ่าน ≤ ± 5 %
☐	ไม่ผ่าน > ± 5 %

ค่า bias หลังการตรวจวัด (Post run system bias check; SB_f)

☑	ผ่าน ≤ ± 5 %
☐	ไม่ผ่าน > ± 5 %

การประเมินค่า Drift (Drift assessment)

☑	ผ่าน ≤ ± 3 %
☐	ไม่ผ่าน > ± 3 %

บริษัท เอ็นไวร์ เซอร์วิส จำกัด
42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นไวร์ เซอร์วิส จำกัด ENVIR SERVICE CO., LTD. 42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201

1. **ข้อมูล** Analyzer Calibration Error

Certified conc of calibration gas; C_V (ppm)		Measured concentration of calibration gas; C_{Dir} (ppm)	$\lvert C_v - C_{Dir} \rvert$ (ppm)	ACE=$\frac{\lvert C_V - C_{Dir} \rvert}{CS}$ (100) (%)
Low	95	95.02	0.20	0.20
Mid	450	448.60	1.40	1.00
High	950	950.00	0.00	0.00

สรุปผลการทดสอบ

ความผิดพลาดของการสอบเทียบ (Analzer (Direct) calibration error; ACE)

☑	ผ่าน ≤ ± 5 %
☐	ไม่ผ่าน > ± 5 %

2. ข้อมูลการปรับเทียบเครื่องมือด้วยก๊าซมาตรฐานที่ระดับความเข้มข้นต่ำ กลาง หรือความเข้มข้นสูง (Initial Analyzer Calibration) และ System Bias Error

Calibration gas level (ppm)		Initial values				Final values		
		C_{Dir} (ppm)	System response time (Second)	Measured concentration of calibration gas (System); C_s (ppm)	SB_i = $\frac{(C_s - C_{Dir})}{CS} \times 100$ (%)	C_s (ppm)	SB_f (%)	Drift $\lvert SB_f - SB_i \rvert$ (%)
Low level	95	95.02	300	95.05	0.03	95.40	0.40	0.37
High or mid level	950	950	300	950	0.00	950.20	0.02	0.02

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ENVIR SERVICE CO., LTD.
42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201

1. **ข้อมูล** Analyzer Calibration Error

Certified conc of calibration gas; C_V (ppm)		Measured concentration of calibration gas; C_{Dir} (ppm)	$\lvert C_v - C_{Dir} \rvert$ (ppm)	$ACE = \frac{\lvert C_V - C_{Dir} \rvert}{CS}(100)$ (%)
Low	95	95.05	0.05	0.05
Mid	450	451.00	1.00	1.00
High	950	950.50	0.50	0.00

สรุปผลการทดสอบ

ความผิดพลาดของการสอบเทียบ (Analzer (Direct) calibration error; ACE)

☑	ผ่าน $\leq \pm 5\ \%$
☐	ไม่ผ่าน $> \pm 5\ \%$

2. ข้อมูลการปรับเทียบเครื่องมือด้วยก๊าซมาตรฐานที่ระดับความเข้มข้นต่ำ กลาง หรือความเข้มข้นสูง (Initial Analyzer Calibration) และ System Bias Error

Calibration gas level (ppm)		Initial values				Final values		
		C_{Dir} (ppm)	System response time (Second)	Measured concentration of calibration gas (System); C_s (ppm)	$SB_i = \frac{(C_s - C_{Dir})}{CS} \times 100$ (%)	C_s (ppm)	SB_f (%)	Driff $\lvert SB_f - SB_i \rvert$ (%)
Low level	95	95.05	300	95.05	0.00	95.40	0.37	0.37
High or mid level	950	950.50	300	950	0.05	950.20	0.03	0.02

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ENVIR SERVICE CO., LTD.
42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 26 June 2023

Instruments Information

Analyzer Type: NOx Analyzer **Model:** 42C	**Manufacturer** Thermo Environmental **S/N:** 42CHL-0527613257

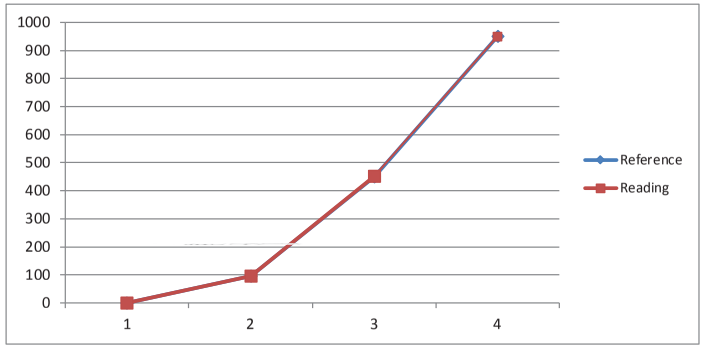
Calibration System

Calibrator Unit	*Standard Gas*
Dilutor Model Dasibi Model 5008 **S/N:** 705 **ZERO AIR Genearator** API MODEL 701 **S/N:** 1924	**NO Conc** 957.2 PPM **SO2 Conc** 960.7 PPM **CO Conc** 960.4 PPM **Expire Date:** 29-Oct-27

Environment: Temperature 25.5 °C Humidity: 51 %RH

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	Reference	Reading	ERROR	%ERROR
ZERO	0	0	0.00	0.00
1	95	95.05	0.05	0.05
2	450	451	1.00	0.22
3	950	950.5	0.50	0.05
				0.08



Calibrate By:
Mr.

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42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 26 June 2023

Instruments Information

Analyzer Type: SO2 Analyzer	**Manufacturer** Thermo Environmental
Model: 42C	**S/N:** 43CHL-59690-324

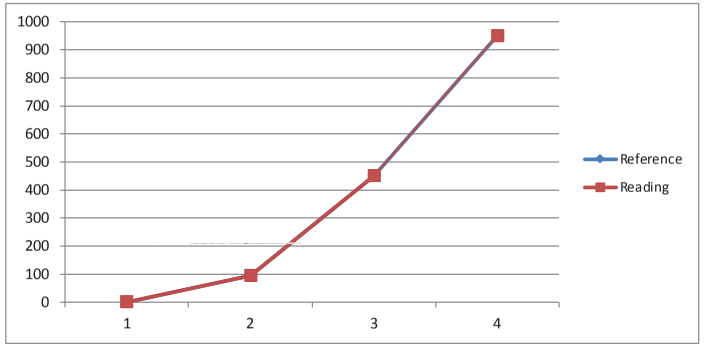
Calibration System

Calibrator Unit	*Standard Gas*
Dilutor Model Dasibi Model 5008	**NO Conc** 957.2 PPM
S/N: 705	**SO2 Conc** 960.7 PPM
ZERO AIR Genearator API MODEL 701	**CO Conc** 960.4 PPM
S/N: 1924	**Expire Date:** 29-Oct-27

Environment: Temperature 25.5 °C Humidity: 51 %RH

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	Reference	Reading	ERROR	%ERROR
ZERO	0	0	0.00	0.00
1	95	94.1	-0.90	-0.95
2	450	450	0.00	0.00
3	950	950.6	0.60	0.06
				0.22



Calibrate By :
Mr.

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สรุปผลการทดสอบ

ค่า bias เริ่มต้นของระบบ (Initial system bias check; SB_i)

☑	ผ่าน	$\leq \pm 5$ %
☐	ไม่ผ่าน	$> \pm 5$ %

ค่า bias หลังการตรวจวัด (Post run system bias check; SB_f)

☑	ผ่าน	$\leq \pm 5$ %
☐	ไม่ผ่าน	$> \pm 5$ %

การประเมินค่า Driff (Driff assessment)

☑	ผ่าน	$\leq \pm 3$ %
☐	ไม่ผ่าน	$> \pm 3$ %

สรุปผลการทดสอบ

ค่า bias เริ่มต้นของระบบ (Initial system bias check; SB_i)

☑	ผ่าน ≤ ± 5 %
☐	ไม่ผ่าน > ± 5 %

ค่า bias หลังการตรวจวัด (Post run system bias check; SB_f)

☑	ผ่าน ≤ ± 5 %
☐	ไม่ผ่าน > ± 5 %

การประเมินค่า Drift (Drift assessment)

☑	ผ่าน ≤ ± 3 %
☐	ไม่ผ่าน > ± 3 %

บริษัท เอ็นไวร์ เซอร์วิส จำกัด
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1. **ข้อมูล** Analyzer Calibration Error

Certified conc of calibration gas; C_V (ppm)		Measured concentration of calibration gas; C_{Dir} (ppm)	$\lvert C_v - C_{Dir} \rvert$ (ppm)	ACE=$\frac{\lvert C_V - C_{Dir} \rvert}{CS}$ (100) (%)
Low	95	94.10	0.90	0.95
Mid	450	450.00	0.00	1.00
High	950	950.60	0.60	0.00

สรุปผลการทดสอบ

ความผิดพลาดของการสอบเทียบ (Analzer (Direct) calibration error; ACE)

☑	ผ่าน ≤ ± 5 %
☐	ไม่ผ่าน > ± 5 %

2. ข้อมูลการปรับเทียบเครื่องมือด้วยก๊าซมาตรฐานที่ระดับความเข้มข้นต่ำ กลาง หรือความเข้มข้นสูง (Initial Analyzer Calibration) และ System Bias Error

Calibration gas level (ppm)		Initial values				Final values		
		C_{Dir} (ppm)	System response time (Second)	Measured concentration of calibration gas (System); C_s (ppm)	SB_i = $\frac{(C_s - C_{Dir})}{CS} \times 100$ (%)	C_s (ppm)	SB_f (%)	Drift $\lvert SB_f - SB_i \rvert$ (%)
Low level	95	94.10	300	95.05	1.00	95.40	1.37	0.37
High or mid level	950	950.60	300	950	0.06	950.20	0.04	0.02

Calibration object

Multi range instrument

Model	BP210D	
Serial Number	70406076	
QM Ident. no | Inventory no.	LB - HE - 003 | ---	
Range	1	2
Maximum capacity (Max. load)	80.00000 g	210.0000 g
Measured range	80.00000 g	210.0000 g
Scale interval	0.00001 g	0.0001 g

Place of calibration

Address	According to page 1
Department | Cost center	QC and RD Department | ---
Building | Floor	--- | 1st Floor
Room	Laboratory Room.
Maximum temperature variation at place of calibration	5 K

Calibration procedure

EURAMET cg-18, V4.0 - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment

Test equipment type	Test equipment ID	Valid until
Thermometer	MHB-382SD Cer No.C19231845,(Traceable to SI unit through DKSH)	23 Aug 2024
Test weight set OIML R111 E2	Certificate No.M2308197S ,E2(Traceable to SI unit through TCS)	24 Aug 2025

SARTORIUS

Accredited by

NSC-TISI-TIS 17025
Calibration 0426

NSC-TISI-TIS 17025
CALIBRATION 0426

Calibration certificate

Calibration Certificate No. 23BCI0439

Object	Electronic non-automatic weighing instrument
Manufacturer	Sartorius
Type	BP210D
Serial | QM Ident. no.	70406076 | LB - HE - 003
Customer	Health & Envitech Co., Ltd. 6 Ngamwongwan Soi 5,Tumbon Bangkhen Muang Nontaburi Nontaburi 11000 Thailand.
Order no.	221429
Number of pages	6
Date of calibration	02 Nov 2023

This calibration certificate documents the traceability to national standards.

Uncertainties of measurements are taken into account when only statements of compliance are made.

This certificate was prepared by Sartorius Corporation in accordance to the current ISO/IEC 17025:2017 standard and Sartorius Work Instruction (Method) SOP WI 08.

This certificate relate and apply this equipment only.

This calibration certificate may not be reproduced other than in full except with the permission of NSC-TISI-TIS-17025 and the issuing laboratory. Calibration certificates without signature are not valid.

The user is obliged to have the object recalibrated at appropriate intervals.

Date	02 Nov 2023	Approval of the Calibration Certificate	Person in charge

Mr.

น.16/25

Range 2

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration	02 Nov 2023
Temperature at place of calibration | Temp. diff. $T_{weights}$ - T_{place}	24.8 °C | 0.2 K
Measuring conditions	The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Comments	Humidity 44.6 %RH

Measurement results | Measurement uncertainties

Repeatability

Test load (nominal): 100 g	
	100 g
1	99.9999 g
2	99.9999 g
3	99.9999 g
4	99.9999 g
5	99.9999 g
6	100.0000 g
7	99.9999 g
8	99.9999 g
9	99.9999 g
10	100.0000 g
	s = 0.00004 g

Eccentricity

Test load (nominal):	100 g
Center	99.9999 g
Front left	99.9999 g
Back left	99.9999 g
Back right	100.0000 g
Front right	100.0000 g
Maximum deviation from centric loading indication $\lvert\Delta I_{ecc}\rvert_{max}$ = 0.0001 g	

Error of indication

Testload L	Indication I	Error E	Expansion factor k	Uncertainty $U(E)$	Uncertainty relative $U_{rel}(E)$
0.01000 g	0.01000 g	0.00000 g	2.00	0.000024 g	0.24 %
0.10000 g	0.10000 g	0.00000 g	2.00	0.000037 g	0.037 %
1.00000 g	1.00000 g	0.00000 g	2.00	0.000037 g	0.0037 %
2.00003 g	2.00003 g	0.00000 g	2.00	0.000050 g	0.0025 %
5.00002 g	5.00002 g	0.00000 g	2.00	0.000050 g	0.00100 %
10.00002 g	10.00002 g	0.00000 g	2.00	0.000069 g	0.00069 %
20.00002 g	20.00002 g	0.00000 g	2.00	0.000069 g	0.00034 %
50.00002 g	50.00002 g	0.00000 g	2.00	0.000091 g	0.00018 %
100.0000 g	99.9999 g	-0.0001 g	2.00	0.00017 g	0.00017 %
150.0000 g	149.9999 g	-0.0001 g	2.00	0.00028 g	0.00019 %
200.0000 g	199.9999 g	-0.0001 g	2.00	0.00028 g	0.00014 %
Maximum error of indication		$\lvert E\rvert_{max}$ = 0.0001 g			

$U_{rel}(E)$ is the quotient of $U(E)$ and test load L. The uncertainty of measurement $U(E)$ is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.
Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented Expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

End of calibration certificate

Range 1

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration	02 Nov 2023
Temperature at place of calibration | Temp. diff. $T_{weights}$ - T_{place}	24.8 °C | 0.2 K
Measuring conditions	The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Comments	Humidity 44.6 %RH

Measurement results | Measurement uncertainties

Repeatability

Test load (nominal): 1 g | 50 g		
	1 g	**50 g**
1	1.00000 g	50.00002 g
2	1.00000 g	50.00002 g
3	1.00000 g	50.00002 g
4	0.99999 g	50.00003 g
5	1.00000 g	50.00002 g
6	1.00000 g	50.00003 g
7	1.00001 g	50.00003 g
8	1.00000 g	50.00003 g
9	1.00001 g	50.00002 g
10	1.00000 g	50.00002 g
	s = 0.000006 g	s = 0.000005 g

Eccentricity

Test load (nominal):	50 g
Center	50.00002 g
Front left	50.00000 g
Back left	50.00000 g
Back right	50.00004 g
Front right	50.00000 g
Maximum deviation from centric loading indication $\lvert\Delta I_{ecc}\rvert_{max}$ = 0.00002 g	

Error of indication

Testload L	Indication I	Error E	Expansion factor k	Uncertainty $U(E)$	Uncertainty relative $U_{rel}(E)$
0.01000 g	0.01000 g	0.00000 g	2.00	0.000024 g	0.24 %
0.10000 g	0.10000 g	0.00000 g	2.00	0.000037 g	0.037 %
1.00000 g	0.99999 g	-0.00001 g	2.00	0.000037 g	0.0037 %
2.00003 g	2.00003 g	0.00000 g	2.00	0.000050 g	0.0025 %
5.00002 g	5.00002 g	0.00000 g	2.00	0.000050 g	0.00100 %
10.00002 g	10.00003 g	0.00001 g	2.00	0.000069 g	0.00069 %
20.00002 g	20.00002 g	0.00000 g	2.00	0.000069 g	0.00034 %
30.00004 g	30.00003 g	-0.00001 g	2.00	0.000093 g	0.00031 %
50.00002 g	50.00002 g	0.00000 g	2.00	0.000091 g	0.00018 %
60.00004 g	60.00003 g	-0.00001 g	2.00	0.00017 g	0.00028 %
77.00008 g	77.00006 g	-0.00002 g	2.00	0.00018 g	0.00023 %
Maximum error of indication		$\lvert E\rvert_{max}$ = 0.00002 g			

$U_{rel}(E)$ is the quotient of $U(E)$ and test load L. The uncertainty of measurement $U(E)$ is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.
Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented Expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

ม.16/26

Uncertainty of measurement in use

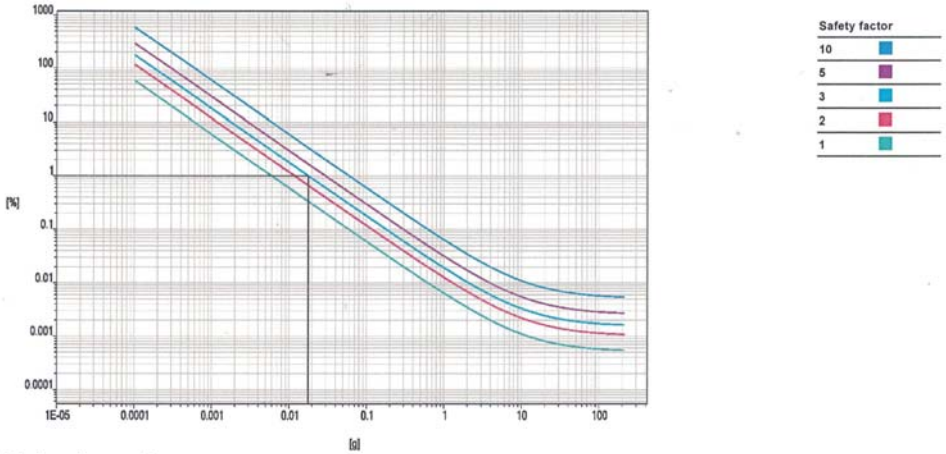
Range 2

Device adjusted before measurement	Yes
Temperature deviation considered	5 K
Temperature coefficient considered	$1 \cdot 10^{-6}$/K
Uncertainty of the weighing result $U_{gl}(W)$	**$U_{gl}(W) = 0.000059\ g + 5.14 \cdot 10^{-6} \cdot R$**

Reference note: The current uncertainty of measurement is calculated by entering of the reading *R* into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from max load	Net indication R	Uncertainty $U_{gl}(W)$	Uncertainty relative $U_{gl}(W)_{rel}$
1 %	2.10000 g	0.000070 g	0.0033 %
25 %	52.50000 g	0.00033 g	0.00063 %
50 %	105.0000 g	0.00060 g	0.00057 %
75 %	157.5000 g	0.00087 g	0.00055 %
100 %	210.0000 g	0.0011 g	0.00054 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

Process accuracy	1.00 %
Safety factor	3
Minimum sample weight	0.01771 g

Uncertainty of measurement in use

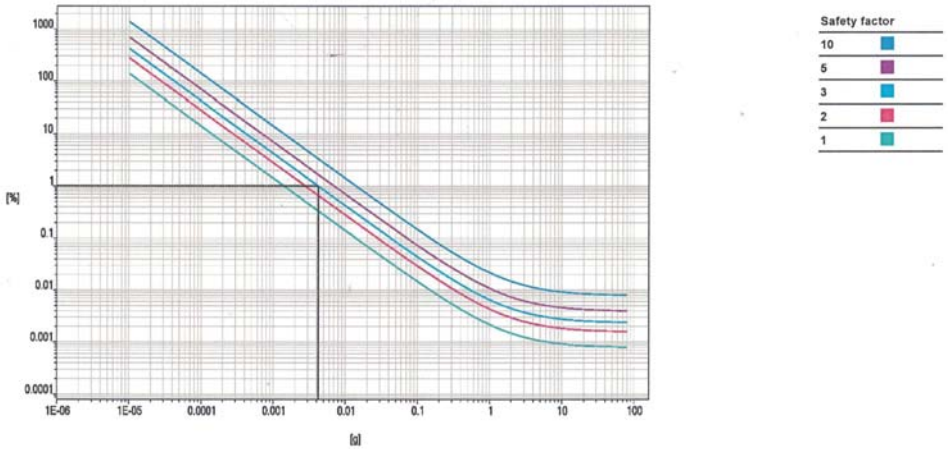
Range 1

Device adjusted before measurement	Yes
Temperature deviation considered	5 K
Temperature coefficient considered	$1 \cdot 10^{-6}$/K
Uncertainty of the weighing result $U_{gl}(W)$	**$U_{gl}(W) = 0.000014\ g + 7.84 \cdot 10^{-6} \cdot R$**

Reference note: The current uncertainty of measurement is calculated by entering of the reading *R* into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from max load	Net indication R	Uncertainty $U_{gl}(W)$	Uncertainty relative $U_{gl}(W)_{rel}$
1 %	0.80000 g	0.000020 g	0.0025 %
25 %	20.00000 g	0.00017 g	0.00085 %
50 %	40.00000 g	0.00033 g	0.00082 %
75 %	60.00000 g	0.00048 g	0.00081 %
100 %	80.00000 g	0.00064 g	0.00080 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

Process accuracy	1.00 %
Safety factor	3
Minimum sample weight	0.00421 g

น.16/27

Validation Calibration Report

Customer Name: Health & Envitech Co.,Ltd

Department: LAB Analytical

Present By: Meshcotech Co., Ltd.

Instrument System ID: LB-HE-069

Instrument List in System

Name and Model	Serial Number	Manufacturer
Clarus 500 GC	650N6091604	Perkin Elmer

This report confirms that the above instrument has been calibrated. The actual measurement results are stated on the inside of Validation Calibration Report.

Qualifier's signature / Date 1/6/2023

(Mr.)

Acceptor's signature / Date

(...Ms .)

VCR-1

Inlet Pressure Accuracy Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.FLOW**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **3186-GFM**
System ID: **LB-HE-069**
Gas Type: **He**

The result reference to raw data on page: 1

Setpoint Inlet Pressure PSI.	Observed Inlet Pressure PSI.	Deviation Inlet pressure. % Error
5.00	4.80	4.00
10.00	9.90	1.00
20.00	20.20	1.00
30.00	30.60	2.00
40.00	41.00	2.50

Acception criteria of absolute deviation ≤ 5%.
Evaluate Result **PASS**

Qualifier's signature: Date: 1/6/2023
Authorised by: Date: 1/6/2023

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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-CARRFLOW

VCR-2

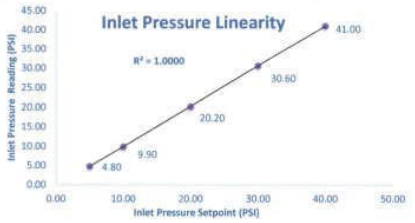
Inlet Pressure Linearity Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.FLOW**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **4075-GSM**
System ID: **LB-HE-069**
Gas Type **He**

The result reference to raw data on page: 1

Inlet pressure Setpoint (PSI)	Inlet pressure (PSI) Reading
5.00	4.80
10.00	9.90
20.00	20.20
30.00	30.60
40.00	41.00
R-Square	1.0000



Acception criteria of R^2 > 0.9990

Evaluate Result **PASS**

Qualifier's signature: Date: 1/6/2023
Authorised by: Date: 1/6/2023

VCR-3

Detector Gas Flow Rate Accuracy Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.FLOW**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **4075-GSM**
System ID: **LB-HE-069**
Gas Type: **H2**

The result reference to raw data on page: 2

Setpoint Flow Rate ml/min.	Observed Flow Rate ml/min.	Deviation ml/min. % Error
20.00	21.00	5.00
30.00	31.00	3.33
40.00	40.80	2.00
50.00	50.80	1.60
60.00	61.50	2.50

Acception criteria of absolute deviation ≤ 5%.
Evaluate Result **PASS**

Qualifier's signature: Date: 1/6/2023
Authorised by: Date: 1/6/2023

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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-CARRFLOW

VCR-4

Detector Gas Flow Rate Accuracy Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.FLOW**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **4075-GSM**
System ID: **LB-HE-069**
Gas Type: **Air**

The result reference to raw data on page: 3

Setpoint Flow Rate ml/min.	Observed Flow Rate ml/min.	Deviation ml/min. % Error
100.00	100.00	0.00
200.00	194.30	2.85
300.00	293.80	2.07
400.00	397.40	0.65
500.00	497.40	0.52

Acception criteria of absolute deviation ≤ 5%.
Evaluate Result **PASS**

Qualifier's signature: Date: 1/6/2023
Authorised by: Date: 1/6/2023

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VCR-CARRFLOW

VCR-5

GC Column OvenTemperature Performance Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.TEMPACC**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **4077-DTM**
System ID: **LB-HE-069**

The result reference to raw data on page: 4

Setpoint Temperature (°C)	Collected 1 Temperature (°C)	Collected 2 Temperature (°C)	Collected 3 Temperature (°C)	Collected 4 Temperature (°C)	Collected 5 Temperature (°C)	Average Temperature (°C)	Deviation of Accuracy Absolute/°C. (Set Temp-Average Temp)
40.0	39.5	39.5	39.6	39.6	39.6	39.6	0.44
100.0	99.5	99.7	99.7	99.8	99.7	99.7	0.32
150.0	149.8	150.0	150.0	150.1	150.1	150.0	0.00
200.0	199.7	199.8	199.9	199.8	199.9	199.8	0.18
280.0	279.8	279.9	280.1	280.1	280.1	280.0	0.00

Acception criteria ≤ 1 °C.
of absolute deviation Accuracy

Evaluate Result **PASS**

Qualifier's signature: Date: 1/6/2023
Authorised by: Date: 1/6/2023

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VCR-GCOVENACC

VCR-6

GC Column OvenTemperature Stability Performance Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.TEMPACC**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **4077-DTM**
System ID: **LB-HE-069**

The result reference to raw data on page: 5

Setpoint Temperature (°C)	Collected Point1 Temperature (°C)	Collected Point2 Temperature (°C)	Collected Point3 Temperature (°C)	Collected Point4 Temperature (°C)	Collected Point5 Temperature (°C)	Average Temperature (°C)	STDEV Temperature (°C)
100.0	99.5	99.7	99.7	99.8	99.7	99.68	0.11

Acception criteria ≤ 0.5 °C.
of absolute deviation Stability

Evaluate Result **PASS**

Qualifier's signature: Date: 1/6/2023
Authorised by: Date: 1/6/2023

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VCR-GCOVENSTAB

VCR-7

GC Injector Temperature Performance Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.TEMPACC**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **4077-DTM**
System ID: **LB-HE-069**

The result reference to raw data on page: 6

Setpoint Temperature (°C)	Collected Temperature (°C)	Deviation of Accuracy Absolute/°C. (Set Temp-Average Temp)
150.0	147.4	2.6
200.0	196.4	3.6
250.0	245.4	4.6

Acception criteria ≤ 10 °C.
of absolute deviation Accuracy
Evaluate Result **PASS**

Qualifier's signature: Date: 1/6/2023
Authorised by: Date: 1/6/2023

VCR
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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-INTEMPACC

VCR-8

GC Base Detector Temperature Performance Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.TEMPACC**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **4077-DTM**
System ID: **LB-HE-069**

The result reference to raw data on page: 7

Setpoint Temperature (°C)	Collected Temperature (°C)	Deviation of Accuracy Absolute/°C. (Set Temp-Average Temp)
250.0	245.5	4.50
300.0	296.4	3.60

Acception criteria ≤ 10 °C.
of absolute deviation Accuracy

Evaluate Result **PASS**

Qualifier's signature Date: 1/6/2023
Authorised by: Date: 1/6/2023

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VCR-DETTEMPACC

VCR-9

GC Injections Carry Over Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **177-FID**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.LINPRC**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **177-FID**
System ID: **LB-HE-069**

The result reference to raw data on page: 8-10

Injections	Peak Retention Time	Area
Carry Over Blank1	-	0.000
Standard 0.08% Tetradecane	1.461	1131130.47
Carry Over Blank2	-	0.000
%Carry Over		0.000

Acception criteria of %Carry Ove ≤ 0.01%

Evaluate Result **PASS**

Qualifier's signature:
Date: 1/6/2023
Authorised by:
Date: 1/6/2023

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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-GCCAROVER

VCR-10

GC Injections Area Precision Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **177-FID**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.LINPRC**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **177-FID**
System ID: **LB-HE-069**

The result reference to raw data on page: 11-16

Number of Injections	Retention Time	Area Peak Number 2
Precision 1 0.08% Tetradecane	1.461	1146805.50
Precision 2 0.08% Tetradecane	1.462	1142966.78
Precision 3 0.08% Tetradecane	1.460	1131811.87
Precision 4 0.08% Tetradecane	1.463	1159745.44
Precision 5 0.08% Tetradecane	1.461	1158710.81
Precision 6 0.08% Tetradecane	1.461	1150475.11
Average 0.08% Tetradecane		1148419.25
STDEV		10455.28
%RSD		0.91

Acception criteria of Precision (%RSD) ≤ 1%

Evaluate Result **PASS**

Qualifier's signature:
Date: 1/6/2023
Authorised by:
Date: 1/6/2023

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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-CGPRE

VCR-11

GC Injections Retention Precision Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **177-FID**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.LINPRC**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **177-FID**
System ID: **LB-HE-069**

The result reference to raw data on page: 11-16

Number of Injections	Peak Retention time Peak Number 2
Precision 1 0.08% Tetradecane	1.461
Precision 2 0.08% Tetradecane	1.462
Precision 3 0.08% Tetradecane	1.460
Precision 4 0.08% Tetradecane	1.463
Precision 5 0.08% Tetradecane	1.461
Precision 6 0.08% Tetradecane	1.461
Average	1.461
STDEV	0.001
%RSD	0.07

Acception criteria of Peak Retention (%RSD) ≤ 0.5%

Evaluate Result **PASS**

Qualifier's signature:
Date: 1/6/2023
Authorised by:
Date: 1/6/2023

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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-CGPRE

VCR-12

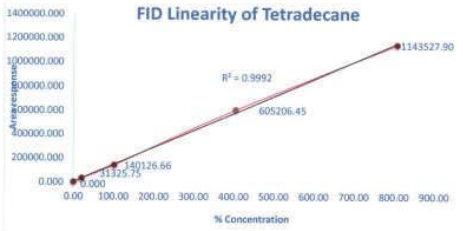
FID Lineaity Result

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Serial No: **650N6091604**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **VKIT.GC.LINPRC**
Model: **Clarus 500 GC**
Detector Type: **FID**
Traceable To: **177-FID**
System ID: **LB-HE-069**

The result reference to raw data on page: 17-21

Injection	Tetradecane concentration (µg/ml)	Area
Linearity 1 0.000% Tetradecane	0.00	0.000
Linearity 2 0.002% Tetradecane	20.30	31325.75
Linearity 3 0.010% Tetradecane	101.40	140126.66
Linearity 4 0.040% Tetradecane	404.60	605206.45
Linearity 5 0.080% Tetradecane	807.10	1143527.90
R-Square		0.9992



Acception criteria of Linearity (R^2) >0.9990

Evaluate Result **PASS**

Qualifier's signature:
Date: 1/6/2023
Authorised by:
Date: 1/6/2023

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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-GCLIN

VCR-13

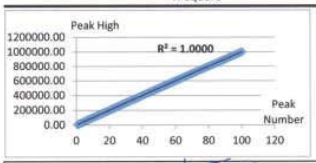
Data System Linearity of Detection Check

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Version: **6.3**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **Validator Method**
Model: **TotalChrom**
Detector Type: **FID**
Traceable To: **Validator ™**
System ID: **LB-HE-069**

The result reference to raw data on page: 22-24

Peak Number#	Peak High (uVolt)	Peak Number#	Peak High (uVolt)	Peak Number#	Peak High (uVolt)	Peak Number#	Peak High (uVolt)
1	10002.00	26	260002.43	51	509996.49	76	759996.98
2	20003.00	27	270002.06	52	519993.03	77	769993.79
3	30004.00	28	281599.30	53	529994.64	78	780631.83
4	40004.00	29	290001.64	54	539997.42	79	789994.06
5	50004.53	30	300003.60	55	549996.61	80	799996.06
6	60006.00	31	310002.06	56	559996.06	81	809994.61
7	70005.00	32	320005.98	57	569994.06	82	819996.97
8	80003.00	33	330004.52	58	579991.43	83	829996.57
9	90004.06	34	340005.72	59	589993.16	84	839996.61
10	100006.38	35	350005.35	60	599994.14	85	849995.05
11	110004.48	36	360003.49	61	609991.62	86	859996.12
12	120004.00	37	370003.06	62	619995.56	87	869995.92
13	130005.06	38	380005.12	63	629990.37	88	879994.61
14	140006.36	39	390002.44	64	639993.06	89	889995.06
15	150004.44	40	400000.84	65	649994.62	90	899994.59
16	160005.06	41	410003.61	66	659993.58	91	909996.23
17	170004.67	42	420001.49	67	669990.49	92	919995.29
18	180004.49	43	429999.68	68	679996.01	93	929995.41
19	190006.49	44	440000.06	69	689994.78	94	939994.44
20	200005.14	45	449998.44	70	699993.99	95	949993.25
21	210002.03	46	459996.88	71	709992.6	96	959996.12
22	220004.44	47	469999.06	72	719992.75	97	969992.63
23	230003.37	48	479996.98	73	729996.12	98	979995.09
24	240003.12	49	489994.06	74	739995.6	99	989993.96
25	250002.84	50	499996.99	75	749995.66	100	999993.66
		R-Square				1.0000	



Linearity Correlation Calculated
Acception criteria of R^2 ≥0.9960

Evaluate Result **PASS**

Qualifier's signature:
Date: 1/6/2023

Authorised by:
Date: 1/6/2023

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VCR-14

Data System Precision of Detection Check

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Version: **6.3**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **Validator Method**
Model: **TotalChrom**
Detector Type: **FID**
Traceable To: **Validator ™**
System ID: **LB-HE-069**

The result reference to raw data on page: 22-36

Collected 3 Peak Data 4-1		Collected 3 Peak Data 4-2		Collected 3 Peak Data 4-3		Collected 3 Peak Data 4-4		Collected 3 Peak Data 4-5	
Peak Number#	Peak High (uVolt)	Peak Number#	Peak High (uVolt)	Peak Number#	Peak High (uVolt)	Peak Number#	Peak High (uVolt)	Peak Number#	Peak High (uVolt)
1	10002.000	1	10002.120	1	10003.000	1	10001.000	1	10005.560
50	499996.990	50	499986.060	50	499995.890	50	499996.120	50	499974.610
100	999993.660	100	999979.490	100	999996.270	100	999996.540	100	999952.560

%RSD at peak Number 1 = 0.02
%RSD at peak Number 50 = 0.00
%RSD at peak Number 100 = 0.00

Acception criteria of Precision deviation %RSD ≤ 0.5

Evaluate Result **PASS**

Qualifier's signat
Date: 1/6/2023

Authorised by:
Date: 1/6/2023

VCR
82 Moo.18, Buengkamproi, Lamlukka,Pathum thani, Thailand 12150
Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-15

Data System Number of Detection Check

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Version: **6.3**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **Validator Method**
Model: **TotalChrom**
Detector Type: **FID**
Traceable To: **Validator ™**
System ID: **LB-HE-069**

The result reference to raw data on page: 37-38

Peak Count# Peak Detected Specify	Peak count Detected
≥ 32 Peak Number	43 Peak Number

Acception criteria of absolute deviation ≥ 32 Peak

Evaluate Result **PASS**

Qualifier's signature:
Date: 1/6/2023

Authorised by:
Date: 1/6/2023

VCR
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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-16

Data System Square Peak High Check

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Version: **6.3**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **Validator Method**
Model: **TotalChrom**
Detector Type: **FID**
Traceable To: **Validator ™**
System ID: **LB-HE-069**

The result reference to raw data on page: 39

Peak Number# Peak Detection Specify	Peak high /1000 Collected (millivolt)	%deviation	Evaluate Result
1 500 millivolt	499.992	0.00	PASS
2 1000 millivolt	999.999	0.00	PASS

Acception criteria of % deviation ≤1%

Evaluate Result **PASS**

Qualifier's signature:
Date: 1/6/2023

Authorised by:
Date: 1/6/2023

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VCR-17

บริษัท เมชโคเทค จำกัด
MESHCOTECH CO.,LTD.

Data System Retention Time Reproduced Check

Customer: **Health & Envitech Co.,Ltd.**
Department: **LAB Analytical**
Manufacturer: **PERKIN ELMER**
Version: **6.3**
Standard Batch: **N/A**
Expiry Date: **June 01,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **Validator Method**
Model: **TotalChrom**
Detector Type: **FID**
Traceable To: **Validator ™**
System ID: **LB-HE-069**

The result reference to raw data on page: 40

Peak Number#	Retention Time Apex	Previuos peak-Curent peak Absulute time /min.	Evaluate Result
1	0.476	N/A	
2	1.897	1.421	PASS
3	3.318	1.421	PASS
4	4.738	1.420	PASS
5	6.159	1.421	PASS
6	7.580	1.421	PASS
		Acception criteria of absolute deviation	1.41-1.43 Minute
		Evaluate Result	PASS

Qualifier's signature:

Date: 1/6/2023

Authorised by:

Date: 1/6/2023

VCR
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Tel. (6698)970-7090, Fax.(662)540-2541 Email: sales.meshcotect@gmail.com

VCR-DATASYS

บริษัท เมชโคเทค จำกัด
MESHCOTECH CO.,LTD.

Flow Rate Accuracy Result

Customer Name: **Health & Envitech Co.,Ltd.**
Department: **Analytical Lab**
System ID: **IC-01**
Manufacturer: **Dionex**
Serial No: **07090143**
Report Expiry Date: **Sep 08,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **SOP V5-EA v5r0**
Flow Meter Model: **VKIT-LFM**
Model: **ICS-1000**
Flow Meter S/N: **L-2330**
Traceable To: **4072-LFM**

The result reference to raw data on page: 1

Theoretical Flow Rate ml/min.	Observed Flow Rate ml/min.		Deviation ml/min. %Error
0.5000	0.4979 0.4963 0.4982 0.4996 0.4990	0.4982	0.36
1.0000	0.9967 0.9987 0.9977 0.9980 0.9969	0.9976	0.24
1.5000	1.4980 1.4983 1.4989 1.4986 1.4998	1.4987	0.09
2.0000	2.0010 2.0009 2.0009 2.0010 2.0011	2.0010	0.05

Acception criteria of absolute deviation ≤ 1%
Evaluate Result **PASS**

Qualifier's signature:	Date: 08/09/2023
Authorised's signature:	Date: 08/09/2023

PQR

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Tel. (6698)970 7090 , Fax.(662)560 2541

PQR-PUMF

Equipment Qualification Plan To IC System

This Qualified has Included

Performance Qualifications (PQ)

To Instrument Lists on below:

Name and Model	Serial Number	Manufacturer
ICS-1000	07090143	Dionex
AS-1	09090418	Dionex
Chromeleon	Version6.80	Dionex

This report confirms that the above instrument has been installed and performancetests the actual record and measurement results are stated on the inside of Equipment Qualification Report.

Present to Customer Name: Health & Envitech Co.,Ltd.
Address: 6 Ngamwongwan Soi 5, Tumbon Bangkhen, Muangnontaburi, Nontaburi 11000
Department: Analytical Lab
Present By: Meshcotech Co., Ltd.
Instrument System ID: LB-HE-108

Qualifier'S Signature/Date 08/09/2023
(Mr.

Acceptor's Signature/Date _____
(.....)

บริษัท เมชโคเทค จำกัด
MESHCOTECH CO.,LTD.

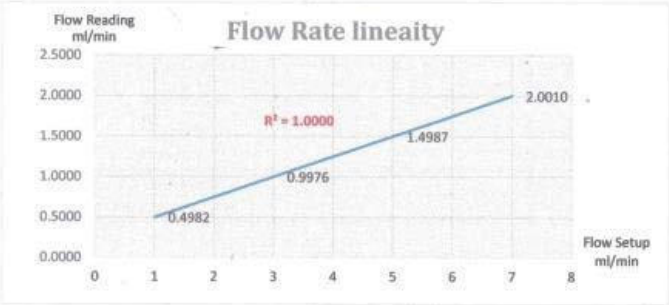
Flow Rate Linearity Result

Customer Name: **Health & Envitech Co.,Ltd.**
Department: **Analytical Lab**
System ID: **IC-01**
Manufacturer: **Dionex**
Serial No: **07090143**
Report Expiry Date: **Sep 08,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **SOP V5-GX v5r0 HPLC**
Flow Meter Model: **VKIT-LFM**
Model: **ICS-1000**
Flow Meter S/N: **L-2330**
Traceable To: **4072-LFM**

The result reference to raw data on page: 1

	Flow Rate 0.5 (ml/min)	Flow Rate 1.0000 (ml/min)	Flow Rate 1.5000 (ml/min)	Flow Rate 2.0000 (ml/min)
1	**0.4979**	**0.9967**	**1.4980**	**2.0010**
2	**0.4963**	**0.9987**	**1.4983**	**2.0009**
3	**0.4982**	**0.9977**	**1.4989**	**2.0009**
4	**0.4996**	**0.9980**	**1.4986**	**2.0010**
5	**0.4990**	**0.9969**	**1.4998**	**2.0011**
Average	**0.4982**	**0.9976**	**1.4987**	**2.0010**
R-Square			**1.0000**	



Acception criteria of R^2 > 0.9980

Evaluate Result **PASS**

Qualifier's signature:

Date: 08/09/2023

Authorised's signature:

Date: 08/09/2023

PQR
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Tel. (6698)970 7090 , Fax.(662)560 2541
POR-PUMF

บริษัท เมชโคเทค จำกัด
MESHCOTECH CO.,LTD.

Flow Rate Precision Result

Customer Name: **Health & Envitech Co.,Ltd.**
Department: **Analytical Lab**
System ID: **IC-01**
Manufacturer: **Dionex**
Serial No: **07090143**
Report Expiry Date: **Sep 08,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **SOP V5-EA v5r0**
Flow Meter Model: **VKIT-LFM**
Model: **ICS-1000**
Flow Meter S/N: **L-2330**
Traceable To: **4072-LFM**

The result reference to raw data on page: 1

	Flow Rate 0.5000 ml/min	Flow Rate 1.0000 ml/min	Flow Rate 1.5000 ml/min	Flow Rate 2.0000 ml/min
1	**0.4979**	**0.9967**	**1.4980**	**2.0010**
2	**0.4963**	**0.9987**	**1.4983**	**2.0009**
3	**0.4982**	**0.9977**	**1.4989**	**2.0009**
4	**0.4996**	**0.9980**	**1.4986**	**2.0010**
5	**0.4990**	**0.9969**	**1.4998**	**2.0011**
Average	**0.4982**	**0.9976**	**1.4987**	**2.0010**
%RSD	**0.2519**	**0.0821**	**0.0461**	**0.0042**

Acception criteria of %RSD ≤ 1 %

Evaluate Result **PASS**

Qualifier's signature:

Date: 08/09/2023

Authorised's signature:

Date: 08/09/2023

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Tel. (6698)970 7090 , Fax.(662)560 2541
POR-PUMF

บริษัท เมชโคเทค จำกัด
MESHCOTECH CO.,LTD.

Autosampler Injection Precision Result

Customer Name: **Health & Envitech Co.,Ltd.**
Department: **Analytical Lab**
System ID: **IC-01**
Manufacturer: **Dionex**
Serial No: **09090418**
Report Expiry Date: **Sep 08,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **SOP V5-FL v5r0 HPLC**
Model: **AS-1**
Lot Number: **201006**
Traceable To: **060254**

The result reference to raw data on page: 14-23

Injection Repeations	Area Injection 20ul	Area Injection 50ul
Injections Repeat 1	62117.557	168996.834
Injections Repeat 2	62504.412	169948.976
Injections Repeat 3	62685.539	169400.425
Injections Repeat 4	62137.204	169054.271
Injections Repeat 5	62632.355	167041.198
Injections Repeat 6	62266.866	170099.238
Injections Repeat 7	62824.089	169268.542
Injections Repeat 8	62075.598	169668.971
Injections Repeat 9	62053.576	169109.679
Injections Repeat 10	62005.139	169011.021
Average of STD Area	62330.234	169159.916
% RSD of Injections	0.401	0.651

Acception criteria of %RSI ≤ 1 %

Evaluate Result **PASS**

Qualifier's signature:

Date: 08/09/2023

Authorised's signature:

Date: 08/09/2023

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Tel. (6698)970 7090 , Fax.(662)560 2541

POR-DECODE

บริษัท เมชโคเทค จำกัด
MESHCOTECH CO.,LTD.

Autosampler Injection Carry Over Result

Customer Name: **Health & Envitech Co.,Ltd.**
Department: **Analytical Lab**
System ID: **IC-01**
Manufacturer: **Dionex**
Serial No: **09090418**
Report Expiry Date: **Sep 08,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **SOP V5-EA v5r0**
Model: **AS-1**
Lot Number: **220701**
Traceable To: **060254**

The result reference to raw data on page: 2-13

Blank	Area
Carry Over Blank 1	0
Carry Over Blank 2	0
Standard	**Area**
Standard 1	62117.557
Standard 2	62504.412
Standard 3	62685.539
Standard 4	62137.204
Standard 5	62632.355
Standard 6	62266.866
Standard 7	62824.089
Standard 8	62075.598
Standard 9	62053.576
Standard 10	62005.139
Area Average	62330.234
% Carry Over :	0.00

Acception criteria of % Carry Over ≤ 1%

Evaluate Result **PASS**

Qualifier's signature:

Date: 08/09/2023

Authorised's signature:

Date: 08/09/2023

PQR
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Tel. (6698)970 7090 , Fax.(662)560 2541

POR-CARR

บริษัท เมชโคเทค จำกัด
MESHCOTECH CO.,LTD.

Detector MS Signal to Noise Test

Customer Name: **Health & Envitech Co.,Ltd.**
Department: **Analytical Lab**
System ID: **IC-01**
Manufacturer: **Dionex**
Serial No: **07090143**
Report Expiry Date: **Sep 08,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **SOP V5-GS.v5r0 HPLC**
Model: **ICS-1000**
Lot Number: **201006**
Traceable To: **060254**

The result reference to raw data on page: 29

	Actual Reading	Signal to Noise
Standard Response /	18.141480	1287.542938
Noise Response at 11-15 Minute	0.014090	

Acception criteria
Signal to Noise ≥ 50
Evaluate Result **Pass**

Qualifier's signature:

Date: 08/09/2023

Authorised's signature:

Date: 08/09/2023

บริษัท เมชโคเทค จำกัด
MESHCOTECH CO.,LTD.

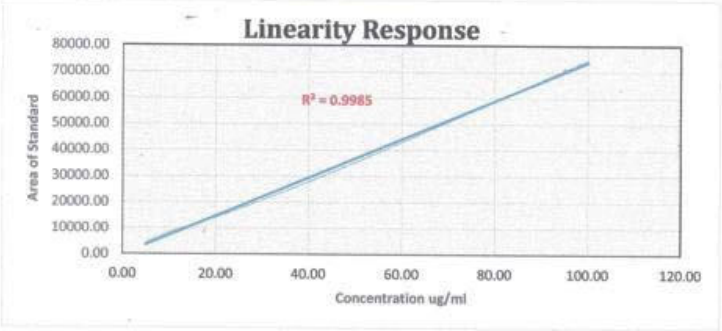
CD Detector Response Linearity Result

Customer Name: **Health & Envitech Co.,Ltd.**
Department: **Analytical Lab**
System ID: **IC-01**
Manufacturer: **Dionex**
Serial No: **07090143**
Report Expiry Date: **Sep 08,2024**

Qualifier: **Meshcotech Co., Ltd.**
Procedure: **SOP V5-FS v5r0 HPLC**
Model: **ICS-1000**
Lot Number: **201006**
Traceable To: **060254**

The result reference to raw data on page: 24-28

Concentration (ug/ml)		Area of standard
Standard 1	5.02	**4378.816**
Standard 2	9.86	**8139.765**
Standard 3	25.02	**17456.702**
Standard 4	50.54	**35820.801**
Standard 5	100.00	**74596.992**
R-Square		**0.9985**



Acception criteria of R^2 >0.9980

Evaluate Result **PASS**

Qualifier's signature:

Date: 08/09/2023

Authorisedr's signature:

Date: 08/09/2023

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

Result : Without adjustment
Calibration Point : 50, 90, 100, 110 ml

Nominal value (ml)	Standard reading (ml)	UUC* correction (ml)	Uncertainty of measurement (+/- ml)
50	50.0176	0.0176	0.056
90	90.0217	0.0217	0.063
100	100.0269	0.0269	0.063
110	110.0290	0.0290	0.073

UUC* = Unit under calibration

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

Certificate of Calibration

Customer : Health & Envitech Co.,Ltd.
Address : 77/11 M.2 Ngamwongwan Rd., Soi 5, T.Bangkhen, A.Muang Nontaburi 11000

Description : Personal Sampler Calibrator
Manufacturer : SKC
Model : 303
Serial No. : N/A
Identification No. : PC-001
Calibration Place : Chemical Laboratory 2

Order No. : 3486/22
Received date : Nov 28, 2022
Calibration date : Nov 29, 2022
Environment Condition :
Temperature : (20+/-2) °C
Humidity : (50+/- 15) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure *CP-MC-004* According to comparison with Analytical Balance. The calibration methods based on ASTM E542-01.

Reference Standard Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
Analytical Balance	AE-FA220	201907106	MM22-2494	Aug 29, 2023
Humidity / Baro / Temp. Data Recorder	MH-382SD	N/A	MT22-4415	Jul 27, 2023
Digital Thermometer	EFT-4	EFT42020033	MT22-3124	May 03, 2023

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 : _____ **Approved by :** ____
Issue date : Nov 29, 2022 ( )

This calibration certificate shall not be reproduced other than in full except with the prior written approval of Inctech Metrological Center Co.,Ltd

Calibration Results:

Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.8	-0.19	0.13
460.05	460.0	0.05	0.13
536.66	536.4	0.26	0.13
637.98	638.4	-0.42	0.13
748.48	748.9	-0.42	0.13
807.03	807.1	-0.07	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2899	0.290	-0.0001	0.0045
	0.5170	0.520	-0.0030	0.0045
	1.0286	1.033	-0.0044	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.2837	0.284	-0.0003	0.0045
	0.5074	0.509	-0.0016	0.0045
	1.0071	1.010	-0.0029	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.2487	0.249	-0.0003	0.0045
	0.4593	0.461	-0.0017	0.0045
	0.9322	0.934	-0.0018	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2434	0.244	-0.0006	0.0045
	0.4649	0.466	-0.0011	0.0045
	0.9457	0.947	-0.0013	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2570	0.257	0.0000	0.0045
	0.5035	0.504	-0.0005	0.0045
	1.0022	1.003	-0.0008	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.2560	0.256	0.0000	0.0045
	0.4968	0.498	-0.0012	0.0045
	0.9713	0.973	-0.0017	0.0045

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Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Certificate of Calibration

Equipment:	SPECTROPHOTOMETER	Certificate No.:	C06230019
Model:	DR 5000	Issued Date:	17 January 2023
Serial No. (or ID.):	1293028 (LB-HE-101)	Job No.:	KSPR2300722
Manufacturer:	HACH	Page:	1 of 3
Condition:	In Condition		

Customer: Health & Envitech Co.,Ltd.
6 Ngamwongwan Soi 5,
Tumbon Bangkhen, Mueangnontaburi, Nontaburi 11000 Thailand

Environment Condition:

Temperature	25.8	°C	±	0.4	°C
Humidity	54.5	%RH	±	2.3	%RH

Calibration Place: Health & Envitech Co.,Ltd. (Laboratory 2)
6 Ngamwongwan Soi 5,
Tumbon Bangkhen, Mueangnontaburi, Nontaburi 11000 Thailand

Calibration By: Mr.Siwapan Srijan

Calibration Date: 17 January 2023

The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04

Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.

The standard for Wavelength Certificate No. 91418 and 91435
The standard for Photometric Certificate No. 9112739 and 103073
The standard for Stray light Certificate No. 103141 and 103142
The standard for Spectral resolution Certificate No. 103140

(Mr. S (M
Person in charge Authorized signatory

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

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

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

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CAL-FM-C06-15: 12 Sep 2022

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The error of temperature determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, ASTM E 275-08 and ASTM E 387-04. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

Decision rule :

- ☐ Choice A Binary Statement for Simple Acceptance Rule (w = 0), Specific Risk < 50% PFA.
- ☑ Choice B Non-binary statement with guard band (w = 1 U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.
- ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band (w = r U) .

; PFA – Probability of False Accept

Authorized signatory

Calibration Results:

Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7361	0.740	-0.0039	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8585	0.860	-0.0015	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2861	0.289	-0.0029	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6378	0.639	-0.0012	0.0080

Stray light *

Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)
260.67 +/- 0.11 nm	260.7	1.0	2.000
391.7 +/- 0.11 nm	391.7	1.4	1.854

Spectral Resolution *

Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.73	266.77	1.46	2.00
UUC: Wavelength (nm)	268.5	266.4		
Std Absorbance (A)	0.4237	0.2591		
Absorbance (A)	0.380	0.261		

* Calibration Marked " Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate

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Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Unit Under Calibration	Correction	Guard Band (w)	Tolerance (±)	Conformity
420 nm	0.000	0.0000	0.0045	0.015	Pass
	0.290	-0.0001	0.0045	0.015	Pass
	0.520	-0.0030	0.0045	0.015	Pass
	1.033	-0.0044	0.0045	0.015	Pass
440 nm	0.000	0.0000	0.0045	0.015	Pass
	0.284	-0.0003	0.0045	0.015	Pass
	0.509	-0.0016	0.0045	0.015	Pass
	1.010	-0.0029	0.0045	0.015	Pass
465 nm	0.000	0.0000	0.0045	0.015	Pass
	0.249	-0.0003	0.0045	0.015	Pass
	0.461	-0.0017	0.0045	0.015	Pass
	0.934	-0.0018	0.0045	0.015	Pass
546.1 nm	0.000	0.0000	0.0045	0.015	Pass
	0.244	-0.0006	0.0045	0.015	Pass
	0.466	-0.0011	0.0045	0.015	Pass
	0.947	-0.0013	0.0045	0.015	Pass
590 nm	0.000	0.0000	0.0045	0.015	Pass
	0.257	0.0000	0.0045	0.015	Pass
	0.504	-0.0005	0.0045	0.015	Pass
	1.003	-0.0008	0.0045	0.015	Pass
635 nm	0.000	0.0000	0.0045	0.015	Pass
	0.256	0.0000	0.0045	0.015	Pass
	0.498	-0.0012	0.0045	0.015	Pass
	0.973	-0.0017	0.0045	0.015	Pass

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

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Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm

Unit Under Calibration	Correction	Guard Band (w)	Tolerance (±)	Conformity
418.8	-0.19	0.13	3.0	Pass
460.0	0.05	0.13	3.0	Pass
536.4	0.26	0.13	3.0	Pass
638.4	-0.42	0.13	3.0	Pass
748.9	-0.42	0.13	3.0	Pass
807.1	-0.07	0.13	3.0	Pass

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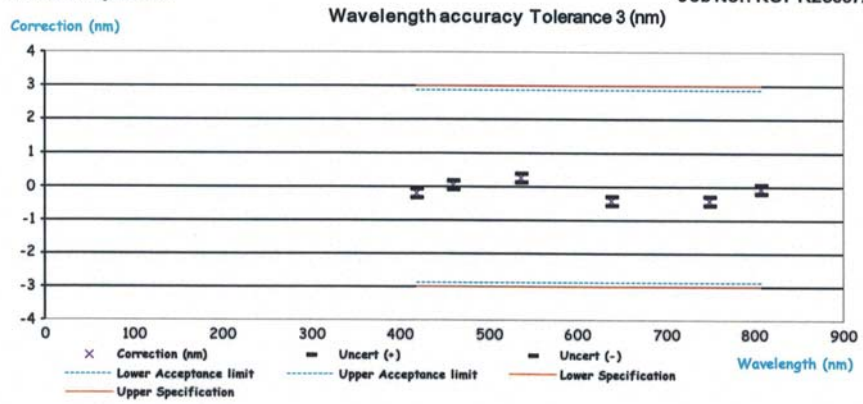
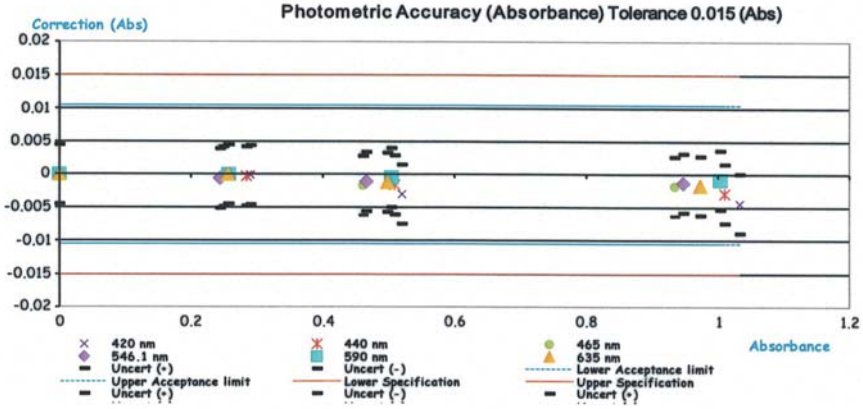
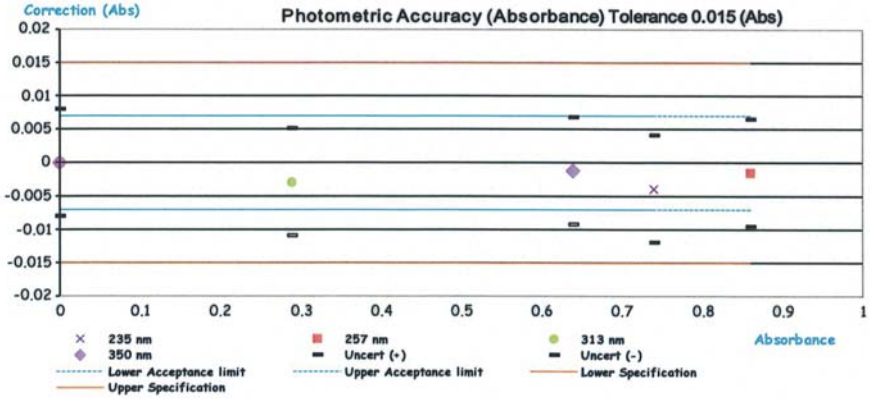
Without Adjustment

Job No.: KSPR2300722







Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Unit Under Calibration	Correction	Guard Band (w)	Tolerance (±)	Conformity
235 nm	0.000	0.0000	0.0080	0.015	Pass
	0.740	-0.0039	0.0080	0.015	Pass
257 nm	0.000	0.0000	0.0080	0.015	Pass
	0.860	-0.0015	0.0080	0.015	Pass
313 nm	0.000	0.0000	0.0080	0.015	Pass
	0.289	-0.0029	0.0080	0.015	Pass
350 nm	0.000	0.0000	0.0080	0.015	Pass
	0.639	-0.0012	0.0080	0.015	Pass

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

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analytikjena
An Endress+Hauser Company

Maintenance Protocol

PlasmaQuant PQ 9000 (Elite)
ICP-OES

Analytik Jena AG
Konrad-Zuse-Strasse 1
07745 Jena · Germany

Phone +49 3641 77 70
info@analytik-jena.com
www.analytik-jena.de

DKSH

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2300722

ชนิดเครื่องมือ: SPECTROPHOTOMETER รุ่น: DR 5000 หมายเลขเครื่อง: 1293028

ตรวจสอบ (รับ) 17 Jan 2023		รายการตรวจเช็ค	ตรวจสอบ (ส่ง) 17 Jan 2023		หมายเหตุ
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
☑	☐	1. ความสมบูรณ์เครื่อง	☑	☐	
☑	☐	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	☑	☐	
☑	☐	3. สวิทช์ ปิด – เปิด เครื่อง (On-Off Swicth)	☑	☐	
☑	☐	4. ปุ่มกด (Keypad)	☑	☐	
☑	☐	5. หน้าจอ (Display, Screen Contrast)	☑	☐	
		Spectrophotometer			
☐	☐	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	☐	☐	
☐	☐	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	☐	☐	
☑	☐	8. ความยาวคลื่น (Wavelength Check)	☑	☐	656.1 = 656.2 nm
☑	☐	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	☑	☐	15.3 Hours
☑	☐	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	☑	☐	135.4 Hours
☐	☐	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	☐	☐	
		pH Meter and Conductivity Meter			
☐	☐	12. อิเล็คโทรด (Electrode and Connection Cable)	☐	☐	
☐	☐	13. ระดับสารละลายใน Electrode (Level KCl)	☐	☐	
☐	☐	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	☐	☐	
☐	☐	15. ขาจับอิเล็คโทรด (Stand)	☐	☐	
		Turbidimeter			
☐	☐	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	☐	☐	
☐	☐	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่เกิน 3.0)	☐	☐	
		Automatic titrator			
☐	☐	18. สภาพ Piston Burettes	☐	☐	
☐	☐	19. Function Rinsing and Dosing	☐	☐	
☐	☐	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	☐	☐	

เพิ่มเติม/ข้อแนะนำ :

Mr.Siwapan Srijan
Service Engineer

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1 Customer and service data

Customer address

Company	บ.เฮลธ์ แอนด์ เอ็นไวเทค จำกัด
Department	QC
Address (street, number, zip code, city)	6 ซอยงามวงศ์วาน 5 ต.บางเขน อ.เมือง จ.นนทบุรี 11000
Phone	
E-mail	
Customer number	
Order number	

Device data (model and serial number)

ICP OES	PQ9000
Mobile cooling unit	PolyScience
Autosampler	-

Analytik Jena representative information

Name	Mr.Pukitja somton
Company	Analytik Jena Instrument Thailand

Maintenance date

Date	11 October 2023

Table of contents

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2 Maintenance with subsequent Operational Qualification (OQ) 4
3 Maintenance work on the base unit 5
4 Maintenance work on accessories 8
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6 Comments and objections 16
7 Completing maintenance 17

3 Maintenance work on the base unit

Update firmware and software

	Complies	Does not comply
Save device parameters and neon table	☑	☐
Check the firmware version and FPGA	☑	☐
Check the version of the ASpect PQ software	☑	☐
Update software, FPGA and firmware Approval for firmware and software updates was given by the customer.	☑	☐
The customer's was informed that the Operational Qualification (OQ) and software validation may have to be repeated for validated systems after a firmware/software update.	☑	☐
Update ASpect PQ	☑	☐
▪ Current version: 1.2.3.0		
▪ Version after update: –		
Update FPGA	☑	☐
▪ Current version: h09; h00		
▪ Version after update: –		
Updating the firmware	☑	☐
▪ Current version: 1.36		
▪ Version after update: –		
Record running time (in hours)	☑	☐
▪ Base unit: 3339		
▪ RF generator: 1949		

Service the rear of the device

	Complies	Does not comply
Replace the air filter mat	☑	☐

2 Maintenance with subsequent Operational Qualification (OQ)

- If an Operational Qualification (OQ) is carried out after maintenance, there is no need to check analytical parameters in the maintenance report.
- The analytical parameters are then checked in the separate OQ report.

	Yes	No
Maintenance with subsequent Operational Qualification (OQ)	☐	☑

Comments:

-

Service the spectrometer

	Complies	Does not comply
Clean and lubricate the spindle of the prism and grating with a little oil	✓	

Check gas flows at the gas box

Gas flow	Rated value	Actual value	Complies	Does not comply
Nebulizer gas flow	0.5 L/min ± 15 %	0.493	✓	
Auxiliary gas flow	0.5 L/min ± 15 %	0.496	✓	
Cone gas flow	1,7 ... 2,8 L/min	2.7	✓	
Oxygen is used (optional)				
Oxygen flow	00.5 L/min ± 15 %	-		

Comments:

Service the sample introduction system

	Complies	Does not comply
Remove, disassemble and clean the torch ▪ Check the surface of the glass parts (injector, inner tube, outer tube and glass holder) for damage, heavily coated and broken parts. Replace glass parts, if necessary ▪ Clean glass parts in aqua regia	✓	
Check the sealing rings, replace if necessary ▪ Sealing rings in torch holder (3 pieces) and torch shuttle (2 pieces) ▪ Sealing rings in injector and mixing chamber mount (Check sealing rings for porous and hardened areas, replace if necessary)	✓	
Check pump tubing (sample, waste), replace if necessary	✓	
Check peristaltic pump, disassemble and lubricate if necessary	✓	
Check the nebulizer for damage and clean it	✓	
Remove and clean the mixing chamber	✓	
Check the sealing ring of the mixing chamber	✓	
Check and clean torch height adjustment drive	✓	
Lubricate the linear drive with a little oil	✓	
Check the igniting pin for signs of wear	✓	

Comments:

-

Service the plasma compartment

	Complies	Does not comply
Disassemble the cone, check geometry and clean it if necessary Take out the windows (axial/radial) and clean or replace them Replacing the sealing rings	✓	
Check the surface of the first mirror, clean or replace it if necessary	✓	
Check the air outlet for deposits and blockages, clean it if necessary	✓	
Remove the cover plate below the plasma compartment and clean it Renew the filter mat	✓	
Check the coil for its material condition, position, geometry and for the tightness of connections	✓	
Clean or replace bonnet	✓	
Check RF deflector spring, replace it if necessary	✓	

	Complies	Does not comply
Check the functionality of the washing cup	✓	
Check the hose connections for leaks	✓	

4 Maintenance work on accessories

Service the mobile cooling unit

		Complies	Does not comply
Vacuum or clean the condenser		✓	
Record the condition of the cooling water before maintenance:		✓	
Particles and discoloration present:	☐ yes ☑ No		
cooling water flow rate	1.50		
Cooling water primary pressure	49 psi		
Conductivity of the cooling water	120		
Clean the water filter on the base unit (if filter is installed)		✓	
Renew cooling water ▪ Prepare cooling water according to Analytik Jena's specifications ▪ Use cooling water additive from Analytik Jena		✓	
Check filling level of cooling water, top up if required		✓	

Cooling water circuit after maintenance

	Rated value	Actual value	Complies	Does not comply
cooling water flow rate	1.5 to 2.0 L/min	1.50	✓	
Cooling water primary pressure	max. 6 bar (85 psi)	55 psi	✓	
Conductivity of the cooling water	50 to 200 µS/cm	100	✓	
Cooling water temperature (in mobile cooling unit)	18 °C	18	✓	

Service the autosampler

	Complies	Does not comply
Check cannula and tubing to the base unit	✓	
Check pump tubing (washing solution, waste), replace if necessary	✓	
Clean the covers, rack mount and accessories	✓	
Check the condition of the toothed belts for cracks, gaps and changes in color	✓	
Check the peristaltic pump for smooth operation	✓	

5.3 Check of neon energy

The plasma must be ignited for this test (CCD cooling active).

	Rated value (Steps)	Actual value (Steps)	Complies	Does not comply
585.2462 nm	> 4000 ct/s	30337	☑	☐
594.4807 nm	> 3000 ct/s	11135	☑	☐
640.2217 nm	> 3000 ct/s	4286	☑	☐
849.5322 nm	> 3000 ct/s	3653	☑	☐
607.4311 nm	> 3000 ct/s	26711	☑	☐
659.8923 nm	> 3000 ct/s	21792	☑	☐
743.8864 nm	> 3000 ct/s	32092	☑	☐
703.2381 nm	> 10000 ct/s	19529	☑	☐

Comments:

–

5.4 Adjustment of transfer optics (Mn 257.610 nm)

Adjust detection (axial)		Complies	Does not comply
X offset	-0.6	☑	☐
Y offset	-2.1	☑	☐

5 Checking basic functions and device parameters

5.1 Check of correction functions

	Rated value (Steps)	Actual value (Steps)	Complies	Does not comply
As (193.6950 nm)	± 500	143	☑	☐
Cu (324.7540 nm)	± 500	98	☑	☐
Na (588.9953 nm)	± 500	75	☑	☐
K (766.4908 nm)	± 500	89	☑	☐

Comments:

–

5.2 Check of safety circuits

	Complies	Does not comply
Safety circuit for torch position	☑	☐
Safety circuit for door of plasma compartment	☑	☐
Safety circuit for interrupted cooling water flow (cooling water flow < 0.85 L/min)	☑	☐
Safety circuit for suction power (check the setting Par[85])	☑	☐
Value Par[85]: 4115		
Safety circuit for argon inlet pressure (p < 4 bar)* * if sensor is installed (Par[116] = 1)	–	☐

Comments:

–

Adjust detection (axial)		Complies	Does not comply
Intensity value	2420277	☑	☐

Adjust detection (radial)		Complies	Does not comply
X offset	14.7	☑	☐
Y offset	-0.7	☑	☐
Intensity value	395776	☑	☐

Comments:

—

5.5 Verification of the wavelength accuracy, generator robustness and analytical performance

- Requirements
  - Start ASpect PQ
  - Perform measurements with the standard sample introduction kit
  - Load the sequence "maintenance_PQ9000"
  - Plasma burn-in time 15 min
  - 1 mg/L multi-element solution (Merck standard IV for ICP) in 3 % HNO_3
  - Plasma conditions 12 L/min plasma gas, 0.5 L/min auxiliary gas, 0.6 L/min nebulizer gas
  - Plasma power 1200 W
  - Measurement time 10 s
- Start the sequence "maintenance_PQ9000" (duration approx. 40 min).
  The sequence automatically loads the methods that are necessary to determine the data.

Wavelength accuracy

- Open the spectra display of the measured lines one after the other. Read off the peak position (peak position before correction). Carry out the peak correction by clicking on **[Find peak center]** and read off the peak position again (peak position after correction). Calculate the difference between the two values (peak position before correction - peak position after correction).

Line	Peak position before correction	Peak position after correction	Difference Rated value	Difference Actual value
Zn 213.8560 nm	181.0 ± 2.1	181.0 ± 1.6	± 1.0	0.5
Mn (257.6100 nm)	181.0 ± -0.3	181.0 ± -0.3	± 1.0	0.0
Cu (324.7540 nm)	181.0 ± -0.2	181.0 ± -0.1	± 1.0	-0.1
Li 670.7910 nm	181.0 ± -2.5	181.0 ± -3.5	± 1.0	1.0

Comments:

—

Robustness factor

Calculation according to the following formula:

$$F_r = \frac{\text{intensity } Mg_{280.271} \,/\, \text{intensity } BG\ Mg_{280.271}}{\text{intensity } Mg_{285.213} \,/\, \text{intensity } BG\ Mg_{285.213}}$$

Intensity / calculated factor	Value
Intensity Mg 280.271	1538110
Intensity BG Mg 280.271	8481
Intensity Mg 285.213	175650
Intensity BG Mg 285.213	8437
F_r	8.71

Comments:

—

		Rated value	Actual value
	Relative standard deviation (RSD) [%]	< 2	0.23
Mn (257.6100 nm)	Limit of detection LOD [mg/L]	< 0.0004	0.000045
	Recovery [%]	100 ± 10	101.5
	Relative standard deviation (RSD) [%]	< 1.5	0.42
Cu (324.7540 nm)	Limit of detection LOD [mg/L]	< 0.0015	0.000403
	Recovery [%]	100 ± 10	101.1
	Relative standard deviation (RSD) [%]	< 1.5	0.29
Li 670.7910 nm	Limit of detection LOD [mg/L]	< 0.003	0.00037
	Recovery [%]	100 ± 10	101.9
	Relative standard deviation (RSD) [%]	< 1.5	0.52

Comments:

Analytical performance

PlasmaQuant PQ 9000 Elite

		Rated value	Actual value
Zn 213.8560 nm	Limit of detection LOD [mg/L]	< 0.0015	–
	Recovery [%]	100 ± 10	–
	Relative standard deviation (RSD) [%]	< 2	–
Mn (257.6100 nm)	Limit of detection LOD [mg/L]	< 0.0002	–
	Recovery [%]	100 ± 10	–
	Relative standard deviation (RSD) [%]	< 1.5	–
Cu (324.7540 nm)	Limit of detection LOD [mg/L]	< 0.0010	–
	Recovery [%]	100 ± 10	–
	Relative standard deviation (RSD) [%]	< 1.5	–
Li 670.7910 nm	Limit of detection LOD [mg/L]	< 0.0025	–
	Recovery [%]	100 ± 10	–
	Relative standard deviation (RSD) [%]	< 1.5	–

PlasmaQuant PQ 9000

		Rated value	Actual value
Zn 213.8560 nm	Limit of detection LOD [mg/L]	<0.002	0.000198
	Recovery [%]	100 ± 10	98.8

7 Completing maintenance

	Complies	Does not comply
Maintenance on the analyzer has been completed.	☑	☐
The functionality and analytical performance of the device was checked in the presence of the user. The device meets its technical specification.	☑	☐

Name	Function	Date	Signature
Wipawan pathumwan	Representative Customer	11/10/2023	
Mr.Pukitja Somton	Representative Analytik Jena AG	11/10/2023	

6 Comments and objections

Comments and possible objections raised during installation and commissioning are to be recorded in writing in this section.

Certificate of Calibration

Method 5 Pre-Test Calibration - Liters (L)

UUT Meter Console Information		Calibration Conditions		Factors/Conversions		Reference Equipment	
Model #:	XC-572-OV	Bar. Pressure (mm Hg):	756.8	Std. Temp. (K):	293.15	Calibration Meter Model:	DGMR-200H
Serial #:	1204012	Ambient Temperature (ºC):	24.7	Std. Press. (mm Hg):	760	Cal. Due Date:	25-Jul-24
DGM Model #:	G1.6	Relative Humidity (%):	51.0	K_1 (K/mm Hg):	0.3857	Serial No.:	0000026
DGM Serial #:	2012-006454	Altitude (m):	1.83			Gamma:	1.0000
		Bar. Pressure Corr. (mm Hg):	756.7				

UUT Meter (DGM)							Reference Meter (WTM)					
Run Time (seconds)	Orifice, ΔH (mm H2O)	Volume			Meter Temperature (ºC)		Meter Pressure (in H2O)	Volume (L)			Outlet Temperature (ºC)	
		Initial (L)	Final (L)	Total (L)	Initial	Final		Initial	Final	Total	Initial	0.00
Θ	$P_{m(g)}$	V_{mi}	V_{mf}	V_m	t_{mi}	t_{mf}	P_w	V_{wi}	V_{wf}	V_w	t_{wi}	t_{wf}
840.00	13.00	338514.6	338674.4	159.8	24.0	24.0	0.3	0.00	156.99	156.99	24.0	24.0
600.00	25.00	338674.4	338836.0	161.6	24.0	24.0	0.5	0.00	159.88	159.88	24.0	24.0
455.00	50.00	338836.0	339005.2	169.2	25.0	26.0	0.6	0.00	167.42	167.42	24.0	24.0
350.00	80.00	339005.2	339173.8	168.6	26.0	27.0	2.0	0.00	166.72	166.72	24.0	24.0
300.00	120.00	339173.8	339347.0	173.2	27.0	27.0	2.4	0.00	171.38	171.38	24.0	24.0

Standardized Data

Reference Meter (L)		UUT Meter (L)		Correction Factor		ΔH @ (mm H2O)	
Std. Vol.	Std. Flow	Std. Vol.	Std. Flow	Value	Variation	0.0212 SCMM	Variance
$V_{w(std)}$	$Q_{w(std)}$	$V_{m(std)}$	$V_{w(std)}$	Y	ΔY	ΔH@	ΔΔH@
154.31	11.02	157.15	11.0	0.9819	-0.0080	47.5	1.219
157.23	15.72	159.11	15.7	0.9882	-0.0017	45.0	-1.296
164.68	21.72	166.16	21.7	0.9911	0.0012	47.1	0.786
164.57	28.21	165.49	28.2	0.9944	0.0045	45.0	-1.372
169.33	33.87	170.38	33.9	0.9938	0.0039	47.0	0.663
				0.9899	= Y Avg.	**46.3**	= ΔH@ Avg.

Metric

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

Note: For $\Delta H_@$, orifice pressure differential that equates to 0.0212m^3/min at standard temperature and pressure, acceptable tolerance of individual values from the average is +-0.2inches (5.1mm) H_2O.

Pass/Fail Judgment : Pass

Calibrate By : Appproved By: Date: 29 Aug 23

The instruments listed and described on this certificate have been calibrated against standards traceable to the National Institute of Standards and Technology (N.I.S.T.) and in reference to EPA Method 5, Section 10.3.1.

Neediss Supply Instrument Co.,Ltd.

Certificate of Calibration - Supplemental

Nomenclature

- P_b - Barometric Pressure
- DGM - Dry Gas Meter
- K_1 - Constant based on standard temp and press
- Θ - Run time, in minutes
- P_m - ΔH (Meter Pressure, gauge)
- V_m - Volume collected by test meter, corrected for STP
- $Q_{m(std)}$ - Calculated flow rate of test meter
- K' - Critical orifice coefficient
- P_w - Measured pressure of reference meter
- t_w - Temperature measured in reference meter

Equations

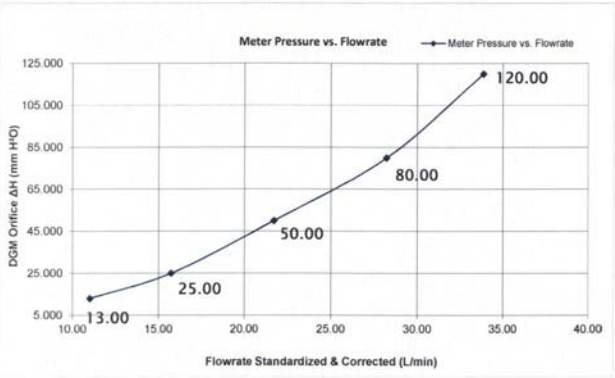
$$V_{w(std)} = Y * K_1 \frac{V_w * (P_{bar} + \frac{P_{m(g)}}{13.6})}{T_w}$$

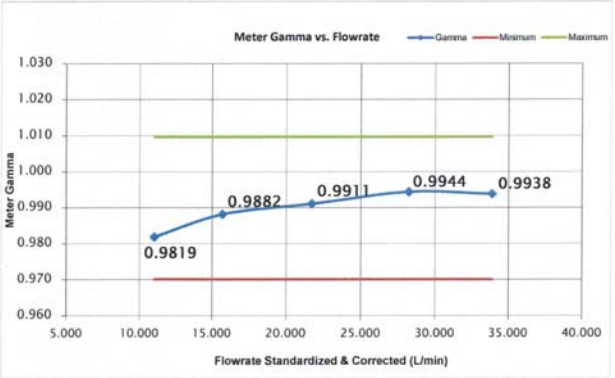
$$V_{m(std)} = \frac{K_1 V_m (P_{bar} + \frac{\Delta H}{13.6})}{T_m}$$

$$K_1 = \frac{T_{std}}{P_{std}} \qquad Y = \frac{V_{cr(std)}}{V_{m(std)}} \qquad Q_{w(std)} = \frac{V_{w(std)}}{\Theta}$$

$$Metric\ \Delta H_@ = \frac{P_{m(g)} * 0.0011696 * (P_{bar} + \frac{P_{m(g)}}{13.6})}{T_m} * \left(\frac{T_w * \Theta}{V_w * P_{bar}}\right)^2$$

Calibration Train





Console Sensor Calibration Data Sheet

Console Information

Model #: XC-572-OV
Serial #: 1204012
Units: Metric
Type: "English"

Calibration Conditions

Pbar (mm. Hg): 756.8
Humidity (%): 51.0
Tamb (°C): 24.7
Corr. Pbar (mm. Hg): 756.7

Reference Devices

TC Simulator Model: CC-VTR-SH
Reference #: 091109269
Barometer Model: 736930
Reference #: EBARODIALSPE01
Digital Pressure Calibrator Model: 718 30G
Reference #: 3891001

Pressure Gauge / Manometer Calibration Data

Console Vacuum Calibration			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status[6]
#	in. Hg	in. Hg	Pass/Fail
1	-5.0	-5.0	PASS
2	-15.0	-15.0	PASS
3	-20.0	-20.0	PASS

Reference Point[1]	ΔH_Manometer Calibration			Reference Point Status[2]
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	mm H2O	mm H2O	mm H2O	Pass/Fail
1	-200.000	0.0	-200.0	PASS
2	-150.000	0.0	-150.0	PASS
3	-100.000	0.0	-100.0	PASS
4	-80.000	0.0	-80.0	PASS
5	-50.000	0.0	-50.0	PASS
6	0.000	0.0	0.0	PASS
7	50.000	50.0	0.0	PASS
8	80.000	80.0	0.0	PASS
9	100.000	100.0	0.0	PASS
10	150.000	150.0	0.0	PASS
11	200.000	200.0	0.0	PASS
			ΔH Overall Audit Status	PASS

Reference Point[1]	ΔP_Manometer Calibration			Reference Point Status[2]
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	mm H2O	mm H2O	mm H2O	Pass/Fail
1	-200.000	0.0	-200.0	PASS
2	-150.000	0.0	-150.0	PASS
3	-100.000	0.0	-100.0	PASS
4	-80.000	0.0	-80.0	PASS
5	-50.000	0.0	-50.0	PASS
6	0.000	0.0	0.0	PASS
7	50.000	50.0	0.0	PASS
8	80.000	80.0	0.0	PASS
9	100.000	100.0	0.0	PASS
10	150.000	150.0	0.0	PASS
11	200.000	200.0	0.0	PASS
			ΔP Overall Audit Status	PASS

Calibrate By : Appproved By: Date: 29 Aug 23

Notes

[1] Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

[2] For valid test results, the maximum difference between temperature and reference readings should be less than ±5.4 °F (±3 °C), for all thermocouples except for the stack thermocouple which should be less than ±1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than ±2°F (±1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

[3] Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

[4] Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

[5] For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ±0.1 in. Hg (±2.5 mm Hg). (EPA Method 5, Section 6.1.2)

[6] For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.5 in. Hg (±12.5 mm Hg)

[6] For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.05 in. H2O (±1.25 mm H2O), or 5% of full scale

I certify that the above Thermocouple Sensors were calibrated in accordance with US EPA Methods 2 and 5, CFR 40 Part 60.

Neediss Supply Instrument Co.,Ltd

Certificate of Calibration

Method 5 Console Sensor Calibration - Metric Units

Console Information

Model #: XC-572-OV
Serial #: 1204012
Units: Metric

Calibration Conditions

Pbar (mm. Hg): 756.8
Humidity (%): 51
Tamb (°C): 24.7
Elevation (m): 1.8
Corr. Pbar (mm. Hg): 756.7

Reference Devices

TC Calibrator Model: CC-VTR-SH
Reference #: 091109269
Barometer Model: 736930
Reference #: EBARODIALSPE01
Pressure Model: 718 30G
Reference #: 9543013

Temperature Display Calibration Data

Reference Point[1]	Reference Temp.	Test Thermocouple Calibrations						Reference Point Status[2]
		Aux	Stack	Probe	Oven	Filter	Exit	
#	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
1	-18	-17	-16	-17	-17	-17	-18	PASS
2	38	37	37	36	36	36	37	PASS
3	93	92	93	92	92	92	92	PASS
4	149	148	149	148	148	148	148	PASS
5	260	259	258	258	258	259	259	PASS
6	371	370	371	370	370	370	370	PASS
7	482	481	481	480	480	480	481	PASS
8	593	592	593	591	591	592	592	PASS
9	816	815	815	814	814	814	815	PASS
10	1038	1038	1038	1037	1037	1037	1038	PASS
								PASS
								Overall Audit Status

NIST Reference Thermocouple ID: 12702001

	Ref Point	Theoretical Temp.	DGM Thermocouple Sensor Reading	ΔT_{abs}[4]
	#	°C	°C	°C
Ice Water	1	0.9	1	0.04%
Ambient[3]	2	24.7	24	0.14%
			Maximum[2]	0.14%
			Status	PASS

Internal temperature thermocouple is not audited to EPA standards, and should not be used as an official reference for ambient temperature.

Calibrate By : Appproved By: Date: 29 Aug 23

Notes

[1] Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

[2] For valid test results, the maximum difference between temperature and reference readings should be less than ±5.4 °F (±3 °C), for all thermocouples except for the stack thermocouple which should be less than ±1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than ±2°F (±1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

[3] Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

[4] Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

[5] For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ±0.1 in. Hg (±2.5 mm Hg). (EPA Method 5, Section 6.1.2)

[6] For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.5 in. Hg (±12.5 mm Hg)

[6] For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.05 in. H2O (±1.25 mm H2O), or 5% of full scale

Neediss Supply Instrument Co.,Ltd

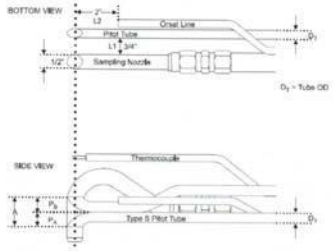
neediss Sampling Probe and Pitot Validation

Samplig System Equipment Information

Probe Sheat	Apex 1 in. , 4 ft.
Probe Number	W1909261
Pitot tube Number	A8895
Pitot tube Type	S Type 3/8 Inc.
Validation method	Standard Probe 1 in. and
	1/2 in. Sampling Nozzle

Valibration Conditions and Equipment

Digital Calipers	CD-15APX	
Reference No.	A22070181	
Digital Inclinometer	BASELINE	
Reference No.	FEI 12-1057	
Temperatute	24.7	°C±3
Barometric Pressure	756.8	mm Hg



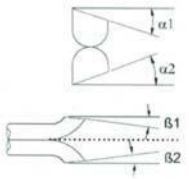
Sampling Probe Validation with Tune up

☑ Measure and Alinment with 1/2" Sampling Nozzle(12.7 mm)

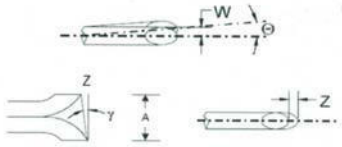
	Measured		Standard Range
L_1 =	1.97	cm.	(1.905 cm. or 3/4 in.)
L_2 =	4.99	cm.	(5.08 cm. or 2.0 in.)
D_T =	0.961	cm.	(3/8 in.)
A =	2.25	cm.	($2.1\ D_T \le A \le 3D_T$)
$A/2D_T$ =	1.171	cm.	($1.05\ P_A / D_T \le A \le 1.5$)

Pitot Tube Validations and Engles measurement Result

☑ : Measure Result after Maintanance and Adjustable



P_B Size			Standard Range
α_1	=	-0.20 °	≤ 10°
β_1	=	-0.20 °	≤ 5°
P_A Size			
α_2	=	1.00 °	≤ 10°
β_2	=	0.40 °	≤ 5°



Engles measurement		Calculated Result		Standard Range
W =	-1.10 °	-0.043	cm.	W < 0.08 cm (1/32 in.)
Z =	0.60 °	0.024	cm.	Z < 0.032 cm (1/8 in.)

Can be use **0.84** for Cp(s) if the type of face-opening misafgnment show above with not affect the base line value of Cp(s) Solong as standard range

Validation By: _____ Appproved By: _____ Date: 29 Aug 23

neediss
Neediss Supply Instrument Co.,Ltd.

neediss Console Sensor Audit QA Sheet

Meter Console Information (UUT)

Model #:	XC-572-OV
Serial #:	1204012
Units:	Metric

Calibration Conditions

Pbar (mm. Hg):	756.8
Humidity (%):	51.0
Amb. Temp. (°C):	24.7
Altitude (m):	1.8
Corrected Pbar (mm. Hg):	756.7

Reference Devices

TC Simulator Model:	CC-VTR-SH
Reference #:	91109269
Barometer Model:	369307
Reference #:	EBARODIALSPE01
Digital Pressure Calibrator Model:	718 30G
Reference #:	9543013

Audit Data

Reference Point	Reference Temp.	Thermocouple Probe Audit						Reference Point Status[1]
		Aux	Stack	Probe	Oven	Filter	Exit	
	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
Ambient	24.7	25	25	25	25	25	25	PASS
Ice Water	0.9	1	1	1	1	1	1	PASS

Audit Data

Console Vacuum Audit			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status[3]
#	in. Hg	in. Hg	Pass/Fail
1	17.0	17.0	PASS

Calibrate By: _____ Appproved By: _____ Date: 29 Aug 23

Notes

[1]For valid test results, the maximum difference between test and reference readings should be less than 5.4 °F (3 °C), for all thermocouples except for the stack thermocouple which should be less than 1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

[2]For valid test results, the maximum difference between console and reference barometric pressure readings should be less than 0.1 in. Hg (2.5 mm Hg), (EPA Method 5, Section 6.1.2)

[3]For valid test results, the maximum difference between console and reference vacuum readings should be less than 0.5 in. Hg (12.5 mm Hg)

I certify that the above Thermocouple, Barometric, and Vacuum Sensors were calibrated and audited in accordance with US EPA Methods, CFR 40 Part 60.

neediss
Neediss Supply Instrument Co.,Ltd.

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 8361-6 , e-mail: service.thailand@sartorius.com

NSC-TISI-TIS 17025
CALIBRATION No.0426

SARTORIUS

Certificate of Calibration

Model Number :	BP210D	Certificate No. :	22BNA0225
Description :	Semi-micro Balance	Issued Date :	Thursday, November 10, 2022
Serial Number :	70406076	Reference No. :	196389
Manufacturer :	Sartorius	Page No. :	1 0f 2

Customer Name : Health & Envitech Co.,Ltd.
77/11 Moo 2, Ngamwangwan Rd., Soi 5, T.Bangkhen, A.Muang, Nonthaburi 11000

Calibrated Place : Health & Envitech Co.,Ltd.
Weighing Room

Calibrated By : Mr.Nathapol Aeimjangpun
Calibration Date : Tuesday, November 08, 2022

Calibration Procedure No. : This calibration was conducted by
Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 :2019

Metrological data :
Capacity : 60/210 g Readability : 0.01/0.1 mg

Ambients Conditions:

Temperature :	25.8 °C	±	5.0 °C
Humidity :	40.2 % RH	±	10.0 % RH
Pressure	–	±	–

Reasons for calibration
☐ New Installation ☐ Service / Repaired ☑ Re-calibration/ Maintenance

Equipment Condition: ☑ Good Operate ☐ Fair

Measurement Method UKAS Publication Ref :Lab 14

The measurement uncertainty stated is the expended uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came form list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Cetificate No.	Due Date
YCS011-612-00	Sartorius weight set 1mg - 1kg E2,YCS011-612-00	DKSH	C02222038	29-Sep-2024
608H1	Thermo-Hygrometer , Testo 608-H1	SPC-RT	C19210657	14-Dec-2022

This certificate relate and apply this equipment only.
This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.

SOP FM-33 03 February 2022

Mr.Chonchai Inthana (Technical Manager)

STAMP

SARTORIUS (THAILAND) CO., LTD. sartorius ISO/IEC 17025 Cert no. 2300/1025

1.1/6/55

neediss Nozzle Validation

Samplig System Equipment Information

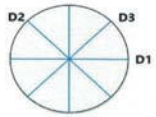
Console Model	XC-572-OV
Console Number	1204012
DGM Model	G1.6
DGM Number	2012-006454

Validation Conditions

Digital Calipers	CD-15APX	
Reference No	A22070181	
Temperatute	24.7	°C±3
Barometric Pressure	756.8	mm Hg

Validation Data					Results	
Nozzle ID	Nozzle Diameter				Different	$(D_1 + D_2 + D_3) / 3$
Sizes		D_1	D_2	D_3	ΔD	Davg
	mm	mm	mm	mm	mm	mm
4	**3.17**	3.16	3.16	3.16	0.000	3.160
6	**4.77**	4.73	4.73	4.74	0.006	4.733
8	**6.35**	6.34	6.35	6.35	0.006	6.347
10	**7.92**	7.91	7.90	7.90	0.006	7.903
12	**9.52**	9.47	9.47	9.47	0.000	9.470
14	**11.09**	11.04	11.04	11.02	0.012	11.033
16	**12.70**	12.70	12.70	12.70	0.000	12.700

Where :
D1, D2, D3 = There difference nozzle diamiters , mm ; diameter must be within 0.025 mm
Δ D = Maximum difference between any two diameters, must be ≤ 0.100 mm
D avg = $(D_1 + D_2 + D_3) / 3$



Validation By: Appproved By: Date: 29 Aug 23

neediss
Neediss Supply Instrument Co.,Ltd.

TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

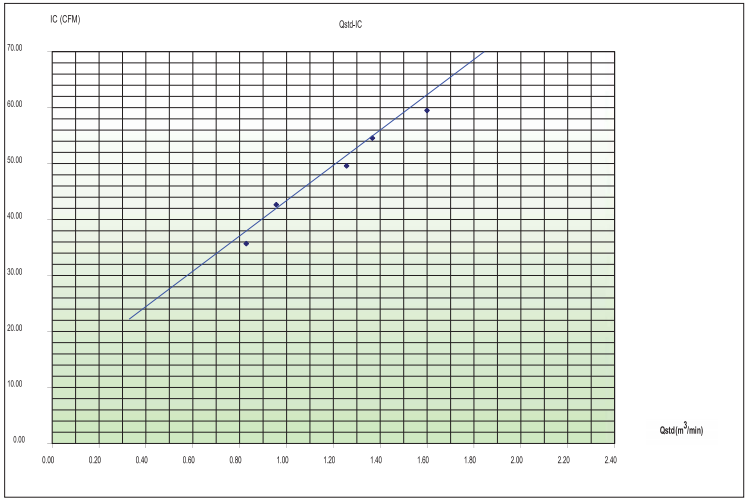
Sampler Location				***Date***	October 25, 2023
Project Site				***Start Time***	1:45 PM
Sampler Number	TSP No.1067	Transfer Standard Type	Orifice	***Stop Time***	2:00 PM
Motor Serial Number	TSP No.1067	Calibrator Model	25A		
Recorder Serial Number	-	Calibrator Serial Number	307N	***Person***	Mr.Patsakron Monthong

Plate No.	(Delta H) Pressure Drop Across Orifice (inH$_2$O) 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) ample Flow Rate Indicato (ft^3/min)	(Y) IC = [(PaPa/P$_{std}$)(T$_{std}$/Ta)]$^{1/2}$	Temperature (°K = ° C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.5	1.4	2.9	1.677116	0.82804	36.0	35.70	303.0	760.0		
7	2.0	1.8	3.8	1.940182	0.95581	43.0	42.64	303.0	760.0		
10	3.4	3.3	6.7	2.58124	1.29846	50.0	49.59	303.0	760.0		
13	4.0	3.9	7.9	2.787143	1.39669	55.0	54.54	303.0	760.0		
18	5.5	5.4	10.9	3.269181	1.59972	60.0	59.50	303.0	760.0		
Linear Regression Y ON X : Y= mX + b							**Average**	303.0	760.0		

1	Slope (m)	2.06353	Linear Equation		r^2	0.9996555	Pstd(mmHg) 760.0
2	Intercept (b)	-0.03151	Set Point Flow Rate (X) (m^3/min)	1.133	r	0.99977775	T_{NTP} 298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)	0	(Pa/Pstd)^(Tstd/Ta)		0.983489835
Result					Ch (Pa/Pstd)^(Tstd/Ta)^0.5		0.991714853

COMMENT

Andersen Instruments, Inc.



Calibrated by:

The end of calibration certificate.

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 8361-6 Fax: +66 2643-8367, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number :	BP210D	Certificate No. :	22BNA0225
Description :	Semi-micro Balance	Issued Date :	Thursday, November 10, 2022
Serial Number :	70406076	Reference No. :	196389
Manufacturer :	Sartorius	Page No. :	2 of 2

Calibration Results : Without Adjustment

Repeatability

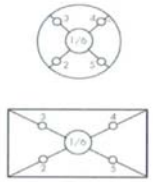
The repeatability is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.

Nominal Value : (Low Load)	19.99998	199.9999
20 g	19.99998	200.0000
Tolerance	19.99999	199.9999
0.0001 g	19.99999	199.9999
	19.99998	200.0000
Nominal Value : (High Load)	19.99996	200.0000
200 g	19.99996	199.9999
Tolerance	19.99998	199.9998
0.0001 g	19.99998	199.9999
	19.99998	199.9998
Standard Deviation	0.00001	0.00007

Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximim capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value : 100 g
Tolerance *0.0004* g



	Difference
1	-
2	-0.0002
3	-0.0002
4	0.0000
5	-0.0001
6	-

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance *0.0002* g

Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.001	0.00100	0.00100	0.00000	0.00018
0.01	0.01000	0.01001	0.00001	0.00018
0.1	0.10000	0.10000	0.00000	0.00018
1	1.00001	1.00001	0.00000	0.00018
2	2.00001	2.00001	0.00000	0.00018
5	4.99999	5.00000	0.00001	0.00018
10	10.00000	10.00001	0.00001	0.00018
50	49.99999	49.99999	0.00000	0.00019
100	99.9999	100.0000	0.0001	0.00020
200	199.9999	199.9999	0.0000	0.00029

SOP FM-33 03 February 2022

TSP10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

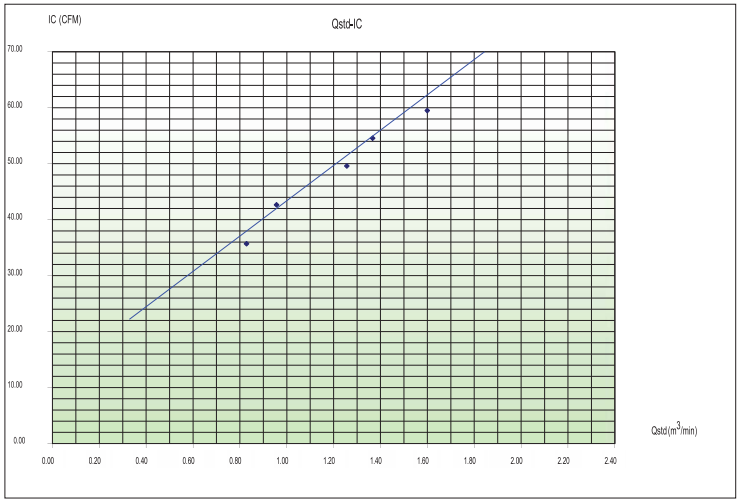
Sampler Location				***Date***	October 25, 2023
Project Site				***Start Time***	10:45 AM
Sampler Number	TSP10 No.1068	Transfer Standard Type	Orifice	***Stop Time***	10:55 AM
Motor Serial Number	TSP10 No.1068	Calibrator Model	25A		
Recorder Serial Number	-	Calibrator Serial Number	307N	***Person***	Mr.Pattsakron Monthong

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) ample Flow Rate Indicatio (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	1.9	1.8	3.7	1.91163	0.94168	32.0	31.27	305.0	760.0		
7	2.8	2.7	5.5	2.32655	1.14273	42.0	41.52	305.0	760.0		
10	4.0	3.9	7.9	2.76945	1.35731	52.0	51.40	305.0	760.0		
13	5.3	5.2	10.5	3.20449	1.56819	58.0	57.33	305.0	760.0		
18	6.4	6.3	12.7	3.52373	1.72304	62.0	61.28	305.0	760.0		
Linear Regression Y ON X : Y= mX + b							**Average**	305.0	760.0		

1	Slope (m)	2.0635	Linear Equation		r^2	0.982631	Pstd(mmHg)	760.0
2	Intercept (b)	-0.03151	Set Point Flow Rate (X) (m^3/min)	1.133	r	0.991277 46	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)	0	(Pa/Pstd)*(Tstd/Ta)		0.977049 18	
Result					C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.988457981	

COMMENT

Andersen Instruments, Inc.



Calibrated by:

The end of calibration certificate.

METTLER TOLEDO

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5846/4 - 846/5 Lasalle Rd., Bangna Tai
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mt.com

NSC-TISI-TIS 17025
CALIBRATION 0062

Accuracy Calibration Certificate

Customer

Company:	EASTERN THAI CONSULTING 1992 CO., LTD.		
Address:	683 Moo 11, Sukhaphiban 8 Rd., Nong Kham		
City:	Sriracha	**Contact:**	Sasiporn Nakin
Zip / Postal:	20230		
State / Province:	Chonburi		
Order Number:	0333319619		

Weighing Device

Manufacturer:	Mettler Toledo	**Instrument Type:**	Weighing Instrument
Model:	XS205DU	**Asset Number:**	LABE 05/1
Serial No.:	1126323724	**Terminal Model:**	SAT
Building:	Laboratory	**Terminal Serial No.:**	1126323724
Floor:	1	**Terminal Asset No.:**	N/A
Room:	Analytical Balance		

Range	Max. Capacity	Readability (d)
1	81 g	0.00001 g
2	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: 25.7 °C	End: 25.8 °C	Start: 50.9 %	End: 50.6 %

As Found Calibration Date:	09-Dec-2024	**Calibrator:**	
As Left Calibration Date:	N/A		
Issue Date:	11-Dec-2024		

Approved Signatory:

Technical Manager / Head of Calibration Center

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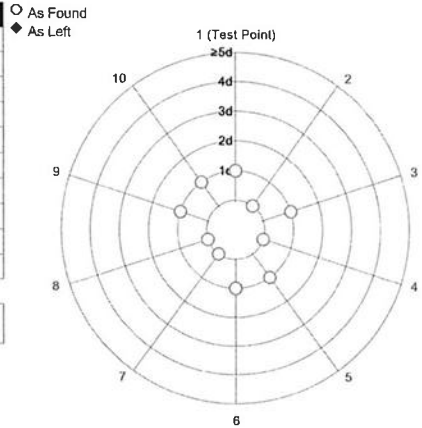
Measurement Results

Repeatability

Test Load: 70 g

	As Found	As Left
1	70.00004 g	N/A
2	70.00005 g	N/A
3	70.00004 g	N/A
4	70.00005 g	N/A
5	70.00006 g	N/A
6	70.00004 g	N/A
7	70.00005 g	N/A
8	70.00005 g	N/A
9	70.00006 g	N/A
10	70.00006 g	N/A
Standard Deviation	**0.000008 g**	**N/A**



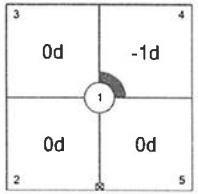
The "d" in the graph represents the readability of the range/interval in which the test was performed.

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	100.0000 g	N/A
3	100.0000 g	N/A
4	99.9999 g	N/A
5	100.0000 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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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

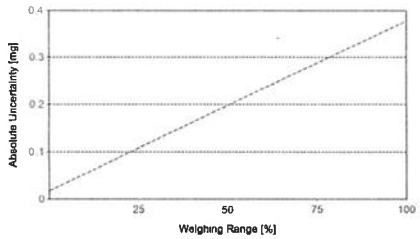
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.00001 g	81 g	U_1 = 0.018 mg + 0.00444 mg/g · R	N/A
2	0.0001 g	220 g	U_2 = 0.06 mg + 0.00439 mg/g · R	N/A

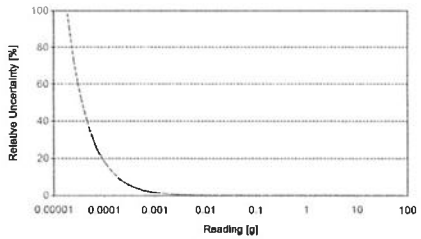
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

Net Indication	As Found		As Left	
0.00220 g	0.018 mg	0.82%	N/A	N/A
0.02200 g	0.018 mg	0.082%	N/A	N/A
0.22000 g	0.019 mg	0.0086%	N/A	N/A
2.20000 g	0.028 mg	0.0013%	N/A	N/A
220.0000 g	1.0 mg	0.00047%	N/A	N/A



As Found



As Left

The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.

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GWP® Certificate

As Found ✓

The weighing device meets the given process requirements.

As Left ✓

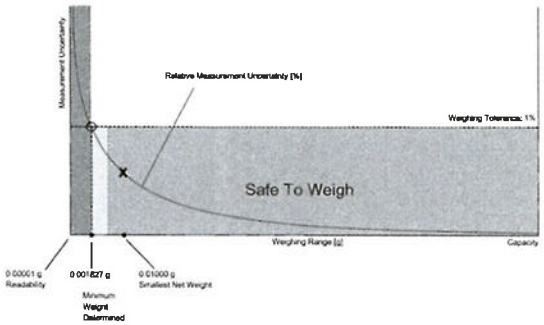
The weighing device meets the given process requirements.

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: **0.01000 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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Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
19.99999 g	0.00002 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
50.00003 g	0.00002 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
100.0000 g	0.0000 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0000 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	0.0000 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%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
19.99999 g	0.00002 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
50.00003 g	0.00002 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
100.0000 g	0.0000 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0000 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	0.0000 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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ANALYTICAL BALANCE (DU)

Model : XS205DU

Serial No. : 1126323724

Certificate No. : 23-148799

Sample Code : 23-56200-001

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : METTLER TOLEDO

Model : XS205DU

Serial No. : 1126323724

ID No. : LABE 05/1

Date of Receipt : 22 December 2023

Date of Calibration : 22 December 2023

Calibrated by Mr. Somwang Sangdee
Scientist

Approved by
Signed for Director

Issue date 25 December 2023

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

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

9.16/62

Certificate No. : 23-148799

Sample Code : 23-56200-001

REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE

Manufacturer : METTLER TOLEDO

Model : XS205DU

Capacity : Max 81 g / 220 g

Resolution : 0.01 mg / 0.1 mg

Serial No. : 1126323724

ID No. : LABE 05/1

Result of Calibration

1.Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity,etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g | Range : 80 | ☑ Before adjustment | ☑ After adjustment

☐ No adjustment
☑ Adjustment

Nominal value	40	80	40	80
Standard weight	40.000054	80.000048	40.000054	80.000048
Average reading of indicator	40.00026	80.00037	40.00017	80.00017
Standard deviation	0.000015	0.000016	0.000008	0.000009

Unit : g | Range : 200 | ☑ Before adjustment | ☑ After adjustment

☐ No adjustment
☑ Adjustment

Nominal value	100	200	100	200
Standard weight	100.000042	200.000041	100.000042	200.000041
Average reading of indicator	100.0003	200.0004	100.0001	200.0001
Standard deviation	0.00005	0.00005	0.00003	0.00005

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ATOMIC ABSORPTION SPECTROPHOTOMETER

Model : Pin AAcle 900F

Serial No. : PFBS22080801

PinAAcle 900F Preventive Maintenance (PM)

Company Name:	Eastern Thai Consulting 1992 Ci.,Ltd.		
Address (Instrument Location):	683 Moo 11 Sukapibal 8 Rd. Nong Kham,Si Racha, Chonburi 20230		
Serial Number:	PFBS22080801	**PM Number:**	2 of 2
Customer Name (if applicable):		**Telephone Number:**	
Customer Support Engineer Name:	Khwanchai	**Service Order Number:**	WO-02963148
Date PM Performed: (DD-MMM-YYYY)	25-Oct-2024	**Next PM Due Date:** (DD-MMM-YYYY)	25-Apr-2025
Standard Labor Hours to Complete PM :		**5 hours**	

Part Number	Release	Publication Date	
09370145 Rev.9	A	January 2018	PerkinElmer®

Scope
The purpose of this PM is to ensure the continued functionality of the PinAAcle 900F 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
FIAS100		

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	**Description**	**Quantity**
B0501696	Fan Filters	NA
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	NA
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	NA
N9301714	Replacement Acetylene Filter Cartridge	NA
TH001022	Replacement Air Filter Cartridge	NA

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	**Description**	**Quality**	**Batch/Lot #**	**Expired Date** (MM/YY)
N9300183	1000 mg/L Copper Standard	AR	27-39CUY1	APR-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

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7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Pass
Drain Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Pass
Nebulizer Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Pass
C_2H_2 Pressure Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Pass
Air Pressure Sensor	Air/C_2H_2 Flame correctly shuts down	Active	Pass
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Pass

8. After PM Performance tests:

8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	1.0531	1.0516	Pass
0.2 A ND Filter	± 5% from Cert.	0.1806	0.1791	Pass

8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0013	Pass

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0001	Pass

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8.4 D_2 Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	-0.0204	Pass

8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0003	Pass

8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0004	Pass

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	NA	NA
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	0.3874	Pass

10. 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.

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BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41

MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
214 Bangwaek Rd. Bangpai Bungkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th

CALIBRATION CERTIFICATE

Certificate No. : L202405022-0013
Date Issued : 08-May-24

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo
Model : -
Serial No. : -
ID No./Tag No. : BM001/41
Date Received : 03-May-24
Date Calibrated : 06-May-24

Calibrated by : Mr. Saruth Srichutikul

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:

(

CERTIFIED MIT

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Certificate No : L202405022-0013

Environment Ambient Temperature : (25 ± 2)°C
Relative Humidity : (50 ± 15)%RH

STD Reading mbar	UUC Reading (mbar) Before Adjusted	UUC Reading (mbar) After Adjusted	UUC Error mbar	Uncertainty ± mbar	MPE ± mbar	Pass / Fail with Guard Band
990.00	990	-	0.00	0.59	10.3	Pass
1000.00	1000	-	0.00	0.59	10.3	Pass
1010.00	1010	-	0.00	0.59	10.3	Pass
1020.00	1020	-	0.00	0.59	10.3	Pass
1030.00	1030	-	0.00	0.59	10.3	Pass

STD = Standard **Pass =** **|error| + |uncertainty| <= |MPE|**
UUC = Unit Under Calibration **Fail =** **|error| + |uncertainty| > |MPE|**
MPE = Maximum Permissible Error

Calibrated condition :

Pressure Medium	Air : Density = 1.19 kg/m³ @ 20°C. 1 bar
Mounting Position	Vertical
Reference Level	at center of its dial
Conversion Factor	Multiply by 1.0 E+02 - Pa unit

Description of UUC :

Range	950 - 1080	mbar Absolute
Calibration Range	990 - 1030	mbar Absolute
Scale Interval	1	mbar

Condition As-Received : Used Item
The measurment results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

iRPC Certificate No. CL1-P230097 for Reference Pressure Monitor Serial No. 1598, Due 09-Nov-24

End of Certificate

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ม.16/67

Hot Air Oven

Model : UM 400

Serial No. : 900982

CERTIFICATE OF CALIBRATION

Certificate No. : 24-001944

Sample Code : 24-00963-001

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)

Manufacturer : Memmert — Model : UM 400

Serial No. : 900982 — ID No. : LABE 17/1

Date of Receipt : 09 January 2024 — Date of Calibration : 09 January 2024

Condition of Calibration

1. Environment
   - 1.1 Ambient temperature : Maximum 30.6 °C ; Minimum 29.2 °C
   - 1.2 Relative humidity : Maximum 57.5 % ; Minimum 46.4 %
   - 1.3 Line voltage supplied : Maximum 229.5 VAC ; Minimum 222.5 VAC
2. Calibration method
   TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.
3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-Pt100)	LB-DA-10 (RTD-257 to RTD-265)	23-066256	29 June 2024

4. This certificate is traceable to the international system of unit (SI Unit).
   The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of calibration item : Normal

Calibrated by M — Approved by

Scientist — Signed for Director

Issue date 09 January 2024

COPY

The uncertainties are for a confidence probability of approximately 95%
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

9.16/69

REPORT OF CALIBRATION

Certificate No. : 24-001944

Sample Code : 24-00963-001

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)									Uncertainty ± (°C)	Coverage factor *k*
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9 Ref		
60	60.0	60.0	60.04	59.90	59.81	59.84	59.47	59.91	60.08	59.98	59.87	0.25	2.00
85	85.0	85.0	86.07	85.75	85.58	85.62	84.69	85.83	86.28	85.94	85.77	0.34	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
60	0.11	0.49	0.80
85	0.09	1.13	1.72

Notes

- UUC* = Unit Under Calibration

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ICP-OES/Avio550

Serial No. : M81S2210101

ICP-OES/Avio550 Preventive Maintenance (PM)

Company Name:	Eastern Thai Consulting 1992 Ci.,Ltd.		
Address (Instrument Location):	683 Moo 11 Sukapibal 8 Rd. Nong Kham,Si Racha, Chonburi 20230		
Serial Number:	M81S2210101	**PM Number:**	2 of 2
Customer Name (if applicable):		**Telephone Number:**	
Service Engineer Name:	Khwanchai	**Service Order Number:**	WO-02963150
Date PM Performed: (DD-MMM-YYYY)	25-Oct-2024	**Next PM Due Date:** (DD-MMM-YYYY)	25-Apr-2025
Standard Labor Hours to Complete PM :		**4 hours**	

Part Number	Release	Publication Date	
TH09370188 Rev.2	B	July 2020	PerkinElmer®

Scope
The purpose of this PM is to ensure the continued functionality of the PerkinElmer / Avio550 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
NA	NA	NA

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	**Description**	**Quantity**
09995098	Air Fiter-Spectrometer	N/A
N077520	Air Fiter-RF Generetor	N/A
09992731	Axial Window	N/A
B0810377	Radial Window	N/A
N0770438	O-ring kit, injector support adapter	N/A
N0780437	O-ring kit, torch	N/A

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	**Description**	**Quality**	**Batch/Lot #**	**Expired Date** (MM/YY)
N0691579	Muti-Element Standard	AR	61-176CRX1	06/2025
N9300221	DL Standard diluted 100 X	AR	59-091CRY1	11/2024
N0582152	Wave Cal Solution	AR	61-023CRX1	02/2025
N9302946	VIS Wavecal Solution	AR	58-145CRT1	04/2025

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☑ Run an Axial & Radial BEC according to the A&T spec.

Test Axial BEC Cd:

Method "BEC-XL" For Samples "IB (2%HNO3)" and "IS (N930-0221/100)", record intensities.

Calculated BEC: BEC = (IB * Conc of Std) / (IS - IB). Where Conc of Std = 500 PPB

Element	Conc.	IB	IS	
Cd 226	500	523.1	223029.5	
IB*Conc	IS-IB	BEC	Spec	Pass/Fail
261550	222506.4	1.18	<150 PPB	Passed

Test Radial BEC Mn:

Method "BEC-RL" For Samples "IB (2%HNO3)" and "IS (N069-1579)", record intensities.

Calculated BEC: BEC = (IB * Conc of Std) / (IS - IB). Where Conc of Std = 1,000 PPB

Element	Conc.	IB	IS	
Mn 257	1,000	586.9	253416.6	
IB*Conc	IS-IB	BEC	Spec	Pass/Fail
586900	252829.7	2.32	<45 PPB	Passed

6. **Review:**
   - ☑ Review with the customer PM work performed.
   - ☑ Discuss recommended customer supplied materials to have on hand.
   - ☑ Attach PM sticker.

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Additional Comments

Additional Comments Regarding the PM
None

Review

The preventive maintenance checks and if applicable performance tests for ICP-OES/Avio550 have been completed. ***This ICP-OES/Avio550 Passes ☑ Fails ☐ the preventive maintenance.***	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:	Date: 25-Oct-2024 (DD-MMM-YYYY)
Authorized Customer Representative:	Date: 25-Oct-2024 (DD-MMM-YYYY)

COPY

MERCURY ANALYZER

Model : RA-4500

Serial No. : 21780504

EASTERN THAI CONSULTING 1992

Automatic Mercury Analyzer

Model : RA-4500

Preventive Maintenance Report

Serial No. : 21780504

Date : 5 February 2024

Due Date : 5 August 2024

PM by : -

( )

Approved by : ___

( )

Coax Group Corporation Ltd.
1131/62,64,325-331 Nakornchaisri road,
Kwang ThanonNakornchaisri, Dusit, Bangkok 10300 Thailand
Tel. 02-2435263, 02-6682436 Fax. 02-2437386

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Inspection result

ITEM		STANDARD	RESULT	JUDGE
1. Self Check	1.1 Heating		PASS	OK
	1.2 Cooling		PASS	OK
	1.3 Leak		PASS	OK
	1.4 Optical system		PASS	OK
	1.5 Drift		PASS	OK
2. Analytical curve inspection(AREA)				
	2.1 No Pretreatment (Low Conc.)	Correlation coefficient	0.9999	OK
		(r) ≥ 0.9990		
3. Repeatability(AREA)				
	3.1 No Pretreatment 50ppb, n=3		1. 49.7680 ppb	
			2. 48.3128 ppb	
			3. 47.1304 ppb	
		C.V ≤ 5 %	2.73%	OK
4. Blank		Below 1.0 (AREA)	0.0192	OK

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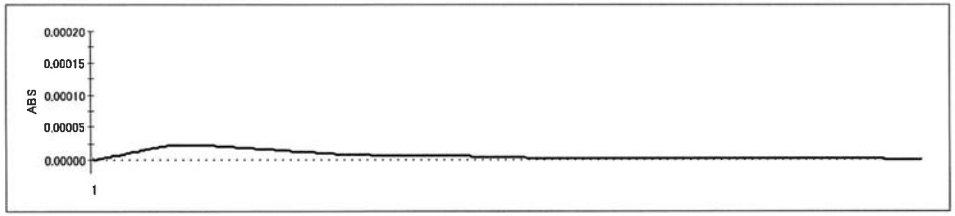
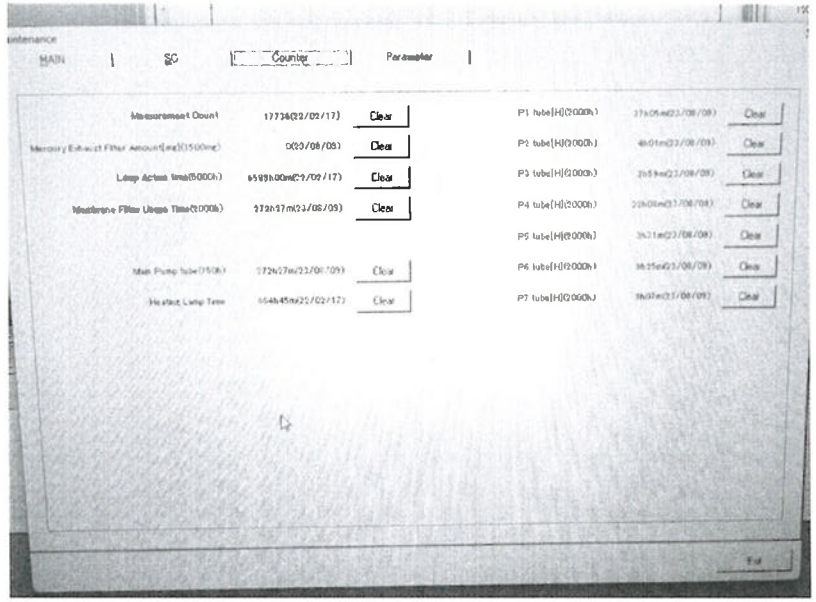
Title : Preventive Maintenance RA-4500 SN:21780504
Date : 5/2/2567
Name : Coax Group Corporation Ltd.
Memo : Blank

SMP

No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Note
1	Blank	5.000	5.000	5.000	0.0080	-0.2612	-0.0522	



GLP of RA-4500 SN:21780504



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NIC NIPPON INSTRUMENTS CORPORATION

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STANDARD WEIGHT 50 g

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 22-052238

Sample Code : 22-19150-003

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Calibration Laboratory)

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by Mr. Somwang Sangdee
Scientist

Approved by (M
Signed for Director

Issue date 31 May 2022

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

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

361 Soi Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
FM-CL-017
TEL 02-516-2422
FAX 02-516-6949
Rev.05
CONTACT@AMARC.CO.TH
WWW.AMARC.CO.TH
Effective Date 15/10/21

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NSC-TISI-TIS17025
CALIBRATION 0152

Certificate No. : 22-052238

Sample Code : 22-19150-003

REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class F1

Serial No. : N/A

ID No. : LABE 10/1

Result of Calibration : ◉ Without adjustment ○ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m^{-3} which it balances in air of a reference density (ρ_0) of 1.2 kg.m^{-3}

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error ± (mg)	ID No.
50 g	-0.324	49.999676 g	0.10	0.30	LABE 10/1

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

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Phlabphla, Wang Thonglang, Bangkok 10310
FM-CL-064
TEL 02-516-2422
FAX 02-516-6949
Rev.03
CONTACT@AMARC.CO.TH
WWW.AMARC.CO.TH
Effective Date 15/10/21

u.16/77

STANDARD WEIGHT 100 g

Certificate No. : 22-052239

Sample Code : 22-19150-004

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Calibration Laboratory)

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by Mr. Somwang Sangdee
Scientist

Approved by (Mr
Signed for Director

Issue date 31 May 2022

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

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

Certificate No. : 22-052239

Sample Code : 22-19150-004

REPORT OF CALIBRATION

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class N/A

Serial No. : N/A

ID No. : LABE 10/2

Result of Calibration : ◉ Without adjustment ○ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m^{-3} which it balances in air of a reference density (ρ_0) of 1.2 kg.m^{-3}

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error ± (mg)	ID No.
100 g	-0.171	99.999829 g	0.16	0.50	LABE 10/2

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

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STANDARD WEIGHT 50 g

Certificate No. : 22-052237

Sample Code : 22-19150-002

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Calibration Laboratory)

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by Mr. Somwang Sangdee Scientist

Approved by (Mr. Signed for Director

Issue date 31 May 2022

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

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

น.16/81

Certificate No. : 22-052237

Sample Code : 22-19150-002

REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class N/A

Serial No. : N/A

ID No. : LABE 10/4

Result of Calibration : ◉ Without adjustment ○ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m^{-3} which it balances in air of a reference density (ρ_0) of 1.2 kg.m^{-3}

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error ± (mg)	ID No.
50 g	-0.111	49.999889 g	0.10	0.30	LABE 10/4

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

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THERMO-HYGROMETER

Model : 608-H1

Serial No. : 45106737

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025 CALIBRATION 0152

CERTIFICATE OF CALIBRATION

Certificate No. : 24-062442

Sample Code : 24-25546-002

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration laboratory)

Equipment : Digital thermo-hygrometer

Manufacturer : testo | Model : 608-H1

Serial No. : 45106737 | ID No. : LABE 09/7

Date of Receipt : 23 May 2024 | Date of Calibration : 27-28 May 2024

Condition of Calibration

1. **Environment**
   1.1 Ambient temperature : 23.0 °C ± 3.0 °C
   1.2 Relative humidity : 55.0 % ± 15.0 %
2. **Calibration method**
   2.1 In-house method: WI-CL-045 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.
   2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in a chamber at the controlled temperature / relative humidity.
3. **Reference standard instrument**

Instrument	Model	ID No.	Certificate No.	Due Date
3.1 Chilled Mirror	Optidew 401	LB-DP-03 & LB-DP-03 (DP)	TH-0064-23	07 August 2024
3.2 Digital Thermometer	Optidew 401	LB-DP-03 & LB-DP-03 (Temp.)	23-103423	03 September 2024
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-89	23-101374	05 September 2024

4. **This certificate is traceable to the international system of unit (SI Unit).**
   4.1 Instrument No. 3.1 through National Institute of Metrology (Thailand).
   4.2 Instrument No. 3.2 and 3.3 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.
5. **This result of calibration was found accurate as shown on date and place of calibration only.**
6. **Condition of calibration item** : Normal

Calibrated by Miss
Scientist

Approved by (Mr.
Signed for Director

Issue date 30 May 2024

COPY

The uncertainties are for a confidence probability of approximately 95%.
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

9.16/83

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025 CALIBRATION 0152

REPORT OF CALIBRATION

Certificate No. : 24-062442

Sample Code : 24-25546-002

Results of Calibration

Temperature measurement

Resolution : 0.1 °C

Range : 0 °C to 50 °C

Calibration point	Average of standard reading		Unit under calibration		Expanded uncertainty
	Controlled humidity	Temperature	Average reading	Correction value	
°C	%RH	°C	°C	°C	°C
20	50	20.00	20.1	- 0.10	± 0.39
25	50	25.00	25.0	0.00	± 0.39
30	50	30.00	29.9	+ 0.10	± 0.39

Humidity measurement

Resolution : 0.1 %RH

Range : 10 %RH to 95 %RH

Calibration point	Average of standard reading		Unit under calibration		Expanded uncertainty
	Air temperature	Calculated humidity	Average reading	Correction value	
%RH	°C	%RH	%RH	%RH	%RH
45	25.02	45.10	48.4	- 3.30	± 1.3
60	25.01	60.07	63.4	- 3.33	± 1.5
75	25.01	75.15	78.5	- 3.35	± 1.7

Notes

- Calibration results without adjustment.

The result expanded uncertainty of measurement *U* is stated as the standard uncertainty of measurement multiplied by the coverage factor *k*, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -

COPY

UV/VIS SPECTROPHOTOMETER

Model : UV-1800

Serial No. : A11635101643 CD

Bara Scientific

Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangrak Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

NSC-TISI-TIS 17025 CALIBRATION 0265

Certificate of Calibration

Certificate No.	BSCC-UV-146/24
Equipment	UV/Vis Spectrophotometer
Model	UV-1800
Manufacturer	Shimadzu
Serial No.	A11635101643 CD
ID No.	LABE 03/2
Date of receipt	22 April 2024
Date of calibration	22 April 2024
Date of issue	29 April 2024
Customer name	Eastern Thai Consulting 1992 Co., Ltd.
Address	683 Moo 11, Sukkhaphibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230
Temperature	(22.9-24.1) °C (On site)
Humidity	(41.7-46.9) %RH (On site)
Equipment condition	Good Operation
Calibration Location	Analysis Department
Calibration Procedure	In-house method WI-UV-702-01 based on ASTM E275-01
Traceability	Wavelength Accuracy is traceable to certificate No. 116614 and 116613 Photometric Accuracy is traceable to certificate No. 116210 and 116224 Stray Light is traceable to certificate No. 116616 The above certificate are traceble to SI unit through Stama Scientific Ltd. (UKAS accredited calibration laboratory NO. 0659)
Calibrated by	Mr.Poomjai Korsawatvorakul

Approved by

Service Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be
except in full, without written approval of the Bara Scientific Co., Ltd.

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Bara Scientific

Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangrak Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

NSC-TISI-TIS 17025 CALIBRATION 0265

Certificate of Calibration

Calibration Results:

1.Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
287.71	287.75	0.04	0.18
445.82	445.89	0.07	0.18
536.52	536.50	-0.02	0.18
741.02	741.01	-0.01	0.18
879.41	879.33	-0.08	0.18

2.Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	0.0000	0.0000	0.0000	0.0075
	0.7415	0.7387	-0.0028	0.0075
257	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
313	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
350	0.0000	0.0000	0.0000	0.0075
	0.6406	0.6395	-0.0011	0.0075

*CNR = Customer not request

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be
except in full, without written approval of the Bara Scientific Co., Ltd.

COPY

ที่ อก ๐๓๒๒/ ๑๗๕๑๕

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๘ ธ.ค. ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เซ้าเทิร์นไทยคอนซัลติ้ง จำกัด

อ้างถึง คำขอต่ออายุของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๐ พฤศจิกายน ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน บริษัท เซ้าเทิร์นไทยคอนซัลติ้ง จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เซ้าเทิร์นไทยคอนซัลติ้ง จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๗๖ สถานที่ตั้ง เลขที่ ๕๙/๔๕ หมู่ที่ ๕ ตำบลศรีสุนทร อำเภอถลาง จังหวัดภูเก็ต ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เซ้าเทิร์นไทยคอนซัลติ้ง จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

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ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

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ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย ตามสิ่งที่ส่งมาด้วย

COPY

หนังสือ....

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑ ธันวาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคใต้
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

COPY

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคใต้
โทร. ๐ ๗๔๓๒ ๕๐๒๙, ๐ ๗๔๘๙ ๐๖๓๔ ต่อ ๕๒๐๑
ไปรษณีย์อิเล็กทรอนิกส์ sirw@diw.mail.go.th

ที่ อก ๐๓๒๐/๑๑๓๔๒

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๗ กรกฎาคม ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด

อ้างถึง คำขอต่ออายุของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๗ มิถุนายน ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๙๒ รายการ จำนวน ๑๙ แผ่น

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๐๓ สถานที่ตั้งเลขที่ ๖๘๓ หมู่ที่ ๑๑ ถนนสุขาภิบาล ๘ ตำบลหนองขาม อำเภอศรีราชา จังหวัดชลบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๔๗ รายการ อากาศเสีย (ปล่องระบาย) จำนวน ๒๑ รายการ น้ำใต้ดิน จำนวน ๑๑๑ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๑๘ รายการ และดิน จำนวน ๙๕ รายการ รวมทั้งสิ้นจำนวน ๒๙๒ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๕ กรกฎาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th

COPY

ขอบข่ายสารมลพิษที่ได้รับการขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๙ รายการ

น้ำเสีย จำนวน 9 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	5-Day BOD Test, Azide Modification Method
2	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method
3	Oil & Grease	Liquid-Liquid, Partition-Gravimetric Method
4	pH	Electrometric Method
5	Sulfide	Iodometric Method
6	Temperature	Laboratory and Field Method
7	Total Dissolved Solids	Dried at 180 °C
8	Total Kjeldahl Nitrogen	Macro-Kjeldahl, Titrimetric Method
9	Total Suspended Solids	Dried at 103-105 °C

เอกสารอ้างอิง

APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24th ed. Washington, DC: APHA, 2023.

COPY

นักวิทยาศาสตร์ชำนาญการ

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ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย

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เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด เลขทะเบียน ว-๐๐๓
ที่ อก ๐๓๒๐/๑๑๓๔๒ ลงวันที่ ๒๗ กรกฎาคม ๒๕๖๖

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย

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๓๖/ นางสาวพรพินัน...

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด เลขทะเบียน ว-๐๐๓
ที่ อก ๐๓๒๐/๑๑๓๔๒ ลงวันที่ ๒๗ กรกฎาคม ๒๕๖๖

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๙๒ รายการ

น้ำเสีย จำนวน 47 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
2	Arsenic	1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
3	Barium	Digestion, Inductively Coupled Plasma Method[4]
4	α-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
5	β-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
6	δ-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
7	γ-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method[4] 2) 5-Day BOD Test, Azide Modification Method[4]
9	Cadmium	Digestion, Inductively Coupled Plasma Method[4]
10	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method[4]
11	cis-Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
12	trans-Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
13	Chromium	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]

COPY

14 Color...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Color	ADMI Weighted-Ordinate Spectrophotometric Method[4]
15	Copper	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
16	Cyanide	Distillation, Colorimetric Method[4]
17	4,4′-DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
18	4,4′-DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
19	DDT	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
20	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
21	Endosulfan I	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
22	Endosulfan II	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
23	Endosulfan sulfate	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
24	Endrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
25	Endrin aldehyde	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
26	Endrin ketone	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
27	Formaldehyde	Distillation, Colorimetric Method[3]
28	Free Chlorine	1) Iodometric Method[4] 2) Colorimetric Method[4]

COPY

29 Heptachlor...

น.16/89

อากาศเสีย (ปล่องระบาย) จำนวน 21 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
2	Arsenic	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
3	Cadmium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
4	Carbon Monoxide	1) Bag, Non-Dispersive Infrared Method[5] 2) Instrumental Analyzer Method[5]
5	Chromium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
6	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
7	Copper	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
8	Hydrogen Sulfide	Absorption Sampling, Iodometric Method[5]
9	Lead	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
10	Manganese	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
11	Mercury	Isokinetic Sampling, Digestion, Cold–Vapor Atomic Absorption Spectrometric Method[5]
12	Nickel	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
13	Opacity	Ringelmann's Method[1,5]
14	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method[8] 2) Instrumental Analyzer Method[7]
15	Selenium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
16	Sulfur Dioxide	1) Absorption Sampling , Barium-Thorin Titrimetric Method[5] 2) Instrumental Analyzer Method[5]
17	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method[6]
18	Tin	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]

COPY

19 Total Suspended Particulate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
29	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
30	Heptachlor Epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
31	Hexavalent Chromium	Filtration, Colorimetric Method[4]
32	Lead	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
33	Manganese	Digestion, Inductively Coupled Plasma Method[4]
34	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4]
35	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[4]
36	Nickel	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
37	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method[4]
38	pH	Electrometric Method[4]
39	Phenols	Distillation, Direct Photometric Method[4]
40	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4]
41	Sulfide	ZnS Precipitation, Iodometric Method[4]
42	Temperature	Field Method[4]
43	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation[4] 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[4]
44	Total Dissolved Solids	Dried at 180 °C [4]
45	Total Kjeldahl Nitrogen	Macro Kjeldahl Method[4]
46	Total Suspended Solids	Dried at 103-105 °C [4]
47	Zinc	Digestion, Inductively Coupled Plasma Method[4]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method[6]
20	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5]
21	Xylene	Adsorption Sampling, Gas Chromatographic Method[6]

น้ำใต้ดิน จำนวน 111 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
5	Antimony	Digestion, Inductively Coupled Plasma Method[4]
6	Arsenic	1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
7	Barium	Digestion, Inductively Coupled Plasma Method[4]
8	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
9	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
10	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
11	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
12	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
13	Benzo[g,h,i]perylene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
14	Beryllium	Digestion, Inductively Coupled Plasma Method[4]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
16	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
17	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
18	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
19	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
20	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
21	Cadmium	Digestion, Inductively Coupled Plasma Method[4]
22	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
23	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
24	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
25	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
26	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
27	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
28	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
29	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
30	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
31	Chromium	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
32	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation[4] 2) Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation[4]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
33	Chromium (VI)	Filtration, Colorimetric Method[4]
34	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
35	Cyanide	Distillation, Colorimetric Method[4]
36	DDD	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
37	DDE	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
38	DDT	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
39	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
40	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
41	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
42	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
43	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
44	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
45	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
46	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
47	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
48	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
49	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
50	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
51	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]

COPY

52 Dieldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
52	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
53	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
54	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
55	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
56	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
57	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
58	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
59	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
60	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
61	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
62	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
63	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
64	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
65	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
66	Hexachloro-1,3-butadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
67	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
68	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
69	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]

COPY

70 γ-HCH...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
89	Phenol	1) Distillation, Direct Photometric Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
90	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
91	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4]
92	Silver	Digestion, Inductively Coupled Plasma Method[4]
93	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
94	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
95	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
96	1.2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
97	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
98	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
99	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
100	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
101	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
102	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
103	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
104	Vanadium	Digestion, Inductively Coupled Plasma Method[4]
105	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
106	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]

COPY

107 m-Xylene ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
70	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
71	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
72	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
73	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
74	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
75	Lead	1) Digestion, Direct Air-Acetylene Flame Method[4] 2) Digestion, Inductively Coupled Plasma Method[4]
76	Manganese	Digestion, Inductively Coupled Plasma Method[4]
77	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4]
78	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
79	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
80	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
81	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
82	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
83	Naphthalene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
84	Nickel	Digestion, Inductively Coupled Plasma Method[4]
85	Nitrobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
86	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
87	pH	Electrometric Method[4]
88	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]

COPY

89 Phenol...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
107	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
108	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
109	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
110	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
111	Zinc	Digestion, Inductively Coupled Plasma Method[4]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 18 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Digestion, Inductively Coupled Plasma Method[9,10]
2	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
3	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
4	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
5	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
6	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
7	Chromium (VI)	1) Waste Extraction, Digestion, Colorimetric Method[2,13] 2) Alkaline Digestion, Colorimetric Method[9,13]
8	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
9	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]

COPY

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
11	Mercury	1) Waste Extraction, Digestion, Cold Vapor Atomic Absorption Spectrometric Method[2,11] 2) Digestion, Cold vapor Atomic Absorption Spectrometric Method[9,11]
12	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
13	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
14	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
15	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
16	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
17	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]
18	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[2,9,10] 2) Digestion, Inductively Coupled Plasma Method[9,10]

COPY

ดิน จำนวน 95 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
3	Anthracene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
4	Antimony	Digestion, Inductively Coupled Plasma Method[9,10]
5	Arsenic	Digestion, Inductively Coupled Plasma Method[9,10]
6	Barium	Digestion, Inductively Coupled Plasma Method[9,10]
7	Benz(a)anthracene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
8	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
9	Benzo(b)fluoranthene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
10	Benzo(k)fluoranthene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
11	Benzo(a)pyrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
12	Benzo[g,h,i]perylene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
13	Beryllium	Digestion, Inductively Coupled Plasma Method[9,10]
14	Bis(2-chloroethyl)ether	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
15	Bis(2-ethylhexyl)phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
16	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
17	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
18	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]

COPY

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Butyl benzyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
20	Cadmium	Digestion, Inductively Coupled Plasma Method[9,10]
21	Carbazole	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
22	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
23	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
24	p-Chloroaniline	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
25	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
26	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
27	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
28	2-Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
29	Chromium	Digestion, Inductively Coupled Plasma Method[9,10]
30	Chromium (III)	Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation[9,10]
31	Chromium (VI)	Alkaline Digestion, Colorimetric Method[12,13]
32	Chrysene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
33	Dibenz(a,h)anthracene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
34	Di-n-butyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
35	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
36	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
37	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
56	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
57	Hexachlorocyclopentadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
58	Hexachloroethane	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
59	Indeno(1,2,3-cd)pyrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
60	Isophorone	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
61	Lead	Digestion, Inductively Coupled Plasma Method[9,10]
62	Manganese	Digestion, Inductively Coupled Plasma Method[9,10]
63	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[9,11]
64	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
65	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
66	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
67	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
68	Naphthalene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
69	Nickel	Digestion, Inductively Coupled Plasma Method[9,10]
70	Nitrobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
71	N-Nitrosodi-n-propylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
72	Phenanthrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
73	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
74	Pyrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]

COPY

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
38	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
39	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
40	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
41	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
42	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
43	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
44	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
45	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
46	Diethyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
47	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
48	2,4-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
49	2,6-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
50	Di-n-octyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
51	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
52	Fluoranthene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
53	Fluorene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
54	Hexachlorobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
55	Hexachloro-1,3-butadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
94	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
95	Zinc	Digestion, Inductively Coupled Plasma Method[9,10]

เอกสารอ้างอิง

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

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COPY

13 United...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
75	Selenium	Digestion, Inductively Coupled Plasma Method[9,10]
76	Silver	Digestion, Inductively Coupled Plasma Method[9,10]
77	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
78	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
79	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
80	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
81	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
82	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
83	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
84	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
85	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
86	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[15,17]
87	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
88	Vanadium	Digestion, Inductively Coupled Plasma Method[9,10]
89	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
90	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
91	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
92	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]
93	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[14,16]

COPY

94 Xylene (Total)...

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ที่ อก ๐๓๒๐/ ๔๖๐๔

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๔ พฤษภาคม ๒๕๖๗

เรื่อง เปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ เปลี่ยนแปลงสารมลพิษในดิน และเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๔ มีนาคม ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ และเปลี่ยนแปลงสารมลพิษบริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด จำนวน ๑๒ แผ่น

ตามคำขอฯ ที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๐๓ สถานที่ตั้งเลขที่ ๖๘๓ หมู่ที่ ๑๑ ถนนสุขาภิบาล ๘ ตำบลหนองขาม อำเภอศรีราชา จังหวัดชลบุรี แจ้งขอเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษในน้ำเสีย น้ำใต้ดิน เปลี่ยนแปลงสารมลพิษในดิน และเปลี่ยนแปลงบุคลากร นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ ราย

๒. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓ ราย

๑)

๒)

๓)

๓. ให้ยกเลิกขอบข่ายรายการสารมลพิษในน้ำเสีย และน้ำใต้ดินตามรายการเอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนที่ อก ๐๓๒๐/๑๑๓๔๒ ลงวันที่ ๒๗ กรกฎาคม ๒๕๖๖

๔. ให้วิเคราะห์สารมลพิษตามขอบข่ายที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๔๗ รายการ และน้ำใต้ดิน จำนวน ๑๑๑ รายการ รวมทั้งสิ้นจำนวน ๑๕๘ รายการ ตามเอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ เปลี่ยนแปลงสารมลพิษในดิน และเปลี่ยนแปลงบุคลากร ดังสิ่งที่ส่งมาด้วย

๕. ให้วิเคราะห์สารมลพิษตามขอบข่ายที่ได้รับขึ้นทะเบียนให้วิเคราะห์เพิ่มเติมในดิน จำนวน ๑๒ รายการ ตามเอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษเปลี่ยนแปลงสารมลพิษในดิน และเปลี่ยนแปลงบุคลากร ดังสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือ ....

COPY

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เอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ
บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด เลขทะเบียน ว-๐๐๓
ที่ อก ๐๓๒๐/ ลงวันที่

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๗๐ รายการ

น้ำเสีย จำนวน 47 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
2	Arsenic	1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method[1] 2) Digestion, Inductively Coupled Plasma Method[1]
3	Barium	Digestion, Inductively Coupled Plasma Method[1]
4	α-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
5	β-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
6	δ-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
7	γ-BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method[1] 2) 5-Day BOD Test, Azide Modification Method[1]
9	Cadmium	Digestion, Inductively Coupled Plasma Method[1]
10	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method[1]
11	cis-Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]

COPY

12 trans-Chlordane ...

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนในวันที่ ๕ กรกฎาคม ๒๕๖๙

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๓๑๓ ๖๐๕๙ ต่อ ๕๐๐๑-๒
ไปรษณีย์อิเล็กทรอนิกส์ eirw@diw.mail.go.th

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	trans-Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
13	Chromium	1) Digestion, Direct Air-Acetylene Flame Method[1] 2) Digestion, Inductively Coupled Plasma Method[1]
14	Color	ADMI Weighted-Ordinate Spectrophotometric Method[1]
15	Copper	1) Digestion, Direct Air-Acetylene Flame Method[1] 2) Digestion, Inductively Coupled Plasma Method[1]
16	Cyanide	Distillation, Colorimetric Method[1]
17	4,4′-DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
18	4,4′-DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
19	DDT	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
20	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
21	Endosulfan I	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
22	Endosulfan II	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
23	Endosulfan sulfate	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
24	Endrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]

COPY

25 Endrin aldehyde ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
25	Endrin aldehyde	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
26	Endrin ketone	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
27	Formaldehyde	Distillation, Colorimetric Method[4]
28	Free Chlorine	1) Iodometric Method[1] 2) Colorimetric Method[1]
29	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
30	Heptachlor Epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method[1] 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
31	Hexavalent Chromium	Filtration, Colorimetric Method[1]
32	Lead	1) Digestion, Direct Air-Acetylene Flame Method[1] 2) Digestion, Inductively Coupled Plasma Method[1]
33	Manganese	Digestion, Inductively Coupled Plasma Method[1]
34	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[1]
35	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method[1]
36	Nickel	1) Digestion, Direct Air-Acetylene Flame Method[1] 2) Digestion, Inductively Coupled Plasma Method[1]
37	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method[1]
38	pH	Electrometric Method[1]
39	Phenols	Distillation, Direct Photometric Method[1]
40	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[1]

COPY

41 Sulfide ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
41	Sulfide	ZnS Precipitation, Iodometric Method[1]
42	Temperature	Field Method[1]
43	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation[1] 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[1]
44	Total Dissolved Solids	Dried at 180 °C [1]
45	Total Kjeldahl Nitrogen	Macro Kjeldahl Method[1]
46	Total Suspended Solids	Dried at 103-105 °C [1]
47	Zinc	Digestion, Inductively Coupled Plasma Method[1]

น้ำใต้ดิน จำนวน 111 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
5	Antimony	Digestion, Inductively Coupled Plasma Method[1]
6	Arsenic	1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method[1] 2) Digestion, Inductively Coupled Plasma Method[1]
7	Barium	Digestion, Inductively Coupled Plasma Method[1]
8	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]

COPY

9 Benzene ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
10	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
11	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
12	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
13	Benzo[g,h,i]perylene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
14	Beryllium	Digestion, Inductively Coupled Plasma Method[1]
15	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
16	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
17	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
18	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
19	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
20	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
21	Cadmium	Digestion, Inductively Coupled Plasma Method[1]
22	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
23	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
24	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]

COPY

25 Chlordane ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
25	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
26	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
27	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
28	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
29	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
30	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
31	Chromium	1) Digestion, Direct Air-Acetylene Flame Method[1] 2) Digestion, Inductively Coupled Plasma Method[1]
32	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation[1] 2) Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation[1]
33	Chromium (VI)	Filtration, Colorimetric Method[1]
34	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
35	Cyanide	Distillation, Colorimetric Method[1]
36	DDD	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
37	DDE	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
38	DDT	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
39	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]

COPY

40 Di-n-butyl phthalate ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
41	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
42	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
43	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
44	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
45	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
46	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
47	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
48	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
49	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
50	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
51	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
52	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
53	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
54	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]

COPY

55 2,4-Dinitrotoluene ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
55	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
56	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
57	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
58	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
59	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
60	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
61	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
62	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
63	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
64	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
65	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
66	Hexachloro-1,3-butadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
67	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
68	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
69	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]

COPY

70 γ-HCH ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
70	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
71	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
72	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
73	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
74	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
75	Lead	1) Digestion, Direct Air-Acetylene Flame Method[1] 2) Digestion, Inductively Coupled Plasma Method[1]
76	Manganese	Digestion, Inductively Coupled Plasma Method[1]
77	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[1]
78	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
79	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
80	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
81	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
82	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
83	Naphthalene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]
84	Nickel	Digestion, Inductively Coupled Plasma Method[1]
85	Nitrobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[1]

COPY

86 N-Nitrosodi-n-propylamine ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
102	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
103	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
104	Vanadium	Digestion, Inductively Coupled Plasma Method[4]
105	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
106	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
107	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
108	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
109	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
110	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
111	Zinc	Digestion, Inductively Coupled Plasma Method[4]

<u>ดิน จำนวน 12 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	α-HCH	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
2	β-HCH	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
3	γ-HCH	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
4	Heptachlor	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]

COPY

5 Aldrin ...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
86	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1]
87	pH	Electrometric Method[4]
88	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
89	Phenol	1) Distillation, Direct Photometric Method[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
90	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]
91	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4]
92	Silver	Digestion, Inductively Coupled Plasma Method[4]
93	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
94	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
95	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
96	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
97	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
98	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
99	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
100	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[4]
101	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[4]

COPY

102 2,4,6-Trichlorophenol ...

ANALYTICAL BALANCE (DU)

Model : XS205DU

Serial No. : 1126323724

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Aldrin	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
6	Heptachlor epoxide	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
7	Chlordane	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
8	Dieldrin	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
9	Endrin	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
10	DDD	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
11	DDT	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]
12	Methoxychlor	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[2,3]

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