

เอกสารแบบ 13
เอกสารอนุญาตห้องปฏิบัติการ

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด
ที่ อก ๐๓๑๐(๑)/ ๒ ๖ ๔ ๓
ลงวันที่ ๓ ๑ มกราคม ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๔ รายการ
น้ำเสีย จำนวน 4 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	5-Day BOD Test, Membrane Electrode Method
2	pH	Electrometric Method
3	Total Dissolved Solids	Dried at 180 °C
4	Total Suspended Solids	Dried at 103-105 °C

เอกสารอ้างอิง
APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater.
23rd ed. Washington, DC: APHA, 2017.



ที่ อก ๐๓๑๐(๑)/ ๒ ๖ ๔ ๓
กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๐๐

๓ ๑ มกราคม ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
เรียน กรรมการผู้จัดการ บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขีดความสามารถของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๘ ธันวาคม ๒๕๖๕
สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๐๑ สถานที่ตั้งเลขที่ ๕/๔๕ หมู่บ้าน บ้านกลางกรุง บิซทาวน์
ซอยศรีนครินทร์ ๔๖/๑ (ปราโมทย์) แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร ดอกรมโรงงานอุตสาหกรรม นั้น
กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด ต่ออายุหนังสือรับขึ้น
ทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยไม่ต้องประกอบดังนี้
ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

ค. ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนไว้วิเคราะห์น้ำเสีย ตามสิ่งที่ส่งมาด้วย
หนังสือฉบับนี้จะหมดอายุในวันที่ ๓ มกราคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดของหนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ผ่านเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code
ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ
ขอแสดงความนับถือ

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๐๓๕-
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๐๓๕
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ผู้บริหารการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ที่คำขอผ่านระบบอิเล็กทรอนิกส์



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



ที่ อก ๐๓๑๐(๑)/ ๖ ๐ ๙ ๒

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒.๒ กรกฎาคม ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์
เรียน กรรมการผู้จัดการ บริษัท ดรรจด์สิ่งแวดล้อม จำกัด
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๕ กรกฎาคม ๒๕๖๕

ตามคำขอที่อ้างถึง บริษัท ดรรจด์สิ่งแวดล้อม จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๐๑ สถานที่ตั้งเลขที่ ๔/๔๕ หมู่บ้าน บ้านกลางกรุง บิซทาวน์ ซอยศรีนครินทร์ ๔๖/๑(ปราโมทย์) แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแล้วแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย

๒. ให้เพิ่มผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๒ ราย

๓. ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑ ราย

อนึ่ง หนังสือฉบับนี้จะสิ้นอายุพร้อมหนังสือต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๓ มกราคม ๒๕๖๙

จึงเรียนมาเพื่อทราบ

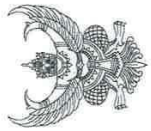
ขอแสดงความนับถือ

ผู้อำนวยการวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติการทางเหนือจิตสำนึกโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



Green Industry
“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



ที่ อก ๐๓๑๐(๑)/๑๐๔๘ ๖

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๗ ตุลาคม ๒๕๖๗

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์
เรียน กรรมการผู้จัดการ บริษัท ดรรจด์สิ่งแวดล้อม จำกัด
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑ ตุลาคม ๒๕๖๗

ตามคำขอที่อ้างถึง บริษัท ดรรจด์สิ่งแวดล้อม จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๓๐๑ สถานที่ตั้งเลขที่ ๔/๔๕ หมู่บ้าน บ้านกลางกรุง บิซทาวน์ ซอยศรีนครินทร์ ๔๖/๑(ปราโมทย์) แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแล้วแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๑ ราย ได้แก่

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



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“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เลขที่ 43/2569

หนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

กรมโรงงานอุตสาหกรรม ออกหนังสือฉบับนี้เพื่อ ต่ออายุ ให้
บริษัท ตรวจวดสิ่งแวดล่อม จำกัด

ห้องปฏิบัติการวิเคราะห์เอกชนเลขทะเบียน ว-301

สถานที่ตั้งห้องปฏิบัติการ
เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง ปิษทาวน์ ซอยศรีนครินทร์ 46/1 (ปราโมทย์)
แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร

โดยมีรายละเอียดผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน
และขอขอบข่ายชนิดสารมลพิษ ดังเอกสารแนบ

ออกให้ ณ วันที่ 10 กุมภาพันธ์ 2569

หมดอายุวันที่ 3 มกราคม 2573

ทดสอบระบบ

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนฉบับนี้อาจถูกเพิกถอนได้ตามเงื่อนไขของข้อ 22
หมวด 6 แห่งประกาศกรมโรงงานอุตสาหกรรม เรื่อง ห้องปฏิบัติการวิเคราะห์เอกชน พ.ศ. 2566



5362699



ที่ อก ๐๓๑๐(๑)/ ๖๗ ๓ ๓

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๕ สิงหาคม ๒๕๖๘

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์
เรียน กรรมการผู้จัดการ บริษัท ตรวจวดสิ่งแวดล่อม จำกัด
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑ สิงหาคม ๒๕๖๘

ตามคำขอที่อ้างถึง บริษัท ตรวจวดสิ่งแวดล่อม จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-๓๐๑ สถานที่ตั้งเลขที่ ๕/๔๕ หมู่บ้าน บ้านกลางกรุง ปิษทาวน์ ซอยศรีนครินทร์ ๔๖/๑(ปราโมทย์)
แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์
จำนวน ๑ ราย ได้แก่

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



Lab regis-2

บุคลากรประจำห้องปฏิบัติการ

เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์เอกชน

ชื่อห้องปฏิบัติการ

บริษัท ดรจวัดสิ่งแวดล้อม จำกัด

เลขทะเบียน

ว-301

สถานที่ตั้งห้องปฏิบัติการ

เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง บิขทาวน์ ซอยศรีนครินทร์ 46/1 (ปราโมทย์) แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร

วันที่ออกหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ

10 กุมภาพันธ์ 2569

วันที่หมดอายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ

3 มกราคม 2573

รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์เอกชน ณ วันที่ออกใบรับรอง

ชื่อ-สกุล	ทะเบียนเลขที่

MM-W09

น.13/4

ใช้ประกอบหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขที่ 43/2569

กรมโรงงานอุตสาหกรรม

รับรองข้อมูล ณ วันที่ 10 กุมภาพันธ์ 2569

1/1



Lab regis-1

บุคลากรประจำห้องปฏิบัติการ

ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน

ชื่อห้องปฏิบัติการ

บริษัท ดรจวัดสิ่งแวดล้อม จำกัด

เลขทะเบียน

ว-301

สถานที่ตั้งห้องปฏิบัติการ

เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง บิขทาวน์ ซอยศรีนครินทร์ 46/1 (ปราโมทย์) แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร

วันที่ออกหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ

10 กุมภาพันธ์ 2569

วันที่หมดอายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ

3 มกราคม 2573

รายชื่อผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน ณ วันที่ออกใบรับรอง

ชื่อ-สกุล	ทะเบียนเลขที่
1.	
2.	

น.13/4

น.13/4

ใช้ประกอบหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขที่ 43/2569

กรมโรงงานอุตสาหกรรม

รับรองข้อมูล ณ วันที่ 10 กุมภาพันธ์ 2569

1/1



หนังสือบันทึกการเปลี่ยนแปลง

ชื่อห้องปฏิบัติการ บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด
เลขทะเบียน ๖-301
สถานที่ตั้งห้องปฏิบัติการ เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง บึงทวารน ขอยศรีนครินทร์ 46/1 (ปราโมทย์)
แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร
วันที่ออกหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ 10 กุมภาพันธ์ 2569
วันที่หมดอายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ 3 มกราคม 2573

ลำดับ ที่	สาระสำคัญของการเปลี่ยนแปลง	ผู้บันทึก
1	ขอต่ออายุทะเบียน	

ใช้ประกอบหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกสาร เลขที่ 43/2569
กรมโรงงานอุตสาหกรรม
รับรองข้อมูล ณ วันที่ 10 กุมภาพันธ์ 2569



30620000

ขอช่วยและขณิสารมลพิษที่ได้รับการขึ้นทะเบียน

ชื่อห้องปฏิบัติการ บริษัท ตรวจวัดสิ่งแวดล้อม จำกัด
เลขทะเบียน ๖-301
สถานที่ตั้งห้องปฏิบัติการ เลขที่ 5/45 หมู่บ้านบ้านกลางกรุง บึงทวารน ขอยศรีนครินทร์ 46/1 (ปราโมทย์)
แขวงหนองบอน เขตประเวศ กรุงเทพมหานคร
วันที่ออกหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ 10 กุมภาพันธ์ 2569
วันที่หมดอายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการ 3 มกราคม 2573

ขอช่วย	สารมลพิษ	วิธีวิเคราะห์
น้ำ/น้ำเสีย 5 รายการ	1. Biochemical Oxygen Demand 2. Oil and Grease 3. pH 4. Total Dissolved Solids 5. Total Suspended Solids	5-Day BOD Test, Membrane-Electrode Method Liquid-Liquid, Partition-Gravimetric Method Electrometric Method Dried at 180 °C Dried at 103-105 °C

เอกสารอ้างอิง

1. APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 23rd ed. Washington, DC: APHA, 2017.



ใช้ประกอบหนังสือรับรองการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกสาร เลขที่ 43/2569
กรมโรงงานอุตสาหกรรม
รับรองข้อมูล ณ วันที่ 10 กุมภาพันธ์ 2569

List Certificate of Instrument for Environmental Quality Analysis.

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำและดิน									
1	UV-VIS Spectrophotometer	Color (ADMI), Fluoride	Agilent Technologies	Cary60 G6860A / MY15410009	DQE Services Co.,Ltd.	SP25 019	26 May 25	25 May 26	-
2	UV-VIS Spectrophotometer	Sulfate, Phosphorus Nitrogen-Ammonia Nitrogen-Nitrate							
3	COD Reactor (Heating Block)	Chemical Oxygen Demand (COD)	Hanna	HI839800-02 / H0185001	Hanna Instruments (Thailand) Ltd.	HIT-2510-0375	7 Mar 25	6 Mar 26	-
4	Cyanuric Acid Portable Photometer	Cyanuric acid	Hanna	HI97722C / 905060058111	Hanna Instruments (Thailand) Ltd.	HIT-2513-0437	24 Mar 25	23 Mar 26	-
5	Atomic Absorption Spectrophotometer (AAS)	Arsenic, Cadmium ,Chromium Copper, Iron, Manganese Zinc, Potaasium	Agilent Technologies	System ID:G8432A AA240FS / MY13160001	Thailand Institute of Scientific and Technological Research (TISTR)	MTCACL.No.372/68	3 Feb 25	2 Feb 26	-
6	Atomic Absorption Spectrophotometer (AAS)	Calcium, Lead, Mercury							
7	Inductively Coupled Plasma (ICP)		Agilent Technologies	System ID:G8015A G8015AA / MY18030001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	3 Nov 25	2 Nov 26	-
8	Cold Vapor Atomic Absorption Spectrophotometer (CVAAS)	Mercury(ดิน)	MILESTONE	DMA-80 / 24114043	Sithiporn Associates Co.,Ltd.	Service Protocol Report	31 Jan 25	30 Jan 26	-
9	Digestor Unit	Total Kjeldahl Nitrogen	FOSS TECATOR	DT2520 / 9190506	National Food Institute, Ministry of Industry, Thailand	2501440-001-01	27 Jan 25	26 Jan 26	-
10	Distillation Unit (Kjeldahl Method)		FOSS TECATOR	KT9 / 91905393	FOSS South East Asia	13851	25 Feb 25	24 Feb 26	-

เอกสารไม่ควบคุม

List Certificate of Instrument for Environmental Quality Analysis.

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำและดิน									
11	Incubator	Total Bacteria Total Coliform Bacteria	Memmert	IPP 260 / V615.0187	National Food Institute, Ministry of Industry, Thailand	2502229-001-01	19 Mar 25	18 Mar 26	-
12	Incubator	Fecal Coliform Bacteria Escherichia coli							
13	Water Bath	Pseudomonas Aeruginosa Staphylococcus Aureus	Memmert	WNE 14 / L416.0606	National Food Institute, Ministry of Industry, Thailand	2501624-001-01	10 Feb 25	9 Feb 26	-
14	Water Bath								
15	Auto Clave		ALP	CL-40L / 808763	National Food Institute, Ministry of Industry, Thailand	2502229-007-01	19 Mar 25	18 Mar 26	-
16	Auto Clave		ALP	CL-40L / 810010	National Food Institute, Ministry of Industry, Thailand	2503287-001-01	5 Jun 25	4 Jun 26	-
17	Analytical Balance		OHAUS	PX623 / C236754745	National Food Institute, Ministry of Industry, Thailand	2502227-001-01	19 Mar 25	18 Mar 26	-

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.

เอกสารไม่ควบคุม

REPORT OF CALIBRATION

Certificate No. : SP25-019

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

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

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

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

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

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 60 nm/min

Scan Interval of UUC : 0.15 nm.

Resolution of UUC : Photometric 0.0001 Abs.

Wavelength 0.1 nm.

CERTIFICATE OF CALIBRATION

Certificate No. : SP25-019

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

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

Location of calibration : Instrument room (207)

Equipment : UV-Vis Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009

ID No. : UAE.WAT.020/2558

Received Date : 26 May 2025

Calibration Date : 26 May 2025

Issue Date : 29 May 2025

Condition Instrument : Good

Calibrated by : _____

Approved by : _____

Technical Manager

Quality Manager

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

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

REPORT OF CALIBRATION

Certificate No. : SP25-019

Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000 0.7469	0.0000 0.7488	0.0000 -0.0019	0.0050 0.0063	2.00 2.00
257	0.0000 0.8674	0.0000 0.8663	0.0000 0.0011	0.0050 0.0067	2.00 2.00
313	0.0000 0.2919	0.0000 0.2902	0.0000 0.0017	0.0050 0.0052	2.00 2.00
350	0.0000 0.6430	0.0000 0.6428	0.0000 0.0002	0.0050 0.0063	2.00 2.00

REPORT OF CALIBRATION

Certificate No. : SP25-019

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000 0.5780 1.0484 2.1876	0.0000 0.5739 1.0430 2.1876	0.0000 0.0041 0.0054 0.0000	0.0028 0.0031 0.0029 0.0084	2.00 2.00 2.00 2.00
440	0.0000 0.5595 1.0239 2.1230	0.0000 0.5581 1.0219 2.1207	0.0000 0.0014 0.0020 0.0023	0.0028 0.0034 0.0035 0.0085	2.00 2.00 2.00 2.00
465	0.0000 0.5230 0.9633 1.9753	0.0000 0.5190 0.9609 1.9719	0.0000 0.0040 0.0024 0.0034	0.0028 0.0029 0.0029 0.0079	2.00 2.00 2.00 2.00
546.1	0.0000 0.5181 1.0002 1.9973	0.0000 0.5161 0.9979 2.0021	0.0000 0.0020 0.0023 -0.0048	0.0028 0.0031 0.0033 0.0102	2.00 2.00 2.00 2.00
590	0.0000 0.5517 1.0803 2.0373	0.0000 0.5503 1.0808 2.0324	0.0000 0.0014 -0.0005 0.0049	0.0028 0.0030 0.0031 0.0105	2.00 2.00 2.00 2.00
635	0.0000 0.5591 1.0518 1.9274	0.0000 0.5583 1.0513 1.9281	0.0000 0.0008 0.0005 -0.0007	0.0028 0.0031 0.0030 0.0102	2.00 2.00 2.00 2.00

REPORT OF CALIBRATION

Certificate No. : SP25-024

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5780	0.574	0.0040	0.0031	2.00
	1.0484	1.044	0.0044	0.0029	2.00
	2.1876	2.185	0.0026	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5595	0.558	0.0015	0.0035	2.00
	1.0239	1.021	0.0029	0.0035	2.00
	2.1230	2.122	0.0010	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5230	0.519	0.0040	0.0030	2.00
	0.9633	0.961	0.0023	0.0029	2.00
	1.9753	1.975	0.0003	0.0071	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5181	0.515	0.0031	0.0031	2.00
	1.0002	0.996	0.0042	0.0033	2.00
	1.9973	1.994	0.0033	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5517	0.549	0.0027	0.0030	2.00
	1.0803	1.078	0.0023	0.0030	2.00
	2.0373	2.031	0.0063	0.0082	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5591	0.557	0.0021	0.0031	2.00
	1.0518	1.049	0.0028	0.0030	2.00
	1.9274	1.924	0.0034	0.0081	2.00

เอกสารนี้ อสงกษ

REPORT OF CALIBRATION

Certificate No. : SP25-024

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

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

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	115663	25 October 2025
Absorbance Standard set	25757	115638	25 October 2025
Wavelength Standard set	25806	115657	25 October 2025
Wavelength Standard set	25758	115665	25 October 2025

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

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

Spectral Band Width of UUC : 5.0 nm.

Scan Speed of UUC : 40

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

เอกสารนี้ อสงกษ

 DQE Services DQE Services Co.,Ltd. 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com 					
REPORT OF CALIBRATION Certificate No. : SP25-024 Wavelength Accuracy :					
Page 5 of 5					
CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>	
241.00	240.4	0.60	0.18	2.00	
279.30	278.8	0.50	0.18	2.00	
288.90	288.3	0.60	0.18	2.00	
334.50	333.9	0.60	0.18	2.00	
361.40	360.8	0.60	0.18	2.00	
418.40	417.9	0.50	0.18	2.00	
447.20	446.6	0.60	0.18	2.00	
459.30	459.1	0.20	0.18	2.00	
537.00	536.4	0.60	0.18	2.00	
638.00	637.5	0.50	0.18	2.00	
441.29	440.7	0.59	0.18	2.00	
479.88	479.4	0.48	0.18	2.00	
513.75	513.3	0.45	0.18	2.00	
528.59	528.2	0.39	0.18	2.00	
575.10	574.5	0.60	0.18	2.00	
585.56	585.4	0.16	0.20	2.00	
684.70	684.1	0.60	0.18	2.00	
740.51	740.2	0.31	0.20	2.00	
747.61	747.0	0.61	0.18	2.00	
807.04	806.4	0.64	0.18	2.00	
879.68	879.1	0.58	0.18	2.00	

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor *k*, which for a normal distribution corresponds to a coverage probability of approximately 95%

- End of Certificate -

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

 DQE Services DQE Services Co.,Ltd. 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com 					
REPORT OF CALIBRATION Certificate No. : SP25-024 Photometric Accuracy :					
Page 4 of 5					
Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7469	0.747	-0.0001	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8674	0.864	0.0034	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2919	0.293	-0.0011	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6430	0.639	0.0040	0.0055	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

Condition of this calibration result:

Reference Standard Instruments : This certification is traceable to the international unit of unit maintained through:

Instruments	Model	Serial No.	Certificate No.	Traceable
Data Acquisition Switch Unit	34970A	MY44065265	WK2407-141-1	WK Electric Co., Ltd.
Digital Thermo-Hygrometer	HIT-771SD	AL07155	25H171	Technology Promotion Association (Thailand-Japan).

Calibration Result:

Measurement Temperature Source Accuracy for COD Reactor.

Capacity (Vial)	Nominal Value (°C)	Average Value (°C)	Uncertainty of Measurement (±°C)
25 Vial	150.0	150.4	0.47

Unit : °C

(1A)	(2A)	(3A)	(4A)	(5A)
150.407	150.377	150.269	150.402	150.422
(1B)	(2B)	(3B)	(4B)	(5B)
150.426	150.394	150.644	150.690	150.542
(1C)	(2C)	(3C)	(4C)	(5C)
150.477	150.303	150.627	150.257	150.176
(1D)	(2D)	(3D)	(4D)	(5D)
150.462	150.456	150.199	150.406	150.102
(1E)	(2E)	(3E)	(4E)	(5E)
150.185	150.513	150.235	150.460	150.442

Figure: Shows the location of the temperature source.

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

** End of certificate **

เอกสารไม่ควบคุม

CERTIFICATE OF CALIBRATION

Equipment :	COD Test Tube Heater
Meter Model :	HI839800-02
Tube Heater :	25 Vial Capacity
Temperature Range :	(-10 to 160) °C
Manufacturer :	Hanna Instruments
Condition As-Received :	Used Product
Ambient Temperature :	(25 ± 2) °C
Customer name :	United Analyst and Engineering Consultant Co., Ltd.
	3 Soi Udomsuk 41, Sukhumvit Rd., Bangchak,
	Phrakhanong, Bangkok 10260
Received date :	5 March 2025
Calibrate date :	7 March 2025
Issue date :	7 March 2025
Calibrated Location :	Hanna Instruments (Thailand) Ltd.
Calibration Procedure :	This calibrator was conducted by using in-house: calibration procedure CP-04 by using certified reference standard instruments.

Customer name : United Analyst and Engineering Consultant Co., Ltd.

3 Soi Udomsuk 41, Sukhumvit Rd., Bangchak,

Phrakhanong, Bangkok 10260

Received date : 5 March 2025

Calibrate date : 7 March 2025

Issue date : 7 March 2025

Calibrated Location : Hanna Instruments (Thailand) Ltd.

Calibration Procedure : This calibrator was conducted by using in-house: calibration procedure

CP-04 by using certified reference standard instruments.

Calibrated by :

Approved by :

Authorized Signatory


HANNA
Instruments
(Thailand) Limited

This certificate was certified only for the instrument we calibrated.

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

** This certificate may not be reproduced other than in full, except with the prior written **

approval of the head of Hanna Instrument (Thailand)เอกสารไม่ควบคุม

Condition of this result of analysis

Cal Check Standard Cuvettes Specifications :

Product code: HI97722-11 Lot number: SC0391/24

Standard cuvette	Standard Value (mg/L)	Lot Standard Deviation (mg/L)	Lot number	Best used before
A, ZERO	0	0.001	8366	April 2026
B, HI97722	20	0.207	7872	April 2026

Specifications for validation procedure:

Standard cuvette	Standard Value (mg/L)	Lot Standard Deviation (mg/L)	Lot number	Best used before
B, HI97722	20 ± 1	19 to 21	7872	April 2026

Method of Standardization

This quality is standardized using which is calibrated by adaptation of Turbidimetric Method as the following details below :

Result of analysis :

Cyanuric Acid Standard (mg/L)	Reading (mg/L)	Error (mg/L)
0	0	0
20 ± 1	20	0

** End of certificate **

เอกสารไม่ควบคุม

Certificate No. : HIT-2513-0437

Page : 1 of 2

CERTIFICATE OF ANALYSIS

Equipment : Cyanuric Acid Portable Photometer
Meter Model : HI97722C Serial No. : 905060058111
Manufacturer : Hanna Instruments
Made in : Romania
Condition As-Received : Used Product
Reference : RE250509
Customer name : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Rd., Bangchak,
Phrakhamong, Bangkok 10260
Received date : 20 March 2025
Calibrate date : 24 March 2025
Issue date : 24 March 2025
Ambient Temperature : (25 ± 2) °C
Relative Humidity : (50 ± 15) % RH
Calibrated Location : Hanna Instruments (Thailand) Ltd.

Calibrated by : ☒ Mr ☐ Mr ☐ Mr
Approved by : _____
Authorized Signatory



This certificate was certified only for the instrument we calibrated.

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

** This certificate may not be reproduced other than in full, except with the prior written **

approval of the head of Hanna Instrument (Thailand) Limited เอกสารไม่ควบคุม



MTC. ACL. No. 372 / 68

CALIBRATION CERTIFICATE

NOMENCLATURE : 1. Atomic Absorption Spectrophotometer “Agilent Technologies”

Model AA240FS, Serial No. MY13160001
Working standard solution "CPA chem"

3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Prakanong, Bangkok 10260

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

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

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

CALIBRATION DATE : 3 February 2025

REFERENCE MATERIAL : Traceable to NIST "Agilent Technologies", "CARLO ERBA", "PanReac AppliChem"

Cadmium Lot No. 0001152457, Chromium Lot No. 0106315418, Copper Batch No. 0001268514, Iron Batch No. T126087A,

Lead Lot No. 0123204734, Manganese Batch No. 0106301952, Nickel Batch No. 0104978044, Zinc Batch No. 0100792297

AMBIENT CONDITIONS : Temperature $25 \pm 5^\circ \text{C}$ Relative humidity $50 \pm 20\%$

The Atomic Absorption Spectrophotometer has been calibrated against Reference Material traceable to National Institute of Standards and Technology (NIST) by The Analytical Chemistry Laboratory. The results are attached herewith.

Calibrated by Approved by:

Approved by.

0

Director o

Director of Analytical Chemistry Laboratory

Ref. 2015268013000459001

Issued Date : 7 March 2025

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MTC. ACL. No. 372 / 68

3. Trueness

3.1 Reading on wavelength- Cadmium(Cd) at 228.8 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cd	0.020	0.020	0.000	1.23	± 0.005
	0.300	0.300	0.000	0.11	± 0.005
	0.700	0.688	-0.012	1.67	± 0.008

3.2 Reading on wavelength- Chromium (Cr) at 357.9 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cr	0.1000	0.109	0.009	9.39	± 0.009
	0.3000	0.306	0.006	1.98	± 0.012
	0.7000	0.657	-0.043	6.20	± 0.023

3.3 Reading on wavelength- Copper (Cu) at 324.7 nm.

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Cu	0.050	0.050	0.000	0.68	± 0.003
	0.300	0.292	-0.008	2.70	± 0.009
	0.700	0.684	-0.016	2.31	± 0.020

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2. Precision

Element	Conc. (mg/l)	Absorbance										Ave. Abs.	SD	%RSD
Cd	0.02	0.0076	0.0066	0.0071	0.0065	0.0075	0.0066	0.0077	0.0065	0.0065	0.0065	0.007	0.0005	7.39
	0.30	0.0923	0.0921	0.0920	0.0917	0.0919	0.0904	0.0929	0.0910	0.0915	0.0927	0.092	0.0008	0.82
	0.70	0.2083	0.2082	0.2100	0.2114	0.2102	0.2091	0.2096	0.2093	0.2088	0.2082	0.209	0.0010	0.49
Cr	0.10	0.0095	0.0104	0.0097	0.0093	0.0095	0.0091	0.0096	0.0095	0.0082	0.0080	0.009	0.0007	7.63
	0.30	0.0234	0.0243	0.0237	0.0242	0.0214	0.0226	0.0232	0.0233	0.0237	0.0237	0.023	0.0008	3.61
	0.70	0.0474	0.0490	0.0497	0.0516	0.0487	0.0476	0.0474	0.0484	0.0473	0.0474	0.048	0.0014	2.85
Cu	0.05	0.0073	0.0072	0.0060	0.0068	0.0067	0.0065	0.0070	0.0066	0.0068	0.0070	0.007	0.0004	5.53
	0.30	0.0380	0.0385	0.0377	0.0382	0.0394	0.0375	0.0381	0.0392	0.0389	0.0385	0.038	0.0006	1.62
	0.70	0.0888	0.0895	0.0890	0.0902	0.0897	0.0893	0.0899	0.0890	0.0902	0.0898	0.090	0.0005	0.56
Fe	0.10	0.0102	0.0103	0.0100	0.0092	0.0109	0.0094	0.0101	0.0098	0.0092	0.0101	0.010	0.0005	5.39
	0.50	0.0421	0.0421	0.0424	0.0421	0.0425	0.0412	0.0419	0.0425	0.0419	0.0429	0.042	0.0005	1.09
	1.00	0.0791	0.0782	0.0780	0.0780	0.0776	0.0792	0.0780	0.0782	0.0786	0.0794	0.078	0.0006	0.78
Pb	0.20	0.0092	0.0087	0.0081	0.0092	0.0090	0.0087	0.0091	0.0082	0.0091	0.0088	0.009	0.0004	4.49
	0.70	0.0275	0.0290	0.0288	0.0283	0.0272	0.0286	0.0280	0.0285	0.0288	0.0286	0.028	0.0006	2.09
	1.50	0.0592	0.0580	0.0591	0.0596	0.0577	0.0589	0.0591	0.0584	0.0575	0.0595	0.059	0.0008	1.28
Mn	0.05	0.0126	0.0130	0.0123	0.0113	0.0115	0.0126	0.0122	0.0123	0.0114	0.0117	0.012	0.0006	4.81
	0.30	0.0588	0.0582	0.0584	0.0593	0.0582	0.0584	0.0596	0.0602	0.0581	0.0577	0.059	0.0008	1.33
	0.70	0.1320	0.1318	0.1313	0.1306	0.1324	0.1314	0.1320	0.1308	0.1303	0.1305	0.131	0.0007	0.56
Ni	0.10	0.0107	0.0110	0.0102	0.0098	0.0101	0.0106	0.0096	0.0108	0.0100	0.0102	0.010	0.0005	4.44
	0.50	0.0452	0.0454	0.0441	0.0449	0.0452	0.0450	0.0453	0.0452	0.0454	0.0455	0.045	0.0004	0.89
	1.00	0.0848	0.0875	0.0856	0.0853	0.0866	0.0866	0.0866	0.0865	0.0857	0.0859	0.086	0.0008	0.92
Zn	0.05	0.0367	0.0370	0.0372	0.0362	0.0369	0.0367	0.0363	0.0367	0.0365	0.0360	0.037	0.0004	1.02
	0.30	0.2022	0.2009	0.2022	0.2017	0.2022	0.2009	0.2001	0.2016	0.2022	0.2023	0.202	0.0008	0.38
	0.70	0.4118	0.4123	0.4107	0.4132	0.4142	0.4157	0.4086	0.4098	0.4101	0.4079	0.411	0.0025	0.60

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

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Ni	0.100	0.098	-0.002	1.60	± 0.013
	0.500	0.490	-0.010	2.00	± 0.018
	1.000	0.951	-0.049	4.90	± 0.032

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

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Zn	0.050	0.048	-0.002	3.37	± 0.013
	0.300	0.325	0.025	8.32	± 0.013
	0.700	0.677	-0.023	3.33	± 0.019

Remark : The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 (k = 2)

which gives a level of confidence of approximately 95%

Calibrated by ...

Approved by

(Mis

Director of Analytical Chemistry Laboratory

Issued Date : 7 March 2025

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End of Certificate

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MTC. ACL. No. 372 / 68

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

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Fe	0.100	0.107	0.007	7.06	± 0.014
	0.500	0.522	0.022	4.49	± 0.016
	1.000	0.990	-0.010	1.02	± 0.029

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

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Pb	0.200	0.200	0.000	0.15	± 0.014
	0.700	0.701	0.001	0.10	± 0.030
	1.500	1.480	-0.020	1.32	± 0.061

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

Element	Standard Value of RM (mg/l)	Reading (mg/l)	Error of Measurement (mg/l)	Error of Measurement (%)	Uncertainty (mg/l)
Mn	0.050	0.051	0.001	2.41	± 0.005
	0.300	0.291	-0.009	2.92	± 0.007
	0.700	0.665	-0.035	4.95	± 0.014

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PinAAcle 900F Preventive Maintenance (PM)

Company Name:	United Analyst and Engineering Consultant Co., LTD.			
Address (Instrument Location):	41 Sukumvit Rd., Phra Khanong, Bangkok 10260			
Serial Number:	PFBS20031902	PM Number:	1 of 2	
Customer Name (if applicable):	K. Yaida	Telephone Number:	095-5580049	
Customer Support Engineer Name:	K. Chayanan	Service Order Number:	WO-03126047	
Date PM Performed: (DD-MMM-YYYY)	29-Apr-2025	Next PM Due Date: (DD-MMM-YYYY)	29-Oct-2025	
Standard Labor Hours to Complete PM :			5 hours	

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

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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PinAAcle 900F Preventive Maintenance Report

Company Name: UAE Consultant Co., LTD.

Instrument Location: 41 Sukumvit Rd.,

Phra Khanong, Bangkok 10260

Instrument Serial No.: PFBS20031902

Date: 29-Apr-2025

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Additional Tools Required for PM			
Part Number (if applicable)	Description	Quantity	Serial #
N1013000	0.2A Neutral density filter	1	101N0089015
N1013002	1.0A Neutral density filter	1	101N0089015
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050121	Cu Lumina HCL	1	060419-030180
N3050109	Ba Lumina HCL	1	061219-020041
N3050139	K Lumina HCL	1	030819-010130
N3050152	Ni Lumina HCL	1	052719-020020

Component List

Component / Specific Model	Serial #	Configuration Notes
PinAAcLe900F	PFBS20031902	Syngistix V4.0.1.1935
FIAS100	100S24040501	

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
B0501696	Fan Filters	2
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	1
N9301714	Replacement Acetylene Filter Cartridge	1
TH001022	Replacement Air Filter Cartridge	1

Additional Reagents and Standards Required for PM			
Part Number (if applicable)	Description	Quality	Batch/Lot #
N9300183	1000 mg/L Copper Standard	AR	27-39CUY1
			Nov 2025

Additional Reagents and Standards Required for PM (Customer Support Solution)			
Part Number (if applicable)	Description	Quantity	Batch/Lot #
N/A	DI Water	250 mL	AR
N/A	0.5% HNO ₃	250 mL	AR
			AR

7. Flame Interlock Check:

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

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
C ₂ H ₂ Pressure Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

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.	0.9668	0.9878	Passed
0.2 A ND Filter	± 5% from Cert.	0.1953	0.1876	Passed

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	0.0005	Passed

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

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

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. General:

- ✓ Review the instrument performance with the customer and document any recent problems.
- ✓ Inspect the customer log book and make any appropriate PM entries.
- ✓ Perform general inspection of system for cleanliness.

2. PC Instrument Software:

- ✓ Instrument Software user files/databases archived, packed, and/or deleted as needed.

3. Mechanical:

- ✓ Inspect and clean all fans and filters. Replace filters if necessary
- ✓ Inspect all gas lines for leaks and/or wear. Replace if needed.
- ✓ Clean exterior of the instrument.
- ✓ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
- ✓ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification
- ✓ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
- ✓ Check the drain system for signs of wear. Replace worn or damaged parts.
- ✓ Visually check for proper flame conditions when igniting the Air-C₂H₂ and N₂O-C₂H₂ flames (if applicable).

4. Electrical:

- ✓ Inspect PC boards. Clean if necessary.
- ✓ Carefully check all internal and external cable connections.
- ✓ Check instrument firmware revisions upgrade to current levels (if necessary)
- ✓ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

5. Optics:

- ✓ Inspect and clean the sample compartment windows, if needed.
- ✓ Inspect optics. Clean or replace if necessary,

6. Gasses:

- ✓ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900 Series Pre-Installation Checklist SDB.
- ✓ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

Additional Comments

Additional Comments Regarding the PM

Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed.	
This PinAAcle 900F Passes ☒ Fails ☐ the preventive maintenance.	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:	Date: 29 Apr 2025 (DD-MM-YYYY)
Authorized Customer Representative:	Date: 29 Apr 2025 (DD-MM-YYYY)

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8.4 D₂ Background Compensation with Copper

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

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.009	Passed

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	0.0001	Passed

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	Passed

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.	N/A	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	N/A	Passed

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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Customer Acknowledgment of receipt of the above repair / replacement.
Special Terms and Conditions: This is not an invoice.
Taxes will be applied to your invoice if applicable.



PerkinElmer Scientific (Thailand) Co., Ltd.
290 Soi Soonyalai 4
Khwang Bangkapi, Khet Huay Kwang
Bangkok 10310
Thailand
Tel: 66 2719 6420 : Fax: +66 2 319 7900
http://www.perkinelmer.com

Service Report

Work Order Number	WO-03126047	Activity Code	Planned Maintenance	Billing Type	Contract	Requested Start Date	10/01/2568 11:08 TL	Model	AAN320051	Serial Number	PFBS20031902
Service Representative Name	Kanan, Chayanon	Contract Number	SC-0035684109	Expiry Date	31/10/2025	Equipment ID	N/A	System ID	N/A		
UDI Number	N/A										
Equipment Location	N/A										
Customer Contact	K. ฤทธิฐานธรณ์ (คุณหนู)										
Phone Number	095-5580049										
Fax Number	N/A										
Email	nichakorn.praemai1996@gmail.com										
Purchase Order	HPO-250100002										

Work Description	PM 2/2 (Auriferous) - Cleaning Cell, Chamber, Filter - Wavelength Calibrate : Pass - Wavelength Scan As,Cu,Ba,K,Ni : Pass - Align cell with Hg : OK										
Start Date	29/04/2025	End Date	09/05/2025	Work Description							

Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date	Next Calibration Date
*** No Calibrated Tools Used ***					

Part Number	Part Description	Note	Lot/Serial Number	Quantity
*** No Parts Used ***				

Part Number	Part Description	Start Date	Quantity
SV000013	Preventative maintenance	29/04/2025	4

Work Complete	Yes ☒	No ☐	Customer Signature	Technician Signature
PM/QC/PPV Left with Customer	Yes ☐	No ☒		

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Component List

Component / Specific Model	Serial #	Firmware Version	Configuration Notes
FIAS100	100S24040501	2.20	Syngistix V4.0.1.1935

Parts Lists

Parts Included with the PM			
Part Number (if applicable)	Description	Quantity	Batch/Lot #
B050 2706	Fan Filter	1	N/A

Additional Tools Required for PM			
Part Number (if applicable)	Description	Quantity	Serial #
N/A	Digital Volt Meter	1	N/A
Additional Reagents and Standards Required for PM			
Part Number (if applicable)	Description	Quantity	Batch/Lot #
N/A	N/A	N/A	N/A

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Atomic Absorption/FIAS 100/400 Preventive Maintenance (PM)			
Company Name:	United Analyst and Engineering Consultant Co., LTD.		
Address (Instrument Location):	41 Sukumvit Rd., Phra Khanong, Bangkok 10260		
Room Number:	Lab		
Asset Number (if applicable):	2 of 2W	Customer System ID:	K. Yanida
Service Engineer Name:	K. Chayanan	Service Order Number:	WO-03051971
Date PM Performed: (DD-MMM-YYYY)	29-Apr-2025	Next PM Due Date: (DD-MMM-YYYY)	29-Oct-2025

Part Number	Release	Publication Date
09370005	C	January 2013
 PerkinElmer®		

Scope

The purpose of this PM is to ensure the continued functionality of the Atomic Absorption/FIAS 100/400 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:

Always check with the customer before making any changes that may affect the customer's analysis or calibration. 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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4. Cell, Cell Windows, Transfer Line:

- ☒ Cell checked
- ☒ Cell windows checked
- ☒ Transfer line checked for moisture (if moisture is a problem, the Nafion dryer might be needed)

5. Operational Tests:

- ☒ Run DI water through the carrier/reductant/sample system. Verify smooth flow of liquid throughout without leaks. Replace tubing & fittings if needed.

6. 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.
- ☒ Update Logbook.

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Is the Working Environment Acceptable? If not, document.

- ☐ Visual Damage (if yes, describe)

- ☒ Check incoming AC line voltage for proper levels and grounding.
- ☒ Verify Voltage switch on back of instrument is correct
- ☒ Perform general inspection of system for cleanliness. Clean if needed.
- ☒ Gas supply cylinders secured, lines leak checked and argon or nitrogen supply pressure verified (45 – 58 psi).
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Fan checked and filter cleaned
- ☒ Heating mantle or Universal Cell Holder checked

2. Instrument components

- ☒ Non-return valve checked/repaced if needed (B019 8111). Clean the valve if there is any liquid in it. Replace the rubber sleeve (B013 5123) if it is worn. Check the flow meter for any signs of fluid in it. Clean the flow meter if needed.
- ☒ Verify condition of pump pressure adjustment levers (B050 7794 - look for cracks or problems with the springs), pump rollers (B300 0251 check for wear), and thumb screws (B050 7796).
- ☒ Check the Multiport valve for proper switching, flow, and insure there are no leaks. Clean valve parts and replace o-rings if needed (large o-ring: B050 1250, small o-ring: B004 5095). Use a squirt bottle & fishing line to try to dislodge clogs.
- ☒ Firmware Version checked. Latest is 2.20.

3. Mixing/Separation Assembly & Pump Tubing:

- ☒ Mixing separator assembly checked
- ☒ Filter/membrane checked (B050 8306)
- ☒ Condition of the pump tubing (replace if necessary), correct pump tubing for the solutions being run. Make sure the correct magazines are being used. B050 7791 for 0.13 – 1.80 mm tubing; B050 7792 for 1.60 – 3.18 mm tubing.

Document History

Revision	Description of Change	Page(s)	Date
A	First release		May 2008
B	Addition of Batch/Lot Number, Expiration Date, and Report Fields.	2,7	February 2009
C	Update to new format	All	January 2013

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Additional Comments

Additional Comments Regarding the PM

Review

The preventive maintenance checks and if applicable performance tests for FIAS 100/400 have been completed.

This FIAS 100/400 Passes ☒ Fails ☐ the preventive maintenance.

Review of Preventive Maintenance:

Authorized PerkinElmer Representative: /	Date: 29 Apr 2025 (DD-MM-YYYY)
Authorized Customer Representative: /	Date: 29 Apr 2025 (DD-MM-YYYY)

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Service Report

Work Order Number	WO-03051971	Activity Code	Planned Maintenance	Billing Type	Contract	Requested Start Date	10/03/2568 23:08 น.	Model	80508570	Serial Number	100524040501
Service Representative Name	Kanin Chayanon	Contract Number	SC-0035656000	Contract Number		Expiry Date	24/05/2025	Equipment ID	N/A	System ID	N/A
UDI Number	N/A										
Equipment Location	N/A										
Customer Contact	K. Nuchakorn Nuchitua	Phone Number	095-5880049	Fax Number	N/A	Email	penpichai.442@gmail.com	Purchase Order	HPO-240400211		

Work Description	
- PM 2/2 Warranty - Cleaning Port Valve, Manifold, Tuning - Run Hg test. Pass	
Start Date	28/04/2025
End Date	29/04/2025
28/04/2025 29/04/2025	

Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date	Next Calibration Date
*** No Calibrated Tools Used ***					

Part Number	Part Description	Note	Lot/Serial Number	Quantity
*** No Parts Used ***				

Part Number	Part Description	Start Date	Quantity
SV000013	Preventative maintenance	29/04/2025	3
SV000002	Service Travel	29/04/2025	1

Work Complete	Yes ☒ No ☐	Customer Signature	Technician Signature
PM/COPY Left with Customer	Yes ☐ No ☒		

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Agilent CrossLab Start Up Services

Agilent 5100 5110 ICP-OES Preventive Maintenance



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

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Revision: A.02, Issued: 21 January 2022
Document Number: G8014-90075
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9/52568 WO-03176049

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Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- Need to place a service call?** Flexible Repair Options | Agilent

Introduction

Customer Information

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

Instrument Maintenance

System Information

☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID
Instrument System Site and Location

5110 VDN ICP-OES
UAE Consultant

List System Component Product Numbers	List the Serial Numbers of each Component
1. G 8015 A	MY 18030601
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

ICP-OES Configuration Table	Circle the type or write in the type if other
Nebulizer Type	SeaSpray OneNeb Conikal Other
Spray Chamber	Cyclonic Single Pass Cyclonic Double Pass Other
Torch	Radiant Dual View Other
Torch Type	One Piece Semi Demountable Fully Demountable Other
Injector Diameter	2.4mm 1.8mm 1.4mm 0.8mm Other
Injector Material	Quartz Ceramic Other

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section
- Ask the customer to sign the Service Verification section including the customer's and your signature.

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☐ Replace high capacity air inlet dust filter element if installed. **116**
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☐ **Service not applicable**
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. **11A**
- ☒ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following instrument tests
 - ☒ Subsystem Communications Test
 - ☒ Air Flow
 - ☒ Water Flow
 - ☒ Gas Flows
 - ☒ RF Generator
 - ☒ Camera Test
 - ☒ Optics Test
 - ☒ Nebulizer Test
- ☒ Record the result in the Instrument Test Results Table

SPS 3 Auto Sampler

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

SPS 4 Auto sampler

- ☒ **Service not applicable**
- ☐ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☐ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☐ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☐ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☐ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☐ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

AVS 4, 6, 7 Advanced Valve System

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

Test Results

Instrument Performance Test Results Table

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

Pre PM Sensitivity Check		Post PM Sensitivity Check	
Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	1783.8	2579.2	2230.8
Mn 257.610 nm SRBR	9430.5	19614.9	10883.0
Al 396.152 nm SBR	5.2	8.0	7.0
K 766.491 nm SBR	3.0	14.6	3.4

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

Instrument Test Results Table

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

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

Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system.
- ☒ Leave system in an idle state: on and purging.
- ☒ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete the Signature Page with both Service Engineer and Customer signatures.

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Agilent Cool Clear Coolant Fluid	5799-0037	Agilent Water Recirculator	1
Purge Gas Filter	G8010-60136	All	1
Air Inlet filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	1
Rotor seal for 6.7 port valve for AVS6/7	G8494-60002	G8494A/G8495	1
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	1
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	1
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	1
PVC waste tubing 8mm od x 5mm id, 2m	G8410-80122	SPS 4	1
Additional Parts may be required from engineer's stock:			
X axis drive belt	5410047500	SPS 3	1
Z axis drive belt	5410047400	SPS 3	1
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	1

Consumed Parts Reference
(Purchased by customer, not included as part of PM)

☒ Section Not Applicable.

Part Description	Part Number	Product or Model# where used	Quantity consumed
------------------	-------------	------------------------------	-------------------

ICP-OES Status Results Table

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

Measurement	Standby Mode	Plasma On
Mains Voltage	231.288	VAC 226.380
Mains Current	0.083	A 0.100
Instrument Temperature	21.1	°C 21.6
RF Air Flow (sensor speed)	44.0	Hz 41.1
Plasma Exhaust Temperature	No measurement	°C 47.1
Water Flow Oscillator	No measurement	L/min 1.14
Water Flow Detector	0.92	L/min 0.90
Water Inlet Temperature	19.5	°C 18.5
Polychromator Temperature	35.4	°C 35.4
CCD Temperature	-40.1	°C -39.9
Thermal Stabilizer	35.0	°C 35.0
Argon Supply Pressure	634.43	kPa 583.73
Purge Gas Supply Pressure*1	631.28	kPa 604.02
Option Gas Supply Pressure*1	-	kPa -
Nebulizer Flow	No measurement	L/min 0.70
Nebulizer Back Pressure	No measurement	kPa 273.61
Plasma Gas Flow	No measurement	L/min 1196
Auxiliary Gas Flow	No measurement	L/min 1.00
RF Power	No measurement	W 1200.4
RF Supply Current	No measurement	A 8.228
RF Supply Voltage	No measurement	V 194.529

*1 If option installed

Report Summary	
Instrument Model	Agilent 5100/5110 VDV ICP-OES
Instrument ID	G8011A/G8015A
Instrument Serial Number	MY18030001
Software Version	7.3.1.9507
Firmware Version	3442
Tested By	Burin 5nd test final
Test Completed On	11/19/2025 2:14:28 PM
Result Summary	
Subsystem Communications Test	Pass
Air Flow Test	Skipped
Water Flow Test	Skipped
Gas Flows Test	Skipped
RF Generator Test	Skipped
Camera Test	Skipped
Optics Test	Skipped
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass
Subsystem Communications Test	Pass

Signature Page

Service Engineer Comments (optional)

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

Service Verification

Service Request Number: 6008006610
Service Engineer Name: Woravit T.
Service Engineer Signature: Woravit T.
Total number of pages in this document: 14

Date Service Completed: 3 Nov 2025
Customer Name: Aphorn O.
Customer Signature: Aphorn O.

Sensitivity Test					Pass	
Radial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 46.0	SRBR	96.4	735.7	50.5	
Se (196.028 nm)	≥ 41.0	SRBR	79.6	779.2	77.7	
Zn (213.857 nm)	≥ 1421.0	SRBR	2270.3	24005.6	110.8	
Pb (220.353 nm)	≥ 46.0	SRBR	129.5	1701.5	144.5	
Mn (257.610 nm)	≥ 3518.0	SRBR	9810.6	233072.5	561.7	
Al (396.152 nm)	≥ 3.4	SBR	6.5	36392.0	4836.0	
Ba (493.408 nm)	≥ 34.0	SBR	93.1	1586633.9	16860.6	
K (766.491 nm)	≥ 1.8	SBR	1.9	54511.9	19124.8	
Axial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 208.0	SRBR	245.0	3080.3	143.7	
Se (196.028 nm)	≥ 159.0	SRBR	211.9	3471.4	233.5	
Zn (206.200 nm)	≥ 234.0	SRBR	771.1	8797.9	126.5	
Zn (213.857 nm)	≥ 1743.0	SRBR	6307.2	120003.6	359.8	
Cd (214.439 nm)	≥ 4227.0	SRBR	6012.4	96451.0	256.0	
Pb (220.353 nm)	≥ 320.0	SRBR	571.2	12760.9	463.5	
Mn (257.610 nm)	≥ 10625.0	SRBR	39386.8	1701779.7	1862.7	
Cr (267.716 nm)	≥ 1048.0	SRBR	5192.7	206938.5	1564.3	
Cu (324.754 nm)	≥ 19.0	SBR	49.4	261983.3	5202.7	
Al (396.152 nm)	≥ 6.0	SBR	20.3	318135.9	14932.2	
Ba (493.408 nm)	≥ 60.0	SBR	255.9	13403057.9	52173.2	
K (766.491 nm)	≥ 24.0	SBR	38.7	1918325.2	48283.1	

Resolution Test					Pass	
Element Wavelength	Specification	Width				
N (174.213 nm)	≤ 9.40	6.66				
As (188.980 nm)	≤ 8.20	6.00				
C (193.027 nm)	≤ 11.50	7.94				
Mo (202.032 nm)	≤ 8.20	6.15				
Cr (206.158 nm)	≤ 13.40	8.80				
Zn (213.857 nm)	≤ 8.70	6.60				
Pb (220.353 nm)	≤ 9.50	7.07				
Co (228.615 nm)	≤ 17.20	10.73				
Ba (230.424 nm)	≤ 9.40	6.85				
Mn (257.610 nm)	≤ 13.30	9.20				
Mn (260.568 nm)	≤ 20.30	13.82				
Cr (267.716 nm)	≤ 11.00	7.99				
Cu (324.754 nm)	≤ 25.00	17.85				
Cu (327.395 nm)	≤ 14.20	11.44				
Sr (338.071 nm)	≤ 33.50	24.20				
Ba (455.403 nm)	≤ 44.00	33.83				
Sr (460.783 nm)	≤ 36.00	18.28				
Ba (493.408 nm)	≤ 36.00	24.97				
Ba (614.171 nm)	≤ 42.00	29.36				
Ar (675.283 nm)	≤ 74.00	57.75				
K (766.491 nm)	≤ 80.00	73.92				



DMA-80 DIRECT MERCURY ANALYZER System



SITHIPORN ASSOCIATES CO.,LTD.
451-451/1 Sirinthorn Road, Bangbunru,Bangplud, Bangkok 10700 Thailand
Tel. (662) 433-8331, 434-9191 fax: (662) 433-1679,434-9510

Precision Test

Radial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	1.32
Se (196.026 nm)	≤ 2.60	0.81
Zn (213.857 nm)	≤ 1.50	0.25
Pb (220.353 nm)	≤ 2.60	0.78
Mn (257.610 nm)	≤ 1.50	0.28
Al (396.152 nm)	≤ 1.50	0.31
Ba (493.408 nm)	≤ 1.50	0.28
K (766.491 nm)	≤ 1.50	0.19

Axial

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.61
Se (196.026 nm)	≤ 1.50	0.72
Zn (206.200 nm)	≤ 1.50	0.37
Zn (213.857 nm)	≤ 1.50	0.32
Cd (214.439 nm)	≤ 1.50	0.31
Pb (220.353 nm)	≤ 1.50	0.37
Mn (257.610 nm)	≤ 1.50	0.69
Cr (267.716 nm)	≤ 1.50	0.35
Cu (324.754 nm)	≤ 1.50	0.49
Al (396.152 nm)	≤ 1.50	0.49
Ba (493.408 nm)	≤ 1.50	0.73
K (766.491 nm)	≤ 1.50	0.31

1. VISUAL INSPECTION

	Good	Damaged	Corroded/Dirty
External chassis	✓		
Inside	✓		
Electric parts	✓		
Screws	✓		

2. ELECTRICAL SAFETY TEST

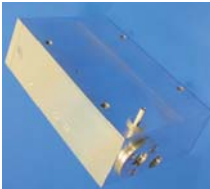
Using a suitable testing device check the below reported parameters and take note of the results.

Parameter	Result	OK	Not OK
Voltage : 230 VAC (+10%)	Actual value : 223 VAC	✓	
Ground : ≤ 2	Actual value: 0.8 VAC	✓	

3. PRESSURE CHECK

Gas carrier	Oxygen (purity O ₂ >99,95%)		Milestone air compressor	
	Purity: -			

The pressure at the supply source manometer should be approx. 4.0bar
The flow rate depends by type of cuvette installed on the DMA-80 unit.

									
	Correct value	Actual value	Final value	Correct value	Actual value	Final value	Correct value	Actual value	Final value
Inlet pressure	3.1 bar	-	-	3.1 bar	-	-	3.1 bar	3.1 bar	Pass
Flow rate	10-12 l/h	-	-	8-10 l/h	-	-	6-8 l/h	8 l/h	Pass

Check all possible leakage points and their conditions:

	Good	Damaged	Corroded
Tubing	✓		
Silicon joints	✓		
O-rings	✓		
Cuvette sealing O-rings	✓		
Gas connections	✓		
Valves	✓		
Sample boat carrier	✓		
Catalyst flange	✓		

DMA-80 Direct Mercury Analyzer

SERVICE PROTOCOL REPORT

To be filled in before service visit (1st page)

Customer information:

Company:	บริษัท เอนเนลิสต์ จำกัด (สง.ใหญ่)
Department:	LAB
Person in charge:	คุณ อ. ชัยวัฒน์ ชัยวัฒน์ \ k _ d i w u
Address:	Bangkok 102601 P ; Z
Tel.:	+66 (86) 3191292
E-mail:	bhuchonk@uaeconsultant.co.th

Technical data:

Unit Serial Number:	24114043		
Terminal type or USB-G40 Gateway:	Terminal-660	SN	24107843
Software, type and revision:	Easy Control	Rev.	03-F-SP1(2023-09-20)
Air Compressor (if present)	95100	SN	12236761
Gas system pump (if present)	-	SN	-
Installation and last maintenance dates:	Inst. on: 31/01/2025	Maint. on:	

NOTE: after achievement of the following protocol a filled and signed copy of this report has to be sent to Milestone srl at: service@milestonesrl.com

For the best result of the test below we recommended to use the Milestone DMA-80 Service Kit (PN DMA-SKIT).

4. AUTOSAMPLER SYSTEM

Calibration of autosampler motor	OK	Not OK	Re-Adjusted
Cylinders alignment	✓		
	✓		
Speed of pneumatic cylinders	Fast	Slow	Normal
			✓

Using the maintenance grease, periodically lightly lubricate all exposed steel rods of the horizontal and vertical cylinders.

5. COMPONENTS CHECK

Conditions of the different parts used/installed on DMA unit:

Catalyst tube	OK	Not OK	Replaced	Cleaned
Amalgamator	✓		✓	
Quartz boats	✓			
Nickel boats	-			
Autosampler plate	✓			
Gas kit accessories	-			

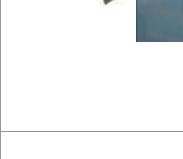
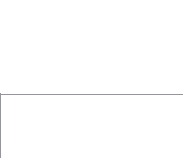
6. TEMPERATURES

	Correct value		Actual value	Final value (Pass)
	If controlled by Infrared sensor	850°C ± 10°C	-	-
Drying/ Decomposition furnace	If controlled by thermocouple	650°C ± 10°C	650	Pass
Catalyst furnace	Type 1		515°C ± 5°C	-
	Type 2,3		565°C ±10°C	Pass

				
Amalgamator stand by temperature	If controlled by Infrared sensor	170°C ± 10°C	170°C	Pass
	If IR sensor is not present	145°C ± 25°C	-	-
Amalgamator heating temperature	850°C ± 10°C		850°C	Pass
Cuvette	125°C ± 5°C		125°C	Pass

7. SPECTROMETER

The spectrometer can be equipped with a single beam system (ducon lamp) or with a dual beam system (tricon lamp)

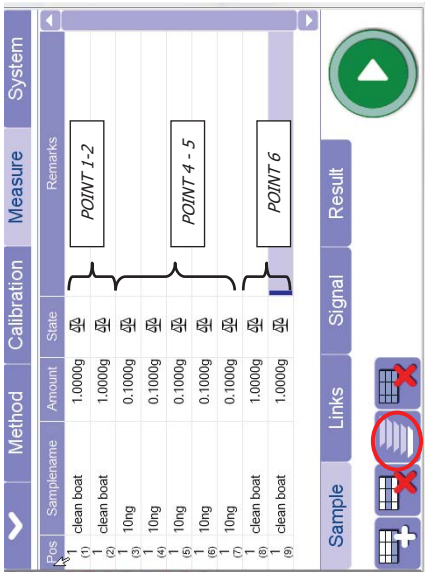
	Old cuvette type			Actual cuvette type		
						
	Gain		Offset		Gain	
	Correct value	Final value	Correct value	Actual value	Correct value	Actual value
Dualcell system	3.6VDC	-	0.015VDC ± 0.005VDC	-	0.015VDC ± 0.005VDC	0.015VDC ± 0.005VDC
Tricell system *	-	-	-	-	3.9V	Pass
	-	-	-	-	3.93VDC	Pass
	-	-	-	-	3.96VDC	Pass

(*) The recommended Hg lamp operating signal should be around 3.96VDC (for detector 2) and 3.93VDC (for detector 1).

10. TESTING PROCEDURE

It consists to run some measurements for the evaluation of the analytical performance of the unit, like: absorbance, peaks shape, temperatures, lamp signal and verify the proper working of whole system.

- 1) Run minimum 2 blanks on the same sample boat (quartz if possible) in manner to clean it
- 2) Run blanks until absorbance value (Height) decrease under 0.0030 in cell 1
- 3) Set a fresh and stabilized 100µg/L Hg standard according to the prescriptions reported on the DMA80 User Manual. The quality of the used standard is fundamental for the success of the entire procedure
- 4) Weight approximately 100µg of the fresh 100µg/L – Standard (10ng) and start the analysis as a single measurement mode
- 5) Repeat five times the test
- 6) Run again two blanks measurements



Now, it is possible to evaluate:

- Peaks

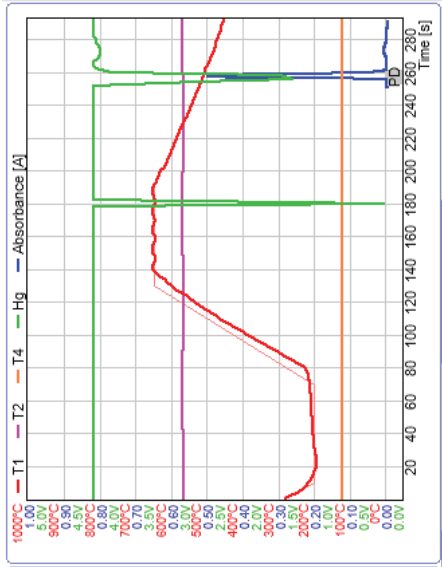
	OK	Not OK
Conditions of the spectrometer system	✓	
Alignment between lamp, cuvette and detector	✓	
Cuvette cleaning (glass windows, sealing O-rings...)	✓	
Lamp intensity	✓	
Operation of the mechanical shutter (if present)	✓	

8. MILESTONE AIR COMPRESSOR

Maintenance	OK	Date last service
Drain (compressor)	✓	
Replacing air filters (air purification module)	✓	
Check sealing connections	✓	

9. PARTS TO BE REPLACED

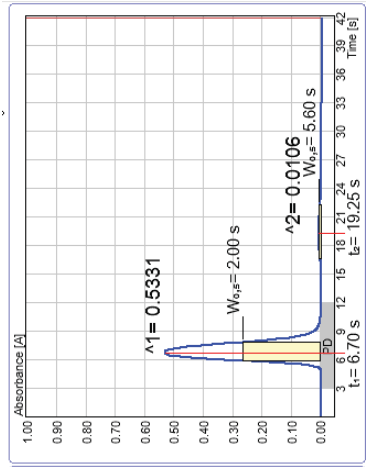
PN	DESCRIPTION	Replaced	Not Replaced
DMA8133	Catalyst tube: 6 months if the unit runs daily, 1 year if the unit is used rarely. <i>In case of analyse of sample with high organic concentration the lifetime of the catalyst can be less than 6 months.</i>		✓
DMA8134	Amalgamator: 6 months if the unit runs daily 1 year if the unit is used rarely		✓
DMA8195A	Hg lamp tri-cell (model 2011): 5 years		✓
DMA8137	Hg lamp dual-cell: 5 years	-	-
70200	Hg trap 1 year		✓
DMA8058/B	Amalgamator coil 6 months/1 year or as soon as the heating is not more homogeneous		✓
DMA8142	Nickel sample boats (set of 40pcs) 2 years if strongly used, replace after 1 year	-	-
DMA8347	Quartz sample boats (set of 10pcs) 2/3 years		✓
DMA8335	Metal sample boat carrier 2 years		✓
SL0108	PU-tube diam. 6/4 mm for internal O ₂ /air supply 2 years		✓
SO0376D	Heating coil for drying/decomposition 2 years		✓



- The Hg lamp signal must be between 3.8 and 4.5V and stable. A few minutes after the start of the analysis the lamp does switch off because of the zero detection but then it instantly returns to the original condition. In case of Tricell configuration two green colour graphics are reported. After the zero shuttering the time necessary to return to full signal is longer on Tricell compare to Ducon lamp.
- During the run the catalyst oven temperature must be stable around to 565°C or 515°C.
- The drying and ashing furnace must be follow the set temperature method.
- During the run the Amalgamator furnace temperature must be stable at the stand by temperature (170°C or 145°C). Then at the release step it must raise up to 850/900°C.
- The Cuvette temperature must be stable at approximately 125°C.
- The Hg absorbance peaks must be correctly detected and reported.

11. FINAL REPORT

All screws inserted and tightened	✓
All tubing sealing connections checked, cleaned or replaced and tightened	✓
All heating elements are working	✓
Sensors installed, checked and tightened	✓
Safety devices (thermo switch) fully checked	✓
All cooling fans are functioning	✓
Testing procedure successfully passed	✓
Necessary tools available at customer's site	✓
Last revision of User Manual available at customer's site	✓
Advised customer about care and maintenance instructions	✓



- The shape of the peak must be regular.
- The distance between Peak Cell 1 and Peak Cell 2 must be between 11 to 15 seconds.

- Results

Pos	Sample name	Amount	State	Height Hg [mg]	[ug/kg]	Cal-Factor	Σ
-	Stability10ng		M		100.290	1.0000	
(7)	Stability10ng	0.1000g	✓	0.4931	9.9095	99.0951	1.0000
(8)	Stability10ng	0.1000g	✓	0.4965	9.9934	99.9335	1.0000
(9)	Stability10ng	0.1000g	✓	0.4991	10.059	100.597	1.0000
(10)	Stability10ng	0.1000g	✓	0.4976	10.022	100.221	1.0000
(11)	Stability10ng	0.1000g	✓	0.5031	10.160	101.602	1.0000
(12)	Stability10ng	0.1000g	✓				

- The obtained absorbance (height) must be > 0.42 in cell 1 for each 100ppb analysis (0.22 with cuvette installed until December 2005, DMA s/n 05120292.)
- The relative standard deviation (rsd) is < 3 %.
- After two blanks (after 10ng measurements), the absorbance is < 0.0030 in cell 1(*).

(*) This condition is valid only in case the unit has: catalyst and amalgamator new, conditioned and never use before, sample boat carrier new and/or perfectly cleaned, catalyst flange new and/or perfectly cleaned, cuvette new and/or perfectly cleaned, tubes, silicon joints and o-rings replaced. Otherwise other blanks (more than 2) might be necessary.

- Temperatures & signal profiles

Verification Certificate

Certificate No.: 2501440-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 4

Equipment: Digestion Unit (Heating Block)
Manufacturer: FOSS
Model: Tecator Digestor 2520
Serial No.: 91905060
ID No.: UAE.WAS.030/2566
Order No.: 2501440
Operation No.: 2501440-001
Date of Receipt: 27 January 2025
Date of Calibration: 27 January 2025

Calibrated by **Scientist** **Approved by**
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 29 January 2025

The uncertainties are for a confidence probability of approximately 95 %.
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-65

Verification Report

Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
 Model: Tecator Digester 2520 Serial No.: 91905060
 Resolution: 1 °C ID No : UAE.WAS.030/2566
 Manufacturer: FOSS
 Date of Calibration: 27 January 2025

Page 3 of 4

Calibration point: 380 °C

Calibration result:

Table 1 : Reporting of Temperature

Block No.	UUC* Setting (°C)	UUC* Reading (°C)	Stability (± °C)	Standard Thermometer (°C)	Uncertainty (± °C)
1	380	380	0.22	377.84	2.0
2	380	380	0.19	378.68	2.0
3	380	380	0.13	378.70	2.0
4	380	380	0.12	379.82	2.0
5	380	380	0.20	381.01	2.0
6	380	380	0.16	380.48	2.0
7	380	380	0.16	378.22	2.0
8	380	380	0.19	377.99	2.0
9	380	380	0.09	378.48	2.0
10	380	380	0.15	378.17	2.0
11	380	380	0.18	377.64	2.0
12	380	380	0.11	379.27	2.0
13	380	380	0.13	378.14	2.0
14	380	380	0.25	379.11	2.0
15	380	380	0.15	379.83	2.0
16	380	380	0.18	378.05	2.0
17	380	380	0.31	378.44	2.0
18	380	380	0.18	378.29	2.0
19	380	380	0.17	378.41	2.0
20	380	380	0.13	379.24	2.0

Note:

- UUC* = Unit Under Calibration
 - Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.
 - Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.
- The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor $k = 2$, providing a level of confidence of approximately 95 %.

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

Verification Report

Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
 Model: Tecator Digester 2520 Serial No.: 91905060
 Resolution: 1 °C ID No : UAE.WAS.030/2566
 Manufacturer: FOSS
 Date of Calibration: 27 January 2025

Page 2 of 4

Location:

Environment Condition:

Dry Laboratory (312), UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
 Ambient Temperature (29 ± 1) °C
 Relative Humidity (58 ± 2) %
 Line Voltage (224 ± 1) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert standard thermocouples type R into its Digestion blocks and Calibration according to NFI Method W-TE-026 based on BS 4309 : 1968
 - The temperature scale used was based on ITS - 90 .
 - All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer with Thermocouple	34970A Type R	MY4045576/MY41194453	TC24/0063	5-Jun-2025	N.M. Technical Center Laboratory

- This certificate is traceable to International System of Units (SI Units).

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

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

- Condition of Calibrated item : Good

UUC* Description

Time of Record 1 Hour 6 Minute At 380 °C

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

FOSS

Customer Service Report

FOSS South East Asia
3388 Sirinrat Building, 25th - 26th Floor, Unit No. 3388/90,
Rama IV Road, Klongtoey, Klongtoey, Bangkok, Thailand 10110

Report No.: 13851

Date: 25 February 2025

Job No.: 11732

Instrument: KTG Distillator

Start Finish
07:00 08:00
09:00 10:00
13:00-15:00

Application		Special		Job Type		Standard	
Distributor	☒	Courtesy Visit	☒	Installation	☒	Training	☒
Digital Service	☒	PMA Onboarding	☒	Quote	☒	In House	☒
Internal	☒	Warranty	☒	Repair	☒	Health Check	☒
Investigate	☒	Sales Support	☒	Remote	☒		

PMA Type		Smartcare		Smartcare Pro		Fosscore	
		☒	☒	☒	☒	☒	☒
		☒	☒	☒	☒	☒	☒

Details of Work / Test		OK	Not OK*
# pm kit 12 MD			
- test before pm			
- cleaning kit , strength			
- flushing Alkali pump			
- replace pm kit 12 MD			
- test operation			
- dilution 80 = 85 ml Cal to 80 ml			
- distillation 5 min 150-170 ml			
- Alkali 50 = 50 ml			
* Receiver not used			
- all pass			

Instrument Ready for Use		OK		Not OK*	
Part No:	Batch	Description		Qty	
60100106	09.12.2024	PM kit Kjetec 9 Distillator		1	

Signed Foss		I confirm this report is accurate and complete	
Name		Signed Customer	Name

Email:		Customer Contact:	
*Remark:			

Please scan QR code



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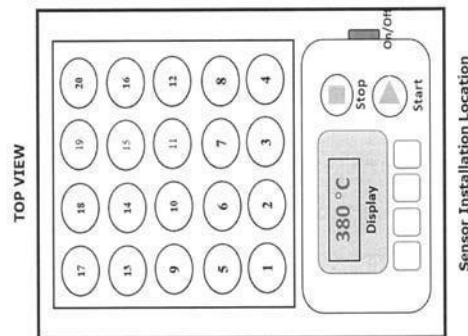
ศูนย์บริการและพัฒนาอุตสาหกรรม
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center
Ministry of Industry

Verification Report

Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
Model: Tecator Digestor ; Serial No.: 91905060
Resolution: 1 °C ID No.: UAE.WAS.030/2566
Manufacturer: FOSS
Date of Calibration: 27 January 2025
Calibration point: 380 °C
Calibration result: Continued

Page 4 of 4

Figure 1. Location of Reference Standard and Block Diagram of Digestion Unit



----- End -----

FCS-012 Revision: 01 Date: 20-04-65

2008 อาคารบริการ 36 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Asoke-Annam Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10110, Thailand
Tel: +66(0) 2422 8688 Fax: +66(0) 2422 8545



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nfi

Calibration Report

Certificate No.: 2502229-001-01
Equipment: CHAMBER (Incubator)
Model: IPP 260
Serial No.: V615.0187
Resolution: 0.1 °C
ID No.: UAE.MTC.003/2559
Manufacturer: MEMMERT
Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Environment Condition:
 Ambient Temperature (16.2 ± 1) °C
 Relative Humidity (32 ± 4) %
 Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49016851	TE 670477-01	4 May 2025	NATIONAL FOOD INSTITUTE
	RTD	CH#101-109/ RTD#101-109			

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. Condition of Calibrated Item : Good

UUC Description :

Time of Record : 1 Hour 9 Minute At 35.0 °C
 Fresh air Damper : ☒ Open ☐ Close Position : ☐ Fan ☐
 Not Available : ☐

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

FCS-012 Revision: 01 Date: 20-04-65



Calibration Certificate

Certificate No.: 2502229-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)

Manufacturer: MEMMERT

Model: IPP 260

Serial No.: V615.0187

ID No.: UAE.MTC.003/2559

Order No.: 2502229

Operation No.: 2502229-001

Date of Receipt: 19 March 2025

Date of Calibration: 19 March 2025

Calibrated by

Approved by

Scientist

Manager, Division of Calibration Laboratory

Responsible for the Technical Management Team

25 March 2025

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

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

FCS-009 Revision: 01 Date: 20-04-65



Calibration Report

Certificate No.: 2502229-003-01
Equipment: CHAMBER (Incubator)
 Model: IPP260 Serial No.: V618.0033
 Resolution: 0.1 °C ID No.: UAE.MIC.021/2561
 Manufacturer: MEMMERT
 Date of Calibration: 19 March 2025

Page 3 of 3

Calibration point: 22.0 and 25.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	22.7	58	220.0
MAX	23.3	60	225.0

Table 1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
22.0	22.18	22.18	22.16	22.19	21.94	21.95	21.96	21.98	22.08	0.27
25.0	25.51	25.32	25.29	25.34	25.05	25.02	25.04	25.09	25.15	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
22.0	22.0	22.0	22.0	0.026	0.14	0.29
25.0	25.0	25.0	25.0	0.035	0.36	0.55

Note: The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

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



nfi.th

Calibration Report

Certificate No.: 2502229-003-01
Equipment: CHAMBER (Incubator)
 Model: IPP260 Serial No.: V618.0033
 Resolution: 0.1 °C ID No.: UAE.MIC.021/2561
 Manufacturer: MEMMERT
 Date of Calibration: 19 March 2025

Page 2 of 3

Location: 302, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Environment Condition: Ambient Temperature (23.0 ± 1) °C

Relative Humidity (59 ± 1) %

Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TIAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY57003188	TE 670486-01	8 June 2025	NATIONAL FOOD INSTITUTE
	RTD	CH#301-309/ RTD#301-309			

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. Condition of Calibrated item : Good

UUC Description :

Time of Record	1	Hour	9	Minute	At	22.0 and 25.0 °C
Fresh air Damper	-	Open	-	-	-	-
	X	Close	-	-	-	-
	-	Not Available	-	-	-	-

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

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

25 March 2025

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nfi.th

Calibration Report

Certificate No.: 2501624-001-01
Equipment: Water Bath
Model: WNE14
Resolution: 0.1 °C
Manufacturer: MEMMERT
Serial No.: L416.0606
ID No.: UAE.MIC.002/2560
Date of Calibration: 10 February 2025

Page 3 of 3

Calibration point: 44.5 °C			
Calibration result:			
Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
Min	25.7	52	223.0
Max	26.3	65	225.0

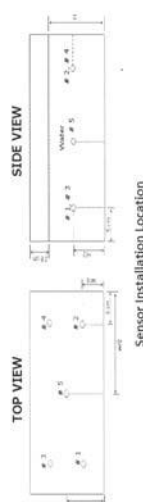


Table 1 : Reporting of Temperature

Measured Temperature (°C) @ Sensor No.						Uncertainty ± (°C)
Calibration Point (°C)	# 1	# 2	# 3	# 4	# 5	
44.5	44.55	44.46	44.48	44.47	44.48	0.18

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)		Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX			
44.5	44.5	44.5	0.082	0.070	0.29

Note The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity)"

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.
The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k= 2, providing a level of confidence of approximately 95 %.

----- End -----

FCS-012 Revision: 01 Date: 20-04-65

19 Feb. 2025

Calibration Certificate

Certificate No.: 2501624-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: Water Bath

Manufacturer: MEMMERT

Model: WNE14

Serial No.: L416.0606

ID No.: UAE.MIC.002/2560

Order No.: 2501624

Operation No.: 2501624-001

Date of Receipt: 10 February 2025

Date of Calibration: 10 February 2025

Calibrated by

Mr. Worapob Sooktong
Scientist
WB

Approved by

Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 19 February 2025

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

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

FCS-009 Revision: 01 Date: 20-04-65

Calibration Certificate

Certificate No.: 2501624-002-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: Water Bath
Manufacturer: MEMMERT
Model: WNE14
Serial No.: L416.0612
ID No.: UAE.MIC.003/2560
Order No.: 2501624
Operation No.: 2501624-002
Date of Receipt: 10 February 2025
Date of Calibration: 10 February 2025

Calibrated by

Scientist

WB
19 February 2025

Approved by
 Manager, Division of Calibration Laboratory
 Responsible for the Technical Management Team

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

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

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



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Calibration Report

Certificate No.: 2501624-001-01
Equipment: Water Bath
Model: WNE14
Resolution: 0.1 °C
ID No.: UAE.MIC.002/2560
Manufacturer: MEMMERT
Date of Calibration: 10 February 2025

Page 2 of 3

Location: 302 Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition:
 Ambient Temperature (26 ± 1) °C
 Relative Humidity (59 ± 7) %
 Line Voltage (224 ± 1) Volt

Condition of this results of Calibration:

1. This instrument was calibrated by insert 5 standard thermometer into its liquid bath and calibration according to W-TE-011 based on ASTM E715-80 (2022): Standard Specification for Gravity-Convection and Forced-Circulation Water Baths.
 - The temperature scale used is ITS - 90.
 - All data show below were final values and the initial data may be obtained upon request.
2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY59002902	TE 670478-01	4-May-25	NATIONAL FOOD INSTITUTE
	RTD	RTD#301-305 / CHF#301-305			

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. Condition of Calibrated item : Good

UUC Description:

Time of Record 1 Hour 9 Minute At 44.5 °C
 Without adjustment
 After adjustment

7. Result of Calibration :

19 Feb. 2025

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



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Calibration Report

Certificate No.: 2501624-002-01

Equipment:

Water Bath

Serial No.: L416.0612

Serial No.: L416.0612

ID No.: UAE MIC.003/2560

Resolution: 0.1 °C

Manufacturer: MEMMERT

10 February 2025

Page 2 of 3

Location:

Environment Condition:

302 Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Ambient Temperature (24 ± 1) °C

Relative Humidity (59 ± 7) %

Line Voltage (224 ± 1) Volt

Condition of this results of Calibration:

1. This instrument was calibrated by insert 5 standard thermometer into its liquid bath and calibration according to W-TE-011 based on ASTM E715-80 (2022). Standard Specification for Gravity-Convection and Forced-Circulation Water Baths.
 - The temperature scale used is ITS - 90.
 - All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument ;

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY59002902	TE 670478-01	4-May-25	NATIONAL FOOD INSTITUTE
	RTD	RTD# 306-310 / CH# 006-310			

3. This certificate is traceable to International System of Units (SI Units).
4. This certificate was certified only for the instrument we calibrated.
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of Calibrated item : Good

UUC Description:

Time of Record	1 Hour	9 Minute	At 44.5 °C
----------------	--------	----------	------------

ation : ☒ Without adjustment

after adjustment

19 Feb. 2025

FCS-012 Revision: 01 Date: 20-04-65

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

----- End -----

19 Feb 2025



2008 ๒๕๕๑ กรุงเทพมหานคร 36 ถนนสุขุมวิท แขวงบางนาใต้ เขตสวนหลวง กรุงเทพมหานคร 10170, Thailand



nfl.org

Calibration Report

Certificate No.:	25022225-007-01
Equipment:	Autoclave
Model:	CL-40L
Serial No.:	808763
Resolution:	0.1 °C
ID No.:	UAE.MIC.026/2563
Manufacturer:	ALP
Date of Calibration:	19 March 2025

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Environment Condition:

Ambient Temperature (	23 ± 1	) °C
Relative Humidity (	60 ± 5	) %
Line Voltage (	225 ± 1	) Volt

Condition of this results of Calibration:

1.1. This instrument was calibrated by insert 3 standard Data loggers with RTD into its autoclave and calibration according to W-TE-018 based on BS 2646-1:2021. Autoclaves for sterilization in laboratories

Part 1: Design, construction, safety and performance - Specification.

- The temperature scale used was based on ITS - 90.

- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer with RTD (Data Logger)	HiTemp140-PT	S35646	TE 670370-01	23-Mar-25	NATIONAL FOOD INSTITUTE
	HiTemp140-PT	S33753	TE 670371-01	23-Mar-25	NATIONAL FOOD INSTITUTE
	HiTemp140-PT	S29973	TE 670372-01	23-Mar-25	NATIONAL FOOD INSTITUTE

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. This standard does not apply to sterilizers or disinfectors used for medical, dental pharmaceutical,

7. Condition of Calibrated item : Good

UUC Description :	Setting program function sterilization :	STERILIZE/NORMAL
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Time of sterilization	At 115.0 and 121.0 °C
15 Minute	

8. Result of Calibration : ☒ Without adjustment

	After adjustment
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EF-CS-012 Revision: 01 Date: 20-04-65

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2008 Soi 36, Aun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
Tel. +66(0) 2422 8698 Fax. +66(0) 2422 8545

Calibration Certificate

Certificate No.: 2502229-007-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangachack, Prakhmonong, Bangkok 10260

Page 1 of 3

Equipment:

Manufacturer:

Model: CL-40L

Serial No.: 808763

ID No.: UAE.MIC.026/2563

Order No.: 25022229

Operation No.: 2502229-007

Date of Receipt: 19 March 2025

Date of Calibration: 19 March 2025

Calibrated by _____ Approved by _____

Scientist

Date of Issue: 25 March 2025

Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

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

The uncertainties are for a compliance probability of approximately 95%. This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

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

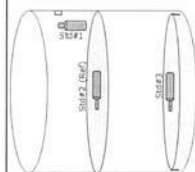
Calibration Report

Certificate No.: 2503287-001-01
Equipment: Autoclave
Model: CL-40L
Resolution: 1 °C
Manufacturer: ALP
Serial No.: 810010
ID No.: UAE.MIC.032/2565
Date of Calibration: 5 June 2025

Page 3 of 3

Calibration point: 115 and 121 °C

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
Min	25.8	50	225
Max	26.8	59	235



Standard at Revision

Std#1 = Attached to the lid temperature probe.
Std#2 = In the upper half of the chamber.
Std#3 = In the chamber drain, within 100 mm.

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.2 is REF)			Uncertainty ± (°C)
	Std.# 1	Std.# 2 (Ref)	Std.# 3	
115	115.46	115.43	115.42	0.70
121	121.59	121.54	121.51	0.70

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	Min (°C)	Max (°C)	Average (°C)			
115	115	115	115	0.08	0.17	0.50
121	121	121	121	0.12	0.19	0.52

Note

The quoted uncertainty include " Stability " and " Loading effect (20% of Uniformity)"

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

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

11 June 2025



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Calibration Report

Certificate No.: 2503287-001-01
Equipment: Autoclave
Model: CL-40L
Resolution: 1 °C
Manufacturer: ALP
Serial No.: 810010
ID No.: UAE.MIC.032/2565
Date of Calibration: 5 June 2025

Page 2 of 3

Location: Room 301 Media Preparation, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Environment Condition:
Ambient Temperature (26 ± 1) °C
Relative Humidity (55 ± 5) %
Line Voltage (230 ± 5) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 3 standard Data loggers with RTD into its autoclave and calibration according to W-TE-018 based on BS 2646-1:2021, Autoclaves for sterilization in laboratories
Part 1: Design, construction, safety and performance - Specification.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer with RTD (Data Logger)	HITemp140-PT	T20627	NC-25-03-18-181	11-Mar-26	MADGETECH, INC.
	OM-CP-HITEMP-140	R56916	2502081-002-01	11-Mar-26	NATIONAL FOOD INSTITUTE
	PRTemp140	R38546	2501835-001-01	22-Feb-26	NATIONAL FOOD INSTITUTE

3. This certificate is traceable to International System of Units (SI Units).

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

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

6. This standard does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical.

7. Condition of Calibrated item : Good

UUC Description : Setting program function sterilization : STERILIZE/NORMAL

Time of sterilization 20 Minute At 115 and 121 °C

8. Result of Calibration :

☒	Without adjustment
☐	After adjustment

11 June 2025

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

11 June 2025



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CERTIFICATE OF CALIBRATION

Certificate No. : COF-049-68

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

: Top Load Office
: Thermo Scientific
: G25A
: 3375
:-
: Used Item
: Environmental Measurements Co., Ltd.
5/45 Baan Klang Krung Bz Town, Soi Sinagarindra 46/1
(Pramote), Nong Bon Sub-District Prawet District, Bangkok
10250

RECEIVED DATE : 12 Nov 2025
MEASUREMENT DATE : 17 Nov 2025
ISSUE DATE : 17 Nov 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

CALIBRATION CONDITION:

: 24 hours at ambient conditions.
: The average values during measurement are 24.1 °C and 47.8 %RH.

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

TABULATION OF RESULTS:

The table on next page give the measured values.



Calibrated by:

☐ ☒

Approved signatory:

Calibration Department Manager

Page 1 of 2 Pages

Calibration procedure:
The Office gas flow device was calibrated against Standard factory Displacement Meter (Roots Meter) Model G65/INVC/W2-ap. The WPL-CL-004 was used as a calibration guideline.

Traceability:
This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MN40016-25.

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



Calibration Report

Certificate No.: 2502227-001-01

Equipment: Electronic Balance

Manufacturer: OHAUS

Model: PX623

Resolution: 0.001

Serial No.: C236754745

ID No.: UAE.MIC.055/2565

Capacity: 620

Date of Calibration: 19 March 2025

Page 2 of 3

Environment Condition: Ambient Temperature: 22.8 ± 0.3 °C Relative Humidity: 51 ± 0.95 %

Place of Calibration: 301, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

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

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	B505567572	TCS	M24041005	19 April 2025
Standard Weight Class E2	500g	B505567696	TCS	M24041015	19 April 2025
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFI.BTH 017/23	Quality Reborn	Q625-0542	10 February 2026

3. This certification is traceable to SI UNIT

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

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

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
300	0.00042
600	0.00048

2. Off-Center Error:

A mass of 200 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

	1	2	3	4	5	6	(Maximum Difference)
(g)	200.002	200.003	200.001	200.001	200.002	200.002	(g)
							(g)
							0.001

FCS-012 Revision: 01 Date: 20-04-65

2008 ตบาสกุลสุนทร 35 มุขสุนทรสุนทร มุขสุนทรสุนทร มุขสุนทรสุนทร 10700

2008 Sol 35, Atun Amann Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700

Tel: +66(0) 2422 8668 Fax: +66(0) 2422 8645



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CALIBRATION LABORATORY Co., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cali-laboratory.com E-mail:sale@cali-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER
MANUFACTURER : VIBROCK
MODEL / TYPE : V9000
SERIAL NO. : 2350
CLID. NO. : 252101272
JOB CONTROL NO. : 251118136392
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 18 November 2025 DATE OF ISSUED : 21 November 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

21 November 2025

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25136392

F3-011-05/12-23

page 1 of 3



@clcalibration



Continuation of Certificate of Calibration Number COF-049-68

Page 2 of 2 Pages

MEASUREMENT RESULTS:

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

Table 1: The results of Q Standard calibration data

Plate	Flow rate m ³ /min	Pressure [Pa] mmHg	Temperature [T _o] °C	Temperature [T _{in}] °C	Ap_meter mmHg	Ap_Office InH ₂ O	γ	Standard Flow [Q _s] m ³ /min
1	0.702	760.447	24.07	23.24	56.905	1.727	1.317	0.654
2	1.004	760.448	24.17	23.44	62.166	3.499	1.874	0.927
3	1.119	760.542	24.15	23.53	43.069	4.593	2.147	1.062
4	1.170	760.587	24.13	23.62	30.735	5.222	2.289	1.129
5	1.416	760.597	24.23	23.81	30.531	7.678	2.776	1.361

Slope (m): 2.04949
Intercept (b): -0.02534
Correlation coefficient (r): 0.99991
Uncertainty (k=2): 0.015 m³/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m ³ /min	Pressure [Pa] mmHg	Temperature [T _o] °C	Temperature [T _{in}] °C	Ap_meter mmHg	Ap_Office InH ₂ O	γ	Standard Flow [Q _s] m ³ /min
1	0.702	760.447	24.07	23.24	56.905	1.727	0.822	0.651
2	1.004	760.448	24.17	23.44	62.166	3.499	1.170	0.924
3	1.119	760.542	24.15	23.53	43.069	4.593	1.340	1.058
4	1.170	760.587	24.13	23.62	30.735	5.222	1.429	1.125
5	1.416	760.597	24.23	23.81	30.531	7.678	1.733	1.361

Slope (m): 1.28368
Intercept (b): -0.01581
Correlation coefficient (r): 0.99991
Uncertainty (k=2): 0.015 m³/min

End of Certificate of Calibration



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

VELOCITY RESULT

Test point (mm/s)	(frequency)	Mode	STD Reading (mm/s)	DUC Reading (mm/s)	Correction (mm/s)	Uncertainty ± (% of rdg.)
10	160 Hz	peak	10.00	9.89	+0.11	1.1
20	160 Hz		20.00	19.49	+0.51	1.0
40	160 Hz		40.00	39.32	+0.68	1.0
60	160 Hz		60.00	58.74	+1.26	1.0
80	160 Hz		80.00	78.11	+1.89	1.0
100	160 Hz		100.00	97.62	+2.38	1.0

Note: The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 62 of 138

This report is valid for the above stated instrument/s only.

End of Certificate



REPORT OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER

MANUFACTURER : VIBROCK

MODEL / TYPE : V9000

SERIAL NO. : 2350

DATE OF CALIBRATION : 19 November 2025

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C

Relative Humidity : (55 ± 15) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-127 based on ISO 16063-21 as calibration guideline.

The calibration was performed by using Digital Multimeter, Programmable Timer/Counter, Accelerometer and Measuring Amplifier which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.
2. Digital Multimeter, Keysight Technologies Model 3458A S/N. MY59352733.
3. Accelerometer with Measuring Amplifier, Briel & Kjaer Model 8305, 2525 S/N. 397018, 2434988.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0054/25 , Due Date 11 June 2026.
2. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0090-25, Due Date 31 July 2026.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0056-24, Due Date 14 December 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"



REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	VIBROCK
MODEL / TYPE	:	V9000
SERIAL NO.	:	2351
DATE OF CALIBRATION	:	10 November 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 15) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-127 based on ISO 16063-21 as calibration guideline.

The calibration was performed by using Digital Multimeter, Programmable Timer/Counter, Accelerometer and Measuring Amplifier which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Digital Multimeter, Hewlett Packard Model 34401A S/N. 3146A75935.
2. Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.
3. Accelerometer with Measuring Amplifier, Bruel & Kjaer Model 8305, 2626 S/N. 705491, 1741406.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0143-24, Due Date 06 December 2025.
2. The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0054/25 , Due Date 11 June 2026.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0051-24, Due Date 13 December 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M-2022)"

Certificate No. Q25131718

F3-011-05/12-23

page 2 of 3



@ckcalibration

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	VIBROCK
MODEL / TYPE	:	V9000
SERIAL NO.	:	2351
CLID. NO.	:	252101273
JOB CONTROL NO.	:	251107131718
CALIBRATION SERVICE	:	☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 November 2025

DATE OF ISSUED : 12 November 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

12 November 2025

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25131718

F3-011-05/12-23

page 1 of 3



@ckcalibration



SCARLET TECH

Certificate of Calibration

WL-21 Wireless Anemometer

Scarlet Tech Ltd. hereby certifies that the WL-21 wireless anemometer listed below was thoroughly calibrated, test and inspected following the standard calibration procedure (st-wl-21) and is within manufacture's specification at the time when the calibration is done.

Client: Envir Service Co., Ltd.
Serial: 2504DR0038 Sensor 2504DT0058
Calibration Date: 2025/10/8
Calibration Expiry Date: 2026/10/7

The Result of Calibration

Velocity			
Measured Value (m/s)	Actual Value (m/s)	Tolerance	Result
1.0	1.0	0.9-1.1	Pass
1.8	2.0	1.8-2.2	Pass
4.7	5.0	4.7-5.3	Pass
6.9	7.0	6.0-8.0	Pass
9.8	10.0	9.5-10.5	Pass
19.8	20.0	19.0-21.0	Pass

Wind Direction			
Measured Value (m/s)	Actual Value (m/s)	Tolerance	Result
46°	45°	42-48	Pass
136°	135°	132-138	Pass
225°	225°	222-228	Pass
314°	315°	312-318	Pass
359°	0°	357-3	Pass

Inspection Room Temp	Actual Value	Deviation	Tolerance	Result
22.2°C	22.5	0.3	21.5-23.5	Pass

Atmospheric Pressure Inspection	Actual Value	Deviation	Tolerance	Result
1007	1005	2	1001-1019	Pass

Environment Conditions:

Air temperature: 22 °C
Relative humidity: 55 %
Static pressure: 102.2 kPa



Performed by: — Certified by Head of Engineering

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CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cali-lab.com E-mail: sale@cali-lab.com



NS-C-TISI-TN 17025
CALIBRATION 0059
CLC

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

VELOCITY RESULT

Test point		Mode	STD Reading (mm/s)	DUC Reading (mm/s)	Correction (mm/s)	Uncertainty ± (% of rdg.)
(mm/s)	(frequency)					
10	160 Hz	peak	10.00	9.85	+0.15	1.1
20	160 Hz		20.00	19.51	+0.49	1.0
40	160 Hz		40.00	39.34	+0.66	1.0
60	160 Hz		60.00	58.98	+1.02	1.0
80	160 Hz		80.00	78.62	+1.38	1.0
100	160 Hz		100.00	97.51	+2.49	1.0

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 60 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25131718

F3-011-05/12-23

page 3 of 3



@ckcalibration



CALIBRATION LABORATORY CO., LTD.

210-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : PRIMARY FLOW CALIBRATOR
MANUFACTURER : MESALABS
MODEL / TYPE : DEFENDER 510-M
SERIAL NO. : 172525
CLID. NO. : 212401789
JOB CONTROL NO. : 251107131507
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
545 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 November 2025

DATE OF ISSUED : 11 November 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory
11 November 2025

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25131507

F3-011-05/12-23

page 1 of 3



@calibration



SCARLET TECH

Certificate of Calibration

WL-21 Wireless Anemometer

Scarlet Tech Ltd. hereby certifies that the WL-21 wireless anemometer listed below was thoroughly calibrated, test and inspected following the standard calibration procedure (st-wl-21) and is within manufacture's specification at the time when the calibration is done.

Client: Envir Service Co., Ltd.
Serial: 2504DR0060 Sensor 2504DT0060
Calibration Date: 2025/10/8
Calibration Expiry Date: 2026/10/7

The Result of Calibration

Velocity			
Measured Value (m/s)	Actual Value (m/s)	Deviation	Result
1.0	1.0	0.0	Pass
2.1	2.0	0.1	Pass
4.8	5.0	0.2	Pass
6.9	7.0	0.1	Pass
9.9	10.0	0.1	Pass
19.8	20.0	0.2	Pass

Wind Direction			
Measured Value (m/s)	Actual Value (m/s)	Deviation	Result
46°	45°	1	Pass
136°	135°	1	Pass
225°	225°	0	Pass
314°	315°	1	Pass
359°	0°	1	Pass

Inspection Room Temp	Actual Value	Deviation	Tolerance	Result
22.2°C	22.5	0.3	21.5-23.5	Pass

Atmospheric Pressure Inspection	Actual Value	Deviation	Tolerance	Result
1007	1005	2	1001-1019	Pass

Environment Conditions:

Air temperature: 22 °C
Relative humidity: 55 %
Static pressure: 102.2 kPa

Performed by:

Certified by Head of Engineering



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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



ANAB
Accredited
CALIBRATION AND
DIMENSIONAL MEASUREMENT
ACDM 2814



CLC
Accredited
ISO/IEC 17025

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring primary flow calibrator.

CALIBRATION DATA

STD Applied (L / min)	DUC Reading (L / min)	Correction (L / min)	Uncertainty ± (L/min)
0.5000	0.50521	-0.00521	0.57735
1.0000	1.0160	-0.0160	0.5774
2.0000	2.0431	-0.0431	0.5774
5.0000	5.1149	-0.1149	0.5781

Technical Note. Media of Gas : Air

Setting Temperature 23 ° C ; Pressure 101.3 kPa

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 016 Page 52 of 73

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25131507
F3-011-05/12-23



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CALIBRATION LABORATORY Co., LTD.

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ANAB
Accredited
CALIBRATION AND
DIMENSIONAL MEASUREMENT
ACDM 2814

REPORT OF CALIBRATION

FOR

NOMENCLATURE : PRIMARY FLOW CALIBRATOR
MANUFACTURER : MESALABS
MODEL / TYPE : DEFENDER 510-M
SERIAL NO. : 172525
DATE OF CALIBRATION : 10 November 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPPF-03. The calibration was performed by comparison with Gas Flow Meter which refers to the standard condition of 101.325 kPa and $0 ^\circ\text{C}$.

REFERENCE STANDARD USED :

Gas Flow Meter, Alicat Scientific Model M-5SLPM-D-DB15 S/N. 261330.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Chell Instrument Ltd.
Certificate No. N039747, Due Date 02 April 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25131507
F3-011-05/12-23



@clccalibration

Request No. : 22-69 / 0084
Serial No. : A.067438

MTC No. : PSL-P 0023 / 69

Results :

UUC Range (lux)	Standard (lux)	*UUC Reading (lux)	Uncertainty of Measurement $\pm$ (lux)
2000	100	104	2.1
	500	505	11
	1000	997	21
	1500	1491	31
	2000	1982	41
20000 ($\times 10$)	2000	199	41
	3000	298	61
	4000	395	81
	5000	493	101

Note : *UUC = Unit Under Calibration.

...end of certificate...

Calibrated by :

Approved by :

Photometry and Temperature Standards Laboratory

Ref. : 2012268111404571001

Issued date : 21 November 2025

page 2 of 2

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

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Head Office
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Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009
E-mail : mt@tistr.or.th Website : www.tistr.or.th

Office/Laboratory
668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 88 1889 6827

FMBL.MTC.002 Rev.5

Request No. : 22-69 / 0084

MTC No. : PSL-P 0023 / 69

CERTIFICATE OF CALIBRATION

Nomenclature : Digital Lux Meter
Maker : EXTECH Instruments
Serial No. : A.067438
Model : 407026

Customer : ENVIRONMENTAL MEASUREMENTS CO., LTD.
Address : 5/45 Baan Klang Krung Biz Town, Soi Srinagarindra 46/1 (Promote)
Nong Bon Sub-District, Prawet District, Bangkok 10250

Date of receipt : 14 November 2025

Date of calibration : 19 November 2025

Place of calibration : Photometry and Temperature Standards Laboratory, MTC. (Bangpoo)

Basis of calibration : calibration at 0 ~ 5000 lux.

Condition of calibration : - Ambient temperature : (25 ± 2) °C

- Relative humidity : (60 ± 20) %

Reference Standard : Working Standard Luminous Intensity Lamp, Serial No.: FEL003, can be traceable to international system of units (SI), through calibration certificate MTC No. PSL-P 0113/68, date of calibration 8 May 2025.

Traceability : This certificate is traceable to SI units through the National Institute of Metrology (Thailand).

calibration certificate No. TP-1002-25, TP-11003-25 and TP-1004-25

Support Equipment : 1. Photometric bench , 3.0 meter long

2. DC power supply, Serial No.: MY41001705

3. Digital Multimeter, Model : 3458A , S/N : MY59351760

Calibration Procedure : The measurement was done in accordance with WLC.P.10.

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

page 1 of 2

R.P.

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

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009
E-mail : mt@tistr.or.th Website : www.tistr.or.th

Office/Laboratory
668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 88 1889 6827

FMBL.MTC.002 Rev.5



MM-W09

CALIBRATION LABORATORY Co., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Road, Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : MS204TS/00
SERIAL NO. : B935191252[LA-002]
LOCATION SITE : LABORATORY - BALANCE ROOM
DATE OF CALIBRATION : 04 February 2026

ENVIRONMENT CONDITIONS :

Temperature : 22 °C to 23 °C Relative Humidity : 52 % to 54 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET cg-18 Version 4.0 (11/2015).

The calibration was performed by Comparison with Standard Weight which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Standard Weight, W&J Class E2 S/N. 1228.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No.Q25059626 , Due Date 28 May 2027.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26013128

F3-011-05/12-23

page 2 of 3



@clcalibration



CALIBRATION LABORATORY Co., LTD.
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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL / TYPE : MS204TS/00
SERIAL NO. : B935191252[LA-002]
CLID. NO. : 362200356
JOB CONTROL NO. : 260130013128
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER :

ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 11 February 2026

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

11 February 2026

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q26013128

F3-011-05/12-23

page 1 of 3



@clcalibration

REPORT OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : SHIMADZU
MODEL / TYPE : AP225WD
SERIAL NO. : D376300692[LA-001]
LOCATION SITE : LABORATORY-BALANCE ROOM
DATE OF CALIBRATION : 04 February 2026

ENVIRONMENT CONDITIONS :

Temperature : 22 °C to 23 °C
Relative Humidity : 52 % to 54 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET cg-18 Version 4.0 (11/2015).
The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Standard weight, W&J Class E2 S.N. 1228

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q25059626, Due Date 28 May 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26013127

F3-011-05/12-23

page 2 of 3



@clcalibration

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION
MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

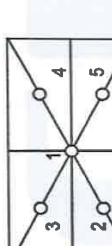
1. Error of indications

Nominal Test Value (g)	Conventional mass (g)	Display Value (g)	Error of Balance (g)	Uncertainty ± (mg)	Coverage factor k
Unload	0.0000	0.0000	0.0000	0.07	2.00
0.1000	0.1000	0.1000	0.0000	0.15	2.00
0.5000	0.5000	0.5000	0.0000	0.15	2.00
1.0000	1.0000	1.0000	0.0000	0.15	2.00
2.0000	2.0000	2.0001	+0.0001	0.15	2.00
5.0000	5.0000	5.0000	0.0000	0.15	2.00
10.0000	10.0000	10.0001	+0.0001	0.15	2.00

2. Repeatability of indications

Nominal Test Value (g)	Standard Deviation of Reading (g)
10.0000	0.00005

3. Effect of eccentric application of a load on the indication

5. Effect of eccentric application of a load on the indication						
☐	☒					
Nominal Test Value (g)	Display Value (g)					Maximum Difference of Center Value (g)
	Position 1	Position 2	Position 3	Position 4	Position 5	
100.0000	99.9999	100.0001	99.9999	99.9998	100.0001	0.0002

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 116 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q26013128

F3-011-05/12-23

page 3 of 3



@clcalibration



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION
MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

1. Error of indications

Nominal Test Value (g)	Conventional mass (g)	Display Value (g)	Error of Balance (g)	Uncertainty $\pm$ (mg)	Coverage factor k
Unload	0.0000	0.0000	0.0000	0.07	2.00
1.0000	1.0000	1.0000	0.0000	0.15	2.00
10.0000	10.0000	10.0000	0.0000	0.15	2.00
20.0000	20.0000	20.0000	0.0000	0.16	2.00
40.0000	40.0000	39.9999	-0.0001	0.18	2.00
60.0000	60.0000	59.9999	-0.0001	0.18	2.00
80.0000	80.0000	79.9999	-0.0001	0.21	2.00
100.0000	100.0000	100.0000	0.0000	0.17	2.00
120.0000	120.0000	120.0000	0.0000	0.22	2.00
140.0000	140.0000	139.9999	-0.0001	0.24	2.00
160.0000	160.0000	159.9998	-0.0002	0.24	2.00
180.0000	179.9999	179.9998	-0.0001	0.27	2.00
200.0000	200.0000	199.9997	-0.0003	0.24	2.00

2. Repeatability of indications

Nominal Test Value (g)	Standard Deviation of Reading (g)
200.0000	0.000063

3. Effect of eccentric application of a load on the indication

	☒				
Nominal Test Value (g)	Display Value (g)				
	Position 1	Position 2	Position 3	Position 4	Position 5
100.0000	100.0000	99.9999	100.0000	99.9999	99.9998
Maximum Difference of Center Value (g)					0.0002

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 116 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q26013127

F3-011-05/12-23

page 3 of 3



@clcalibration



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : SHIMADZU
MODEL / TYPE : AP225WD
SERIAL NO. : D376300692[LA-001]
CLID. NO. : 362100172
JOB CONTROL NO. : 260130013127
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 07 February 2026

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

07 February 2026

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q26013127

F3-011-05/12-23

page 1 of 3



@clcalibration



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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : DO METER
MANUFACTURER : YSI
MODEL / TYPE : 5000-230V/5010
SERIAL NO. : 16D101626/19D100367[DOM-01]
DATE OF CALIBRATION : 28 January 2026

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPCH-06. The calibration was performed by direct measurement with Certified Reference Material (CRM).

REFERENCE STANDARD USED :

Dissolved Oxygen, Sigma-Aldrich Product ID QC3077-500ML.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Sigma-Aldrich USA.
Lot LRAD8571, Due Date April 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26011808
F3-011-05/12-23

page 2 of 3



@clcalibration



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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DO METER
MANUFACTURER : YSI
MODEL / TYPE : 5000-230V/5010
SERIAL NO. : 16D101626/19D100367[DOM-01]
CLID. NO. : 272100329
JOB CONTROL NO. : 260127011808
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 27 January 2026

DATE OF ISSUED : 29 January 2026

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

29 January 2026

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q26011808
F3-011-05/12-23

page 1 of 3



@clcalibration



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL / TYPE : UF110
SERIAL NO. : B422.0026[LA-0012]
CLID. NO. : 33202464
JOB CONTROL NO. : 260130013129
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 09 February 2026

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory
09 February 2026

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q26013129
F3-011-05/12-23

page 1 of 4



@clcalibration

CALIBRATION DATA

DO METER RESULT @ 20 °C

Nominal Value (mg/L)	DUC Reading (mg/L)	Correction (mg/L)	Uncertainty (mg/L)
8.18	8.22	-0.04	± 0.38

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 018 Page 5 of 73

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q26011808
F3-011-05/12-23

page 3 of 3



@clcalibration

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring hot air oven.

CALIBRATION DATA

1. HOT AIR OVEN PERFORMANCE

Setting (°C)	DUC		Measured Uniformity (°C)	Measured Stability (°C)	Measured Overall Variation (°C)
	Indicating (°C)				
104.0	104.0		0.29	0.16	0.55
180.0	180.0		1.08	0.38	2.16

Certificate No. Q26013129

F3-011-05/12-23

page 3 of 4



@cccalibration

REPORT OF CALIBRATION

FOR

NOMENCLATURE : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL / TYPE : UF110
SERIAL NO. : B422.0026[LA-0012]
LOCATION SITE : LABORATORY - HOT ZONE
DATE OF CALIBRATION : 04 February 2026

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 48% to 52 %

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-07 based on TLAS G-20 as calibration guidelines.

The calibration was performed by using Hydra Series II which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Series II, Fluke Model 2635A S/N. 1700013.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.

Certificate No. Q25059630, Due Date 02 June 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 % .
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26013129

F3-011-05/12-23

page 2 of 4



@cccalibration



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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : INCUBATOR
MANUFACTURER : ACCUPLUS
MODEL / TYPE : SMART 1250
SERIAL NO. : 2059-0718-0010[LA-002]
CLID. NO. : 332100155
JOB CONTROL NO. : 260130013130
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 09 February 2026

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

09 February 2026

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q26013130

F3-011-05/12-23

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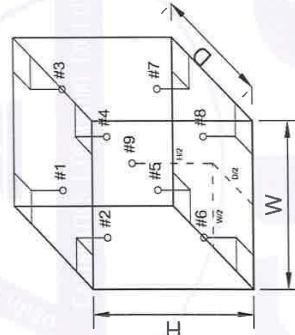
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

DUC			Measured Temperature (° C)@Probe No.9 is Ref.									Uncertainty ± (° C)	Coverage factor <i>k</i>
Setting (° C)	Indicating (° C)		1	2	3	4	5	6	7	8	9		
104.0	104.0		103.65	103.93	103.70	104.00	103.69	103.94	103.69	103.94	103.91	0.21	2,00
180.0	180.0		178.96	178.84	179.84	180.32	178.74	180.02	179.09	180.34	179.69	0.51	2,00

Technical Note : W = 56 cm, D = 40 cm, H = 48 cm.

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 018 Page 63 of 73



This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q26013129

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@clcalibration

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring incubator.

CALIBRATION DATA

1. INCUBATOR PERFORMANCE

Setting (°C)	DUC		Measured Uniformity (°C)	Measured Stability (°C)	Measured Overall Variation (°C)
	Indicating (°C)				
20.0	20.0		0.59	0.36	0.81

Certificate No. Q26013130

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@clcalibration

REPORT OF CALIBRATION

FOR

NOMENCLATURE : INCUBATOR
MANUFACTURER : ACCUPLUS
MODEL / TYPE : SMART i250
SERIAL NO. : 2059-0718-0010[L.A-002]
LOCATION SITE : LABORATORY
DATE OF CALIBRATION : 04 February 2026

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 48 % to 52 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-165 based on TLAS G-20-1/02-08 as calibration guidelines.
The calibration was performed by using Hydra Series II which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Series II, Fluke Model 2635A S/N: 8209003.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q25044222, Due Date 21 April 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26013130

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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : pH METER
MANUFACTURER : APERA
MODEL / TYPE : PH700/201T-F
SERIAL NO. : PH700X1019061009/N/A [I.L.A-008/PH-02]
CLID. NO. : 272401000
JOB CONTROL NO. : 260127011809
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 27 January 2026 DATE OF ISSUED : 29 January 2026
The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

29 January 2026

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q26011809

F3-011-05/12-23

page 1 of 4



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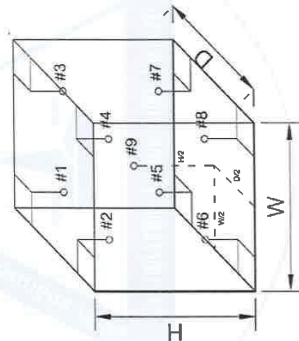
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

DUC		Measured Temperature (°C) @Probe No.9 is Ref.									Uncertainty ± (°C)	Coverage factor k
Setting (°C)	Indicating (°C)	1	2	3	4	5	6	7	8	9		
20.0	20.0	20.63	20.71	20.61	20.43	20.53	20.50	20.53	20.56	20.38	0.60	2.00

Technical Note : W = 50 cm, D = 48 cm, H = 110 cm.

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 129 of 138



This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q26013130

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@clcalibration



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TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Lot Number: 191025, 241025. Due Date 24 December 2026.
2. The measurements are traceable to International System of Units (SI), through Control Company.
Certificate No. 4288-15743843, Due Date 27 February 2027.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q25097314, Due Date 29 August 2026.
4. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 0177/68, Due Date 10 February 2026.
5. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).
Certificate No. TT-1008-25, Due Date 04 March 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26011809
F3-011-05/12-23

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REPORT OF CALIBRATION

FOR

NOMENCLATURE : pH METER
MANUFACTURER : APERA
MODEL / TYPE : PH700/201T-F
SERIAL NO. : PH700X1019061009/N/A [LA-008/PH-02]
DATE OF CALIBRATION : 28 January 2026

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-128, WI-305-238. The calibration was performed by direct measurement with Certified Reference Material (CRM) and comparison with Temperature Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. pH Standard Solution, NIMT TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Control Company Catalog Number 06664263, 11784256, Lot Number CC818772.
3. Temperature Bath, Jingmi Model RTS-35S S/N. 16339.
4. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03.
5. IPRT, ASL Model T100-250-1D S/N. PO106346-1-13.

Certificate No. Q26011809
F3-011-05/12-23

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@clcalibration



REPORT OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : MEMMERT
MODEL / TYPE : WNB14
SERIAL NO. : L418.0758[LA-004]
LOCATION SITE : LABORATORY - HOT ZONE
DATE OF CALIBRATION : 04 February 2026

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C
Relative Humidity : 48% to 52%

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-135 based on ASTM E 715-80:2016 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.
Certificate No. Q25111569, Due Date 24 March 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor $k = 2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %, It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26013132

F3-011-05/12-23



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION
MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of pH meter.

CALIBRATION DATA

1. pH METER RESULT @ 25 °C

Standard pH Buffer Solution (pH)	pH Meter Reading (pH)	pH Meter Reading (mV)	Correction (pH)	Uncertainty of Measurement ($\pm$ pH)	k Factor
4.012	4.00	123	+0.012	0.014	2.15
6.997	7.00	-53	-0.003	0.015	2.06
9.994	10.00	-220	-0.006	0.100	2.00

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 91 of 138

*2. TEMPERATURE RESULT

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty $\pm$ (°C)
100	25.00	25.0	0.00	0.08

Technical Note. Type of sensor : pH Probe
Probe $\varnothing$ 12 mm

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2$.

Note. * means Calibrations marked " Not TISI Accredited " in this Certificate have been included for completeness.

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q26011809

F3-011-05/12-23





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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring water bath.

CALIBRATION DATA

1. WATER BATH PERFORMANCE

Test Point (°C)	DUC Reading (°C)	Uniformity (°C)	Stability (°C)
95.0	95.0	0.39	0.20

Certificate No. Q26013132

F3-011-05/12-23

page 3 of 4



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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : MEMMERT
MODEL / TYPE : WNB14
SERIAL NO. : L418.0758[LA-004]
CLID. NO. : 332100157
JOB CONTROL NO. : 260130013132
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 09 February 2026

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

09 February 2026

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q26013132

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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : M-LAB
MODEL / TYPE : WBN 15
SERIAL NO. : 0335[LA-007]
CLID. NO. : 332300657
JOB CONTROL NO. : 260130013133
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 30 January 2026

DATE OF ISSUED : 09 February 2026

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Calibrated By :

Calibration Engineer



Approved By :

Authorized Signatory

09 February 2026

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Certificate No. Q26013133

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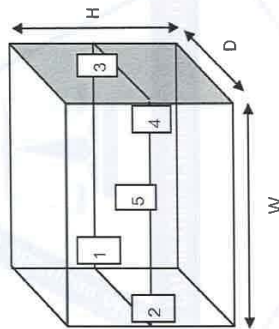
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

Test Point (°C)	DUC Reading (°C)	STD Reading (°C)					Uncertainty ± (°C)
		Probe No. 1	Probe No. 2	Probe No. 3	Probe No. 4	Probe No. 5	
95.0	95.0	96.25	96.15	96.08	95.99	96.03	0.52

Technical Note : W = 35 cm, D = 29 cm, H = 14 cm.

Note. The Scope of Accredited TISI Certificate No. 23-1-B0092 Issue 02 Page 128 of 138



This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q26013132

F3-011-05/12-23

page 4 of 4



@elcalibration



MM-W09

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CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring water bath.

CALIBRATION DATA

1. WATER BATH PERFORMANCE

Test Point (°C)	DUC Reading (°C)	Uniformity (°C)	Stability (°C)
85.0	85.0	0.21	0.14

Certificate No. Q26013133

F3-011-05/12-23

page 3 of 4



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REPORT OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : M-LAB
MODEL / TYPE : WBN 15
SERIAL NO. : 0335[LA-007]
LOCATION SITE : LABORATORY - HOT ZONE
DATE OF CALIBRATION : 04 February 2026

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C Relative Humidity : 48% to 52%

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-135 based on ASTM E 715-80:2016 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q25111569, Due Date 24 March 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q26013133

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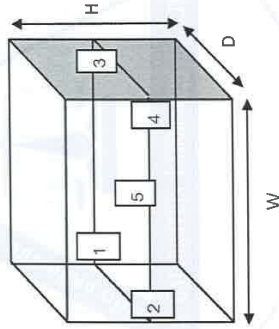
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

Test Point ($^{\circ}\text{C}$)	DUC Reading ($^{\circ}\text{C}$)	STD Reading ($^{\circ}\text{C}$)					Uncertainty $\pm$ ($^{\circ}\text{C}$)
		Probe No. 1	Probe No. 2	Probe No. 3	Probe No. 4	Probe No. 5	
85.0	85.0	84.91	84.92	84.92	84.92	84.84	0.32

Technical Note : W = 35 cm, D = 30 cm, H = 15 cm.

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 128 of 138



This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q26013133
F3-011-05/12-23

page 4 of 4



@clcalibration

ที่ อก ๐๓๑๐(๑)/ ๖ ๙ ๗ ๓



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒ ๕ สิงหาคม ๒๕๖๔

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนาไลติกส์ คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๗ สิงหาคม ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนาไลติกส์ คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้อยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

จำนวน ๕ ราย ได้แก่

- ๑)
- ๒)
- ๓)
- ๔)
- ๕)

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

นักวิทยาศาสตร์ฝ่ายขาย วิชาการเกษตร
ผู้อำนวยการ
ผู้ดำเนินการวิจัยและเตือนภัยมลพิษโรงงาน
บริษัทราชเทวีเคมีภัณฑ์ จำกัด โรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๑๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



สำนักงานถูกต้อง



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



ที่ อก ๐๓๑๐(๑)/ ๘ ๓ ๐ ๒



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐ ๘ ตุลาคม ๒๕๖๔

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนาไลติกส์ คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๕ กันยายน ๒๕๖๔

ตามคำขอที่อ้างถึง บริษัท ยูไนเต็ด แอนาไลติกส์ คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้อยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

จำนวน ๓ ราย ได้แก่

- ๑)
- ๒)
- ๓)

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการวิจัยและเตือนภัยมลพิษโรงงาน
บริษัทราชเทวีเคมีภัณฑ์ จำกัด โรงงานอุตสาหกรรม



สำนักงานถูกต้อง

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๑๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์
บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด เลขทะเบียน ๖-๑๔๕
ที่ อก ๐๓๑๐(๑)/ ๕๖ ๙ ๑ ลงวันที่ ๐๗ กรกฎาคม ๒๕๖๔

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๑ รายการ

น้ำใต้ดิน จำนวน 4 รายการ		วิธีวิเคราะห์
ลำดับที่	สารมลพิษ	
1	Aluminum	Digestion, Inductively Coupled Plasma Method ⁽¹⁾
2	Copper	1) Digestion, Flame Atomic Absorption Spectrometric Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
3	Iron	1) Digestion, Flame Atomic Absorption Spectrometric Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
4	Molybdenum	Digestion, Inductively Coupled Plasma Method ⁽¹⁾

อากาศเสีย (ปล่องระบาย) จำนวน 1 รายการ		วิธีวิเคราะห์
ลำดับที่	สารมลพิษ	
1	Oxides of Nitrogen	Absorption Sampling, Ion Chromatographic Method ⁽²⁾

ดิน จำนวน 6 รายการ		วิธีวิเคราะห์
ลำดับที่	สารมลพิษ	
1	Aluminum	Digestion, Inductively Coupled Plasma Method ^(3,5)
2	Copper	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6) 2) Digestion, Inductively Coupled Plasma Method ^(3,5)
3	Iron	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6) 2) Digestion, Inductively Coupled Plasma Method ^(3,5)
4	Molybdenum	Digestion, Inductively Coupled Plasma Method ^(3,5)
5	pH	Electrometric Method ⁽⁸⁾
6	TPH (C ₅ -C ₈)	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(4,7)

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

2. United States Environmental Protection Agency. Standards of Performance for New Stationary Sources. 40 CFR 60. Appendix A, 2023.

3. United States...



ที่ อก ๐๓๑๐(๑)/ ๕๖ ๙ ๑

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐ ๗ กรกฎาคม ๒๕๖๔

เรื่อง เปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์
เรียน กรรมการผู้จัดการ บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๙ พฤษภาคม ๒๕๖๔

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์
บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด จำนวน ๒ แผ่น
ตามหนังสือที่อ้างถึง บริษัท ยูไนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์
ความละเอียดดังแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๓ ราย

ทะเบียนเลขที่
ทะเบียนเลขที่
ทะเบียนเลขที่

๒. ให้เพิ่มผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑ ราย

๓. ให้เพิ่มข้อขยายสารมลพิษที่วิเคราะห์ให้ไม่จำกัดดิน อากาศเสีย และดิน ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒ กุมภาพันธ์ ๒๕๖๒

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน
ผู้บัญชาการกองวิจัยและเฝ้าระวังมลพิษโรงงาน

กองวิจัยและเฝ้าระวังมลพิษโรงงาน



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ดำเนินการต่อ

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โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๔๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@dw.mail.go.th



"อุตสาหกรรมก้าวหน้า ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"





ที่ อก ๐๓๐๑(๑)/ ๑ ๔ ๙ ๑

กรมโรงงานอุตสาหกรรม

ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๔ กุมภาพันธ์ ๒๕๖๔

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ยูนิค แอนาไลส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ด้อยอายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๘ กุมภาพันธ์ ๒๕๖๔ตามคำขอที่อ้างถึง บริษัท ยูนิค แอนาไลส์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๑๔๕ สถานที่ตั้งเลขที่ ๓ ซอยอุดมสุข ๔๑ ถนนสุขุมวิท
แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้นกรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน
จำนวน ๓ ราย ได้แก่

- ๑) ทะเบียนเลข ๔
- ๒) ทะเบียนเลข
- ๓) ทะเบียนเลข

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนามลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@dvw.mail.go.th

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สำนักงานถูกต้อง



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า รวมกันพัฒนา อุตสาหกรรมสีเขียว”



กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและทะเบียนห้องปฏิบัติการ กองวิจัยและพัฒนามลพิษโรงงาน กรมโรงงานอุตสาหกรรม โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

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สำนักงานถูกต้อง

3. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Acid Digestion of Sediments, Sludges, and Soils. SW-846 Method 3050B, 1996.
4. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis. SW-846 Method 5021A, 2014.
5. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Inductively Coupled Plasma-Optical Emission Spectrometry. SW-846 Method 6010D, 2018.
6. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B, 2007.
7. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8260D, 2018.
8. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Soil and Waste pH. SW-846 Method 9045D, 2004.

[illegible]

၀၃၂ ကမ္ဘာ့

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
เรียน กรรมการผู้จัดการ บริษัท ยูนิค แอนาไลติกส์ แอนด์ เอ็นจิเนียริ่ง คอร์ปอเรชั่น จำกัด
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขีปนสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓ ธันวาคม ๒๕๖๓

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย
๒. รายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๔๑ ราย
๓. ขอบข่ายสารเคมีที่ใช้ได้รับทะเบียนเบียนจากกรมโรงงานอุตสาหกรรม

ตามคำขอที่อ้างถึง บริษัท ยูนิเด็ด แอมบลิสดี แอนด์ เอเจียนซ์รี คอมส์แอนด์เทรด จำกัด ขอตอบว่า

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ยูไนเต็ด แอมนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด ต่อยานยนต์สี่ล้อขับเคลื่อนทั้งปวงเพื่อการวิเคราะห์เอกชน โดยมีดังประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์หาพิษ จำนวน ๑๔๔ ราย ตามสิ่งที่ส่งมาด้วย ๒

ค. ขอบข่ายสามสภะซึ่งได้ตั้งระเบียบวิเคราะห์เป็น ๗/๗ เสีย นวัตกรรม อากาศเสีย

ง. ภูมิพลหรือวัสดุที่ไม่ใช่แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะมีผลภายในวันที่ ๑ กุมภาพันธ์ ๒๕๒๒ หากประสงค์จะต่ออายุหนังสือ
ขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงาน
อุตสาหกรรมภายใน ๖๐ วัน ก่อนวันอายุของหนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

ထိုအခါ၌

รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมพลังงานความร้อน

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์และทดสอบผลิตภัณฑ์ จำกัด
ANALYST AND ENGINEERING LIMITED

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เอกสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

เบรชฌญียอเล็ทอรอนิกส์ saraban@diw.mail.go.th

“อุตสาหกรรมกาวไกล ประเทศไทยก้าวหน้า รวมกันพัฒนา อุตสาหกรรมสีเขียว”



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นางสาวปัทมา นิลน้อย

การเปลี่ยนแปลง

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สำนักงาน
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ขอขยายสารมลพิษที่ได้รับขบตะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๕๗ รายการ

ลำดับ	สารเคมี	วิธีการวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
2	Arsenic	1) Digestion, 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	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
5	β -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
6	δ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
7	γ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^[4] 2) 5-Day BOD Test, Membrane Electrode Method ^[4]
9	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
10	Chemical Oxygen Demand	1) Closed Reflux, Titrimetric Method ^[4] 2) Closed Reflux, Colorimetric Method ^[4] 3) Open Reflux, Titrimetric Method ^[4]
11	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
12	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
13	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[4]
14	Copper	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
15	Cyanide	1) Distillation, Colorimetric Method ^[4] 2) Total Cyanide after Distillation, by Flow Injection Analysis Method ^[4]
16	o,p' -DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
17	$4,4'$ -DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
18	$4,4'$ -DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
19	$4,4'$ -DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
20	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
21	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
22	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
23	Endosulfan sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
24	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]

25 Endrin aldehyde...

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ลำดับ	สารมลพิษ	วิธีวิเคราะห์
25	Endrin aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
26	Formaldehyde	Distillation, Colorimetric Method ⁽²⁾
27	Free Chlorine	1) Iodometric Method ^(a) 2) DPD Ferrous Titrimetric Method ^(a)
28	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
29	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
30	Hexavalent Chromium	Colorimetric Method ^(a)
31	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
32	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
33	Mercury	1) Digestion, Inductively Coupled Plasma Method ^(a) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(a)
34	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
35	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
36	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ^(a) 2) Soxhlet Extraction Method ^(a)
37	pH	Electrometric Method ^(a)
38	Phenols	1) Distillation, Chloroform Extraction Method ^(a) 2) Distillation, Direct Photometric Method ^(a)
39	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
40	Sulfide	1) Iodometric Method ^(a) 2) Methylene Blue Method ^(a)
41	Temperature	Laboratory and Field Methods ^(a)
42	Total Dissolved Solids	Dried at 180 °C ^(a)
43	Total Kjeldahl Nitrogen	Semi-Micro-Kjeldahl Method ^(a)
44	Total Suspended Solids	Dried from 103 to 105 °C ^(a)
45	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method, Calculation ^(a) 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method, Calculation ^(a)
46	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)

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น้ำใต้ดิน จำนวน 126 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
2	Acetone	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
3	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
4	Anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
5	Antimony	Digestion, Inductively Coupled Plasma Method ^(a)
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
8	Barium	Digestion, Inductively Coupled Plasma Method ^(a)
9	Benz(a)anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
10	Benzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
11	Benzo(b)fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
12	Benzo(k)fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)

14 Benzo(a)pyrene...

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ลำดับ	สารเคมี	วิธีวิเคราะห์
29	Chlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
31	Chloroform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
33	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
34	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^(a) 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^(a)
35	Chromium (VI)	Colorimetric Method ^(a)
36	Chrysene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
37	Cyanide	Distillation, Colorimetric Method ^(a)
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
39	DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
40	DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
41	DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
42	Dibenz(a,h)anthracene	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)

43 Di-n-butyl phthalate...

ลำดับ	สารเคมี	วิธีวิเคราะห์
14	Benzo(a)pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
15	Benzo(g,h,i)perylene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
16	Beryllium	Digestion, Inductively Coupled Plasma Method ^(a)
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
20	Bromoform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
21	Butanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
23	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a)
24	Carbazole	3) Digestion, Inductively Coupled Plasma Method ^(a) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
25	Carbon disulfide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
26	Carbon tetrachloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
27	Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)

29 Chlorobenzene...

ลำดับ	สารเคมีพิษ	วิธีวิเคราะห์
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
63	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
64	Endosulfan	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
65	Endrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
66	Ethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
67	Fluoranthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
68	Fluorene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
70	Heptachlor epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

74 α -HCH...

ลำดับ	สารเคมีพิษ	วิธีวิเคราะห์
43	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
44	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
45	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
46	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
47	3,3'-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
48	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
49	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
50	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
51	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
52	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
54	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
55	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
56	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
57	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
58	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

61 2,4-Dinitrotoluene...

ลำดับ	สารเคมี	วิธีวิเคราะห์
74	α-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
75	β-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
76	γ-HCH	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
79	Indeno(1,2,3-cd)pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
81	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a)
82	Manganese	3) Digestion, Inductively Coupled Plasma Method ^(a) 1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
83	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(a)
84	Methanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
85	Methoxychlor	1) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
86	Methyl bromide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)

87 Methylene chloride...

ลำดับ	สารเคมี	วิธีวิเคราะห์
87	Methylene chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
89	2-Methylnaphthalene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
90	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^(a)
91	Naphthalene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
92	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
95	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB-1242 - PCB-1248 - PCB-1254 - PCB-1260	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)
98	pH	Electrode Method ^(a)
99	Phenanthrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(a)

100 Phenol...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
118	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
119	Vanadium	Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
120	Vinyl acetate	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
121	Vinyl chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
122	m-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
123	o-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
124	p-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
125	Xylene (Total)	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
126	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾

อากาศเสีย (ปล่อยระบาย) จำนวน 25 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	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, Inductively Coupled Plasma Method ⁽⁵⁾
3	Cadmium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
4	Carbon Monoxide	Instrumental Analyzer Method ⁽⁵⁾
5	Chlorine	Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾
6	Chromium	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾

Chromium (ต่อ)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
100	Phenol	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
103	Silver	Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
104	Styrene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
106	Tetrachloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
107	Toluene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
108	Toxaphene	1) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₅ - C ₉)	1) Purge and Trap, Gas Chromatographic Method ^(12,22) 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(12,22)
110	TPH (C ₈ - C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
111	TPH (C ₁₆ - C ₃₅)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
112	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
113	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
114	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
115	Trichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

116 2,4,5-Trichlorophenol...

ลำดับ	สารเคมี	วิธีวิเคราะห์
23	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^[3]
24	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
25	Xylene	1) Bag Sampling, Gas Chromatographic Method ^[5] 2) Adsorption Sampling, Gas Chromatographic Method ^[5]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับ	สารเคมี	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[3,9,23] 2) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23]
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[3,6,14] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[3,6,14] 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,16]
4	Barium	4) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[3,6,14]
5	Beryllium	2) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[3,6,14]
6	Cadmium	2) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[3,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[3,6,14]
7	Chlordane	3) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 4) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[3,9,23] 2) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23]

8 Chromium...

ลำดับ	สารเคมี	วิธีวิเคราะห์
6	Chromium (๑๖)	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
7	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
8	Copper	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5]
9	Cresol	Absorption Sampling, Gas Chromatographic Method ^[5]
10	Dioxins/Furans	Isokinetic Sampling ^[5]
11	Hydrogen Chloride	Isokinetic Sampling, Ion Chromatographic Method ^[5]
12	Hydrogen Fluoride	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, 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 ^[11]
19	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method ^[5] 2) Instrumental Analyzer Method ^[5]
20	Selenium	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[5]
21	Sulfur Dioxide	2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5] 1) Absorption Sampling, Barium-Thorium Titrimetric Method ^[5]
22	Sulfuric Acid	2) Instrumental Analyzer Method ^[5] Isokinetic Sampling, Barium-Thorium Titrimetric Method ^[5]

23 Total Suspended Particulate...

ลำดับ	สารเคมี	วิธีวิเคราะห์
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 4) Digestion, Inductively Coupled Plasma Method ^(7.14) 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^(3.6.15,17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation ^(3.6.14,17) 3) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7.14,15,17) 4) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7.14,17)
9	Chromium (III)	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3.17) 2) Alkaline Digestion, Colorimetric Method ^(8.17) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14) 2) Digestion, Inductively Coupled Plasma Method ^(7.14) 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 4) Digestion, Inductively Coupled Plasma Method ^(7.14) 1) Waste Extraction, Gas Chromatographic Method ^(3.26) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(3.26)
10	Chromium (VI)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(7.14) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(3.26)
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14) 2) Digestion, Inductively Coupled Plasma Method ^(7.14) 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 4) Digestion, Inductively Coupled Plasma Method ^(7.14) 1) Waste Extraction, Gas Chromatographic Method ^(3.26) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(3.26)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(7.14) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(3.26)
13	2,4-D	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(7.14) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(3.26)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3.23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.23)

15 DDE...

ลำดับ	สารเคมี	วิธีวิเคราะห์
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3.23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.23)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3.23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.23)
17	Dieldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3.23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.23)
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3.23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.23)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3.23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.23)
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 4) Digestion, Inductively Coupled Plasma Method ^(7.14) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3.23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.23)
21	Lindane	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(7.14) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.23)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(3.19) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14) 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁹⁾ 4) Digestion, Inductively Coupled Plasma Method ^(7.14)

Mercury (ค่า)...
15 DDE...

ลำดับ	สารเคมี	วิธีวิเคราะห์
27	Polychlorinated Biphenyls(ตบ) - 2,2',3,4,4',5'- Hexachlorobiphenyl - 2,2',3,4,5,5'- Hexachlorobiphenyl - 2,2',3,5,5',6'- Hexachlorobiphenyl - 2,2',4,4',5,5'- Hexachlorobiphenyl - 2,2',3,3',4,4',5'- Heptachlorobiphenyl - 2,2',3,4,4',5,5'- Heptachlorobiphenyl - 2,2',3,4,4',5',6'- Heptachlorobiphenyl - 2,2',3,4',5,5',6'- Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6'- Nonachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(3,9,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28) Electrometric Method ^(31,32) 1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(3,6,21) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,21) 4) Digestion, Inductively Coupled Plasma Method ^(7,14) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
28	pH	
29	Selenium	
30	Silver	
31	Thallium	

32 Toxaphene...

ลำดับ	สารเคมี	วิธีวิเคราะห์
22	Mercury (ตบ)	5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽²⁰⁾
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,23) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)
24	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)
25	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3,6,14) 3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 4) Digestion, Inductively Coupled Plasma Method ^(7,14)
26	Polychlorinated Biphenyls - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'- Pentachlorobiphenyl - 2,2',4,5,5'- Pentachlorobiphenyl - 2,3,3',4',6'- Pentachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3,9,24) 2) Ultrasonic Extraction, Gas Chromatographic Method ^(10,24)

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
4	Anthracene (ตอ)	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.28)
5	Antimony	Digestion, Inductively Coupled Plasma Method ^(7.14)
6	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7.16)
7	Atrazine	2) Digestion, Inductively Coupled Plasma Method ^(7.14)
8	Barium	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.28)
9	Benz(a)anthracene	Digestion, Inductively Coupled Plasma Method ^(7.14)
10	Benzene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10.25)
11	Benzo(b)fluoranthene	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.28)
12	Benzo(k)fluoranthene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13.27)
13	Benzoic acid	2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11.27)
14	Benzo(a)pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10.25)
15	Benzo(g,h,i)perylene	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.28)
16	Beryllium	1) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.25)
		2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.28)

17 Bis(2-chloroethyl)ether...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
32	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(3.6.23)
33	Trichloroethylene	2) Ultrasonic Extraction, Gas Chromatographic Method ^(10.25)
34	Vanadium	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(3.12.27)
35	Zinc	2) Waste Extraction, Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(3.11.27)
		3) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13.27)
		4) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11.27)
		1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14)
		2) Digestion, Inductively Coupled Plasma Method ^(7.14)
		1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(3.6.15)
		2) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(3.6.14)
		3) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15)
		4) Digestion, Inductively Coupled Plasma Method ^(7.14)

ติบ จำนวน 125 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10.25)
2	Acetone	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.28)
3	Aldrin	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13.27)
4	Anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10.25)
		2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.28)
		1) Ultrasonic Extraction, Gas Chromatographic Method ^(10.25)
		2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10.28)

Anthracene (ตอ)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
33	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Inductively Coupled Plasma Method ^(7,16)
34	Chromium (III)	1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,15,17) 2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,14,17) Alkaline Digestion, Colorimetric Method ^(8,17)
35	Chromium (VI)	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,25) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
36	Chrysene	Extraction, Distillation, Colorimetric Method ^(29,30) Ultrasonic Extraction, Gas Chromatographic Method ⁽²⁶⁾
37	Cyanide	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
38	2,4-D	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
39	DDD	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
40	DDE	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
41	DDT	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
42	Dibenz(a,h)anthracene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,25) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
43	Di-n-butyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
44	1,2-Dichlorobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(13,27)

45 1,3-Dichlorobenzene...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
17	Bis(2-chloroethyl)ether	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
18	Bis(2-ethylhexyl)phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
21	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
22	Butyl benzyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Inductively Coupled Plasma Method ^(7,16)
24	Carbazole	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
26	Carbon tetrachloride	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
27	Chlordane	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
28	p-Chloroaniline	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
31	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
32	2-Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)

33 Chromium...

ลำดับ	สารเคมี	วิธีวิเคราะห์
58	Diethyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
59	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
60	2,4-Dinitrophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
61	2,4-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
62	2,6-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
63	Di-n-Octyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
64	Endosulfan	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
65	Endrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
66	Ethylbenzene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
67	Fluoranthene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
68	Fluorene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
69	Heptachlor	1) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,23)
70	Heptachlor epoxide	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23)

Heptachlor epoxide (คต)...

ลำดับ	สารเคมี	วิธีวิเคราะห์
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
47	3,3'-Dichlorobenzidine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
48	1,1-Dichloroethane	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
49	1,2-Dichloroethane	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
50	1,1-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
51	cis-1,2-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
52	trans-1,2-Dichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
53	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
57	Dieldrin	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)

58 Diethyl phthalate...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[19] 2) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^[20] Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,27]
84	Methanol	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23]
85	Methoxychlor	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28] Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,27]
86	Methyl bromide	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,27]
87	Methylene chloride	2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
88	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
89	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
90	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,27]
91	Naphthalene	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,25] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
92	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
93	Nitrobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
94	N-Nitrosodiphenylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
95	N-Nitrosodi-n-propylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
96	Polychlorinated Biphenyls - Aroclor 1016	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,24]

Polychlorinated Biphenyls(สต่อ)...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
70	Heptachlor epoxide (สต่อ)	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
71	Hexachlorobenzene	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,27]
73	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,27]
74	α -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
75	β -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
76	γ -HCH	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,23] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
77	Hexachlorocyclopentadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
78	Hexachloroethane	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
79	Indeno(1,2,3-cd)pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^[10,25] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
80	Isophorone	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^[10,28]
81	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]
82	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Inductively Coupled Plasma Method ^[7,14]

83 Mercury...

ลำดับ	สารมลพิษ	วิธีการตรวจ
97	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
98	Phenanthrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,25) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
99	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
100	Pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method ^(10,25) 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
101	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,21) 2) Digestion, Inductively Coupled Plasma Method ^(7,14) Digestion, Inductively Coupled Plasma Method ^(7,14)
102	Silver	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
103	Styrene	2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
105	Tetrachloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
106	Toluene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
107	Toxaphene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
108	TPH (C ₅ -C ₈)	Ultrasonic Extraction, Gas Chromatographic Method ^(10,23) 1) Purge and Trap, Gas Chromatographic Method ^(13,22) 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,22)
109	TPH (C ₈ -C ₁₆)	Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)
110	TPH (C ₅ -C ₃₅)	Ultrasonic Extraction, Gas Chromatographic Method ^(10,22)

111 1,2,4-Trichlorobenzene...

ลำดับ	สารเคมี	วิธีวิเคราะห์
96	Polychlorinated Biphenyls(ต่อ) - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 Polychlorinated Biphenyls - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'- Pentachlorobiphenyl - 2,2',4,5,5'- Pentachlorobiphenyl - 2,3,3',4',6- Pentachlorobiphenyl - 2,2',3,4,4',5'- Hexachlorobiphenyl - 2,2',3,4,5,5'- Hexachlorobiphenyl - 2,2',3,5,5',6- Hexachlorobiphenyl - 2,2',4,4',5,5'- Hexachlorobiphenyl - 2,2',3,3',4,4',5- Heptachlorobiphenyl - 2,2',3,4,4',5,5'- Heptachlorobiphenyl - 2,2',3,4,4',5',6- Heptachlorobiphenyl - 2,2',3,4',5,5',6- Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6- Nonachlorobiphenyl	2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method^[10,28] Ultrasonic Extraction, Gas Chromatographic Method^[10,24]

97 Pentachlorophenol...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
125	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Inductively Coupled Plasma Method ^(7,14)

เอกสารอ้างอิง

- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2549. เรื่อง กำหนดค่าปริมาณขั้นต่ำที่ถือเป็นอากาศที่ระบายออกจากปล่องของหม้อน้ำโรงงานที่เป็นเชื้อเพลิง. ราชกิจจานุเบกษา. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 125จ.
- สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.
- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2566. เรื่อง การจัดการสิ่งปฏิกูลหรือวัสดุที่ไม่ได้เสีย. ราชกิจจานุเบกษา. 31 พฤษภาคม 2566. เล่มที่ 140 ตอนพิเศษ 126 จ.
- APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24th ed. Washington, DC: APHA, 2023.
- United States Environmental Protection Agency. Standards of Performance for New Stationary Sources. 40 CFR 60. Appendix A, 2020.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. SW-846, 2014.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Acid Digestion of Sediments, Sludges, and Soils. SW-846 Method 3050B, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Alkaline Digestion for Hexavalent Chromium. SW-846 Method 3060A, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Separatory Funnel Liquid-Liquid Extraction. SW-846 Method 3510C, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Ultrasonic Extraction. SW-846 Method 3550C, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis. SW-846 Method 5021A, 2014.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Purge and Trap for Aqueous Samples. SW-846 Method 5030C, 2003.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Closed System Purge and Trap and Extraction for Volatile Organics in Soil and Waste Sample. SW-846 Method 5035A, 2000.
- United States...

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
114	Trichloroethylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
115	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
116	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,28)
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
118	Vanadium	Digestion, Inductively Coupled Plasma Method ^(7,14)
119	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
120	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27)
121	m-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
122	o-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
123	p-Xylene	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
124	Xylene (Total)	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,27) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(11,27)

27. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds by Gas Chromatography/ Mass Spectrometry. SW-846 Method 8260D, 2018.
28. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8270E, 2018.
29. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Cyanide Extraction Procedure for Solids and Oils. SW-846 Method 9013A, 2014.
30. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Cyanide in Waters and Extracts using Titrimetric and Manual Spectrophotometric Procedures. SW-846 Method 9014, 2014.
31. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. pH Electrometric Measurement. SW-846 Method 9040C, 2004.
32. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Soil and Waste pH. SW-846 Method 9045D, 2004.



14. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Inductively Coupled Plasma-Optical Emission Spectrometry. SW-846 Method 6010D, 2014.
15. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B, 2007.
16. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Arsenic (Atomic Absorption, Gaseous Hydride). SW-846 Method 7061A, 1992.
17. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Chromium, Hexavalent (Colorimetric). SW-846 Method 7196A, 1992.
18. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Mercury in Liquid Waste (Manual Cold Vapor Technique). SW-846 Method 7470A, 1994.
19. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique). SW-846 Method 7471B, 1998.
20. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Mercury in Solids and Solutions by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry. SW-846 Method 7473, 2007.
21. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Selenium (Atomic Absorption, Borohydride Reduction). SW-846 Method 7742, 1994.
22. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Nonhalogenated Organics Using GC/FID. SW-846 Method 8015D, 2003.
23. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B, 2007.
24. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Polychlorinated Biphenyls (PCBs) by Gas Chromatography. SW-846 Method 8082A, 2007.
25. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B, 2007.
26. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Chlorinated Herbicides by GC Using Methylation or Pentafluorobenzoylation Derivatization. SW-846 Method 8151A, 1996.
27. United States...