ภาคผนวก

ภาคผนวก ก	มาตรฐานน้ำทิ้งจากอาคาร
ภาคผนวก ข	เอกสารการป้องกันและระงับอัคคีภัย
ภาคผนวก ค	อุปกรณ์เก็บตัวอย่างและเครื่องมือตรวจวัด
ภาคผนวก ง	ใบรายงานผลการตรวจวิเคราะห์
ภาคผนวก จ	เอกสารสอบเทียบเครื่องมือ
ภาคผนวก ฉ	หนังสืออนุญาตขึ้นทะเบียน ห้องปฏิบัติการวิเคราะห์เอกชน

ภาคผนวก ก
มาตรฐานน้ำทิ้งจากอาคาร

ประกาศกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม

เรื่อง กำหนดมาตรฐานควบคุมการระบายน้ำทิ้ง
จากอาคารบางประเภทและบางขนาด

โดยที่ได้มีการปฏิรูประบบราชการโดยให้มีการจัดตั้งกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อมขึ้นมา และให้โอนภารกิจของกระทรวงวิทยาศาสตร์ เทคโนโลยีและสิ่งแวดล้อม ในส่วนที่เกี่ยวข้องกับพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ ไปเป็นของกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม ประกอบกับเป็นการสมควรให้คณะกรรมการควบคุมมลพิษเป็นผู้พิจารณาเห็นชอบกับวิธีการตรวจหาค่ามาตรฐานการระบายน้ำทิ้ง นอกเหนือจากวิธีการที่กำหนดไว้แทนกรมควบคุมมลพิษ จึงสมควรแก้ไขปรับปรุงประกาศกระทรวงวิทยาศาสตร์ เทคโนโลยีและสิ่งแวดล้อม เรื่อง กำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากอาคารบางประเภทและบางขนาด

อาศัยอำนาจตามความในมาตรา ๕๕ แห่งพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ แก้ไขโดยมาตรา ๑๑๔ แห่งพระราชกฤษฎีกาแก้ไขบทบัญญัติให้สอดคล้องกับการโอนอำนาจหน้าที่ของส่วนราชการ ให้เป็นไปตามพระราชบัญญัติปรับปรุงกระทรวง ทบวง กรม พ.ศ. ๒๕๔๕ พ.ศ. ๒๕๔๕ อันเป็นพระราชบัญญัติที่มีบทบัญญัติบางประการเกี่ยวกับการจำกัดสิทธิและเสรีภาพของบุคคล ซึ่งมาตรา ๒๙ ประกอบกับมาตรา ๓๕ มาตรา ๔๘ มาตรา ๕๐ และมาตรา ๕๑ ของรัฐธรรมนูญแห่งราชอาณาจักรไทยบัญญัติให้กระทำได้ โดยอาศัยอำนาจตามบทบัญญัติแห่งกฎหมายรัฐมนตรีว่าการกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม โดยคำแนะนำของคณะกรรมการควบคุมมลพิษและโดยความเห็นชอบของคณะกรรมการสิ่งแวดล้อมแห่งชาติ จึงออกประกาศไว้ ดังต่อไปนี้

ข้อ ๑ ให้ยกเลิกประกาศกระทรวงวิทยาศาสตร์ เทคโนโลยีและสิ่งแวดล้อม เรื่อง กำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากอาคารบางประเภทและบางขนาด ลงวันที่ ๑๐ มกราคม พ.ศ. ๒๕๓๗

ข้อ ๒ ในประกาศนี้

"อาคาร" หมายความว่า อาคารที่ก่อสร้างขึ้น ไม่ว่าจะมีลักษณะเป็นอาคารหลังเดียว หรือเป็นกลุ่มของอาคารซึ่งตั้งอยู่ภายในพื้นที่ซึ่งเป็นบริเวณเดียวกัน และไม่ว่าจะมีท่อระบายน้ำท่อเดียว หรือมีหลายท่อที่เชื่อมติดต่อกันระหว่างอาคารหรือไม่ก็ตาม ซึ่งได้แก่

(๑) อาคารชุด ตามกฎหมายว่าด้วยอาคารชุด

(๒) โรงแรม ตามกฎหมายว่าด้วยโรงแรม

(๓) หอพัก ตามกฎหมายว่าด้วยหอพัก

(๔) สถานบริการประเภทสถานอาบน้ำ นวดหรืออบตัว ซึ่งมีผู้ให้บริการแก่ลูกค้า ตามกฎหมายว่าด้วยสถานบริการ

(๕) โรงพยาบาลของทางราชการหรือสถานพยาบาล ตามกฎหมายว่าด้วยสถานพยาบาล

(๖) อาคารโรงเรียนเอกชน ตามกฎหมายว่าด้วยโรงเรียนเอกชน โรงเรียนของทางราชการ อาคารสถาบันอุดมศึกษาของเอกชน ตามกฎหมายว่าด้วยสถาบันอุดมศึกษาของเอกชนและสถาบันอุดมศึกษาของทางราชการ

(๗) อาคารที่ทำการของทางราชการ รัฐวิสาหกิจ หรือองค์การระหว่างประเทศและของเอกชน

(๘) อาคารของศูนย์การค้าหรือห้างสรรพสินค้า

(๙) ตลาด ตามกฎหมายว่าด้วยการสาธารณสุข แต่ไม่รวมถึง ท่าเทียบเรือประมง สะพานปลา หรือกิจการแพปลา

(๑๐) ภัตตาคารหรือร้านอาหาร

"น้ำทิ้ง" หมายความว่า น้ำเสียที่ผ่านระบบบำบัดน้ำเสียแล้วจนเป็นไปตามมาตรฐานควบคุมการระบายน้ำทิ้งตามที่กำหนดไว้ในประกาศนี้

ข้อ ๓ ให้แบ่งประเภทของอาคารตามข้อ ๒ ออกเป็น ๕ ประเภท คือ

(๑) อาคารประเภท ก.

(๒) อาคารประเภท ข.

(๓) อาคารประเภท ค.

(๔) อาคารประเภท ง.

(๕) อาคารประเภท จ.

ข้อ ๔ อาคารประเภท ก. หมายความถึง อาคารดังต่อไปนี้

(๑) อาคารชุดที่มีจำนวนห้องสำหรับใช้เป็นที่อยู่อาศัยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๕๐๐ ห้องนอนขึ้นไป

(๒) โรงแรมที่มีจำนวนห้องสำหรับใช้เป็นห้องพักรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๒๐๐ ห้องขึ้นไป

(๓) โรงพยาบาลของทางราชการ รัฐวิสาหกิจหรือสถานพยาบาล ตามกฎหมายว่าด้วยสถานพยาบาลที่มีเตียงสำหรับผู้ป่วยไว้ค้างคืนรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๓๐ เตียงขึ้นไป

(๔) อาคารโรงเรียนเอกชน โรงเรียนของทางราชการ สถาบันอุดมศึกษาของเอกชน หรือสถาบันอุดมศึกษาของทางราชการที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๒๕,๐๐๐ ตารางเมตรขึ้นไป

(๕) อาคารที่ทำการของทางราชการ รัฐวิสาหกิจ องค์การระหว่างประเทศ หรือของเอกชนที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๕๕,๐๐๐ ตารางเมตรขึ้นไป

(๖) อาคารของศูนย์การค้าหรือห้างสรรพสินค้าที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๒๕,๐๐๐ ตารางเมตรขึ้นไป

(๗) ตลาดที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๒,๕๐๐ ตารางเมตรขึ้นไป

(๘) ภัตตาคารหรือร้านอาหารที่มีพื้นที่ให้บริการรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๒,๕๐๐ ตารางเมตรขึ้นไป

ข้อ ๕ อาคารประเภท ข. หมายความถึง อาคารดังต่อไปนี้

(๑) อาคารชุดที่มีจำนวนห้องสำหรับใช้เป็นที่อยู่อาศัยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๑๐๐ ห้องนอน แต่ไม่ถึง ๕๐๐ ห้องนอน

(๒) โรงแรมที่มีจำนวนห้องสำหรับใช้เป็นห้องพักรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๖๐ ห้อง แต่ไม่ถึง ๒๐๐ ห้อง

(๓) หอพักที่มีจำนวนห้องสำหรับใช้เป็นที่อยู่อาศัยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๒๕๐ ห้องขึ้นไป

(๔) สถานบริการที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๕,๐๐๐ ตารางเมตรขึ้นไป

(๕) โรงพยาบาลของทางราชการ รัฐวิสาหกิจ หรือสถานพยาบาล ตามกฎหมายว่าด้วยสถานพยาบาลที่มีเตียงสำหรับผู้ป่วยไว้ค้างคืนรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๑๐ เตียง แต่ไม่ถึง ๓๐ เตียง

(๖) อาคารโรงเรียนเอกชน โรงเรียนของทางราชการ สถาบันอุดมศึกษาของเอกชน หรือสถาบันอุดมศึกษาของทางราชการที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๕,๐๐๐ ตารางเมตร แต่ไม่ถึง ๒๕,๐๐๐ ตารางเมตร

(๗) อาคารที่ทำการของทางราชการ รัฐวิสาหกิจ องค์การระหว่างประเทศ หรือของเอกชนที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๑๐,๐๐๐ ตารางเมตร แต่ไม่ถึง ๕๕,๐๐๐ ตารางเมตร

(๘) อาคารของศูนย์การค้าหรือห้างสรรพสินค้าที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๕,๐๐๐ ตารางเมตร แต่ไม่ถึง ๒๕,๐๐๐ ตารางเมตร

(๙) ตลาดที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๑,๕๐๐ ตารางเมตร แต่ไม่ถึง ๒,๕๐๐ ตารางเมตร

(๑๐) ภัตตาคารหรือร้านอาหารที่มีพื้นที่ให้บริการรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๕๐๐ ตารางเมตร แต่ไม่ถึง ๒,๕๐๐ ตารางเมตร

ข้อ ๖ อาคารประเภท ค. หมายความถึง อาคารดังต่อไปนี้

(๑) อาคารชุดที่มีจำนวนห้องสำหรับใช้เป็นที่อยู่อาศัยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารไม่ถึง ๑๐๐ ห้องนอน

(๒) โรงแรมที่มีจำนวนห้องสำหรับใช้เป็นห้องพักรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารไม่ถึง ๖๐ ห้อง

(๓) หอพักที่มีจำนวนห้องสำหรับใช้เป็นที่อยู่อาศัยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๕๐ ห้อง แต่ไม่ถึง ๒๕๐ ห้อง

(๔) สถานบริการที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๑,๐๐๐ ตารางเมตร แต่ไม่ถึง ๕,๐๐๐ ตารางเมตร

(๕) อาคารที่ทำการของทางราชการ รัฐวิสาหกิจ องค์การระหว่างประเทศ หรือของเอกชนที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๕,๐๐๐ ตารางเมตร แต่ไม่ถึง ๑๐,๐๐๐ ตารางเมตร

(๖) ตลาดที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคารหรือกลุ่มของอาคารตั้งแต่ ๑,๐๐๐ ตารางเมตร แต่ไม่ถึง ๑,๕๐๐ ตารางเมตร

(๗) ภัตตาคารหรือร้านอาหารที่มีพื้นที่ให้บริการรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๒๕๐ ตารางเมตร แต่ไม่ถึง ๕๐๐ ตารางเมตร

ข้อ ๗ อาคารประเภท ง. หมายความถึง อาคารดังต่อไปนี้

(๑) หอพักที่มีจำนวนห้องสำหรับใช้เป็นที่อยู่อาศัยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคาร ตั้งแต่ ๑๐ ห้อง แต่ไม่ถึง ๕๐ ห้อง

(๒) ตลาดที่มีพื้นที่ใช้สอยรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคารตั้งแต่ ๕๐๐ ตารางเมตร แต่ไม่ถึง ๑,๐๐๐ ตารางเมตร

(๓) ภัตตาคารหรือร้านอาหารที่มีพื้นที่ให้บริการรวมกันทุกชั้นของอาคาร หรือกลุ่มของอาคาร ตั้งแต่ ๑๐๐ ตารางเมตร แต่ไม่ถึง ๒๕๐ ตารางเมตร

ข้อ ๘ อาคารประเภท จ. หมายความถึง ภัตตาคารหรือร้านอาหารที่มีพื้นที่ให้บริการรวมกันทุกชั้นไม่ถึง ๑๐๐ ตารางเมตร

ข้อ ๙ มาตรฐานควบคุมการระบายน้ำทิ้งจากอาคาร ประเภท ก. ต้องมีค่าดังต่อไปนี้

(๑) ความเป็นกรดและด่าง (PH) ต้องมีค่าระหว่าง ๕-๙

(๒) บีโอดี (BOD) ต้องมีค่าไม่เกิน ๒๐ มิลลิกรัมต่อลิตร

(๓) สารแขวนลอย (Suspended Solids) ต้องมีค่าไม่เกิน ๓๐ มิลลิกรัมต่อลิตร

(๔) ซัลไฟด์ (Sulfide) ต้องมีค่าไม่เกิน ๑.๐ มิลลิกรัมต่อลิตร

(๕) สารที่ละลายได้ทั้งหมด (Total Dissolved Solids) ต้องมีค่าเพิ่มขึ้นจากปริมาณสารละลายในน้ำใช้ตามปกติไม่เกิน ๕๐๐ มิลลิกรัมต่อลิตร

(๖) ตะกอนหนัก (Settleable Solids) ต้องมีค่าไม่เกิน ๐.๕ มิลลิลิตรต่อลิตร

(๗) น้ำมันและไขมัน (Fat Oil and Grease) ต้องมีค่าไม่เกิน ๒๐ มิลลิกรัมต่อลิตร

(๘) ทีเคเอ็น (TKN) ต้องมีค่าไม่เกิน ๓๕ มิลลิกรัมต่อลิตร

ข้อ ๑๐ มาตรฐานควบคุมการระบายน้ำทิ้งจากอาคาร ประเภท ข. ต้องเป็นไปตามข้อ ๙ เว้นแต่

(๑) บีโอดี ต้องมีค่าไม่เกิน ๓๐ มิลลิกรัมต่อลิตร

(๒) สารแขวนลอย ต้องมีค่าไม่เกิน ๔๐ มิลลิกรัมต่อลิตร

ข้อ ๑๑ มาตรฐานควบคุมการระบายน้ำทิ้งจากอาคาร ประเภท ค. ต้องเป็นไปตามข้อ ๙ เว้นแต่

(๑) บีโอดี ต้องมีค่าไม่เกิน ๔๐ มิลลิกรัมต่อลิตร

(๒) สารแขวนลอย ต้องมีค่าไม่เกิน ๕๐ มิลลิกรัมต่อลิตร

(๓) ซัลไฟด์ ต้องมีค่าไม่เกิน ๓.๐ มิลลิกรัมต่อลิตร

(๔) ค่าทีเคเอ็น ต้องมีค่าไม่เกิน ๔๐ มิลลิกรัมต่อลิตร

ข้อ ๑๒ มาตรฐานควบคุมการระบายน้ำทิ้งจากอาคาร ประเภท ง. ต้องเป็นไปตามข้อ ๙ เว้นแต่

(๑) บีโอดี ต้องมีค่าไม่เกิน ๕๐ มิลลิกรัมต่อลิตร

(๒) สารแขวนลอย ต้องมีค่าไม่เกิน ๕๐ มิลลิกรัมต่อลิตร

(๓) ซัลไฟด์ ต้องมีค่าไม่เกิน ๔.๐ มิลลิกรัมต่อลิตร

(๔) ค่าทีเคเอ็น ต้องมีค่าไม่เกิน ๔๐ มิลลิกรัมต่อลิตร

ข้อ ๑๓ มาตรฐานควบคุมการระบายน้ำทิ้งจากอาคาร ประเภท จ. ต้องมีค่าดังต่อไปนี้

(๑) ความเป็นกรดและด่างต้องมีค่าระหว่าง ๕-๙

(๒) บีโอดี ต้องมีค่าไม่เกิน ๒๐๐ มิลลิกรัมต่อลิตร

(๓) สารแขวนลอย ต้องมีค่าไม่เกิน ๖๐ มิลลิกรัมต่อลิตร

(๔) น้ำมันและไขมัน ต้องมีค่าไม่เกิน ๑๐๐ มิลลิกรัมต่อลิตร

ข้อ ๑๔ การตรวจสอบมาตรฐานการระบายน้ำทิ้งจากอาคาร ให้ใช้วิธีการดังต่อไปนี้

(๑) การตรวจสอบค่าความเป็นกรดและด่างให้กระทำโดยใช้เครื่องวัดความเป็นกรดและด่างของน้ำ (PH Meter)

(๒) การตรวจสอบค่าบีโอดีให้กระทำโดยใช้วิธีการอะไซด์โมดิฟิเคชั่น (Azide Modification) ที่อุณหภูมิ ๒๐ องศาเซลเซียส เป็นเวลา ๕ วัน ติดต่อกันหรือวิธีการอื่นที่คณะกรรมการควบคุมมลพิษให้ความเห็นชอบ

(๓) การตรวจสอบค่าสารแขวนลอยให้กระทำโดยใช้วิธีการกรองผ่านกระดาษกรองใยแก้ว (Glass Fibre Filter Disc)

(๔) การตรวจสอบค่าซัลไฟด์ให้กระทำโดยใช้วิธีการไตเตรท (Titrate)

(๕) การตรวจสอบค่าสารที่ละลายได้ทั้งหมดให้กระทำโดยใช้วิธีการระเหยแห้งระหว่างอุณหภูมิ ๑๐๓ องศาเซลเซียส ถึงอุณหภูมิ ๑๐๕ องศาเซลเซียส ในเวลา ๑ ชั่วโมง

(๖) การตรวจสอบค่าตะกอนหนักให้กระทำโดยใช้วิธีการกรวยอิมฮอฟฟ์ (Imhoff cone) ขนาดบรรจุ ๑,๐๐๐ ลูกบาศก์เซนติเมตร ในเวลา ๑ ชั่วโมง

(๗) การตรวจสอบค่าน้ำมันและไขมันให้กระทำโดยใช้วิธีการสกัดด้วยตัวทำละลาย แล้วแยกหาน้ำหนักของน้ำมันและไขมัน

(๘) การตรวจสอบค่าทีเคเอ็นให้กระทำโดยใช้วิธีการเจลดาห์ล (Kjeldahl)

ข้อ ๑๕ การคิดคำนวณพื้นที่ใช้สอย จำนวนอาคารและจำนวนห้องของอาคาร หรือกลุ่มของอาคาร ให้เป็นไปตามวิธีการที่คณะกรรมการควบคุมมลพิษกำหนด โดยประกาศในราชกิจจานุเบกษา

ข้อ ๑๖ วิธีการเก็บตัวอย่างน้ำ ความถี่ และระยะเวลาในการเก็บตัวอย่างน้ำ ให้เป็นไปตามที่คณะกรรมการควบคุมมลพิษกำหนด โดยประกาศในราชกิจจานุเบกษา

ข้อ ๑๗ ประกาศนี้ให้ใช้บังคับตั้งแต่วันถัดจากวันประกาศในราชกิจจานุเบกษาเป็นต้นไป

ประกาศ ณ วันที่ ๗ พฤศจิกายน พ.ศ. ๒๕๔๘

ยงยุทธ ติยะไพรัช

รัฐมนตรีว่าการกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม

ภาคผนวก ข
เอกสารการป้องกันและระงับอัคคีภัย

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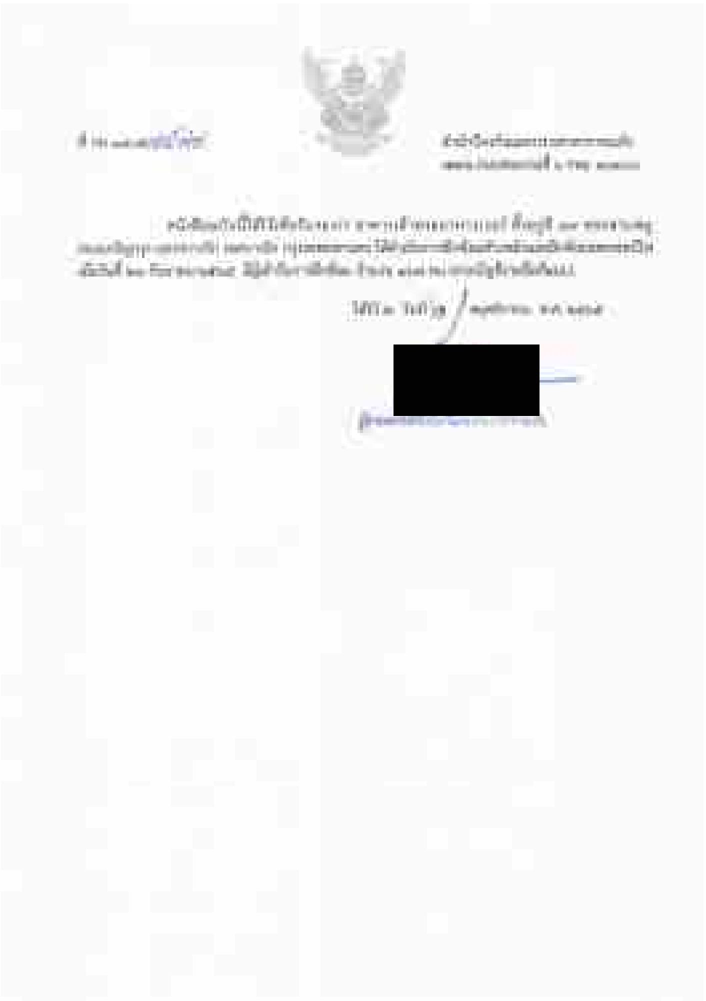

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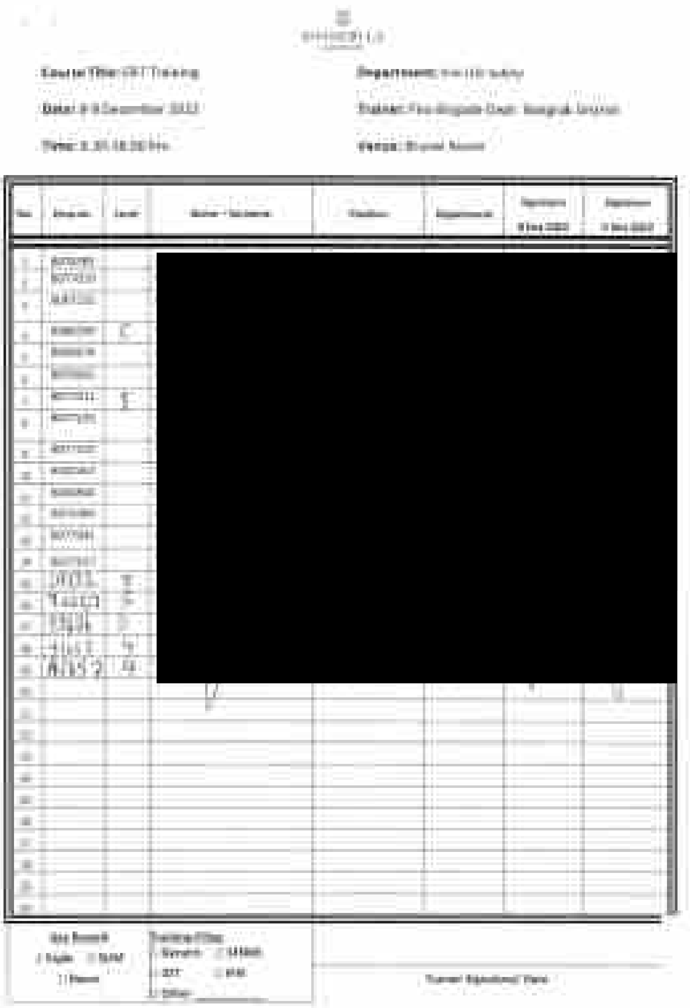
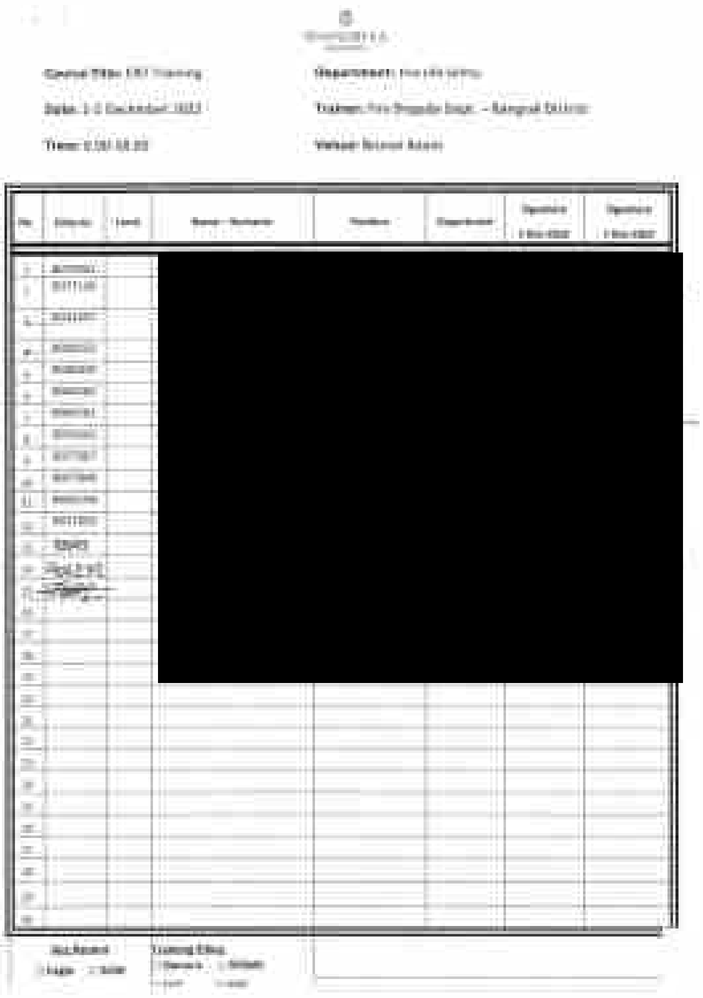


Course Title: ERT Training
Department: Fire Life Safety
Date: 8-9 December 2022
Trainer: Fire Brigade Dept. Bangrak District
Time: 8.30-16.30 Hrs
Venue: Brunei Room

No.	Employee ID	Level	Name - Surname	Position	Department	Signature	Signature
			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Trainer Signature/ Date



Course Title: ERT Training
Department: Fire Life Safety
Date: 1-2 December 2022
Trainer: Fire Brigade Dept. – Bangrak District
Time: 8.30-16.30
Venue: Brunei Room

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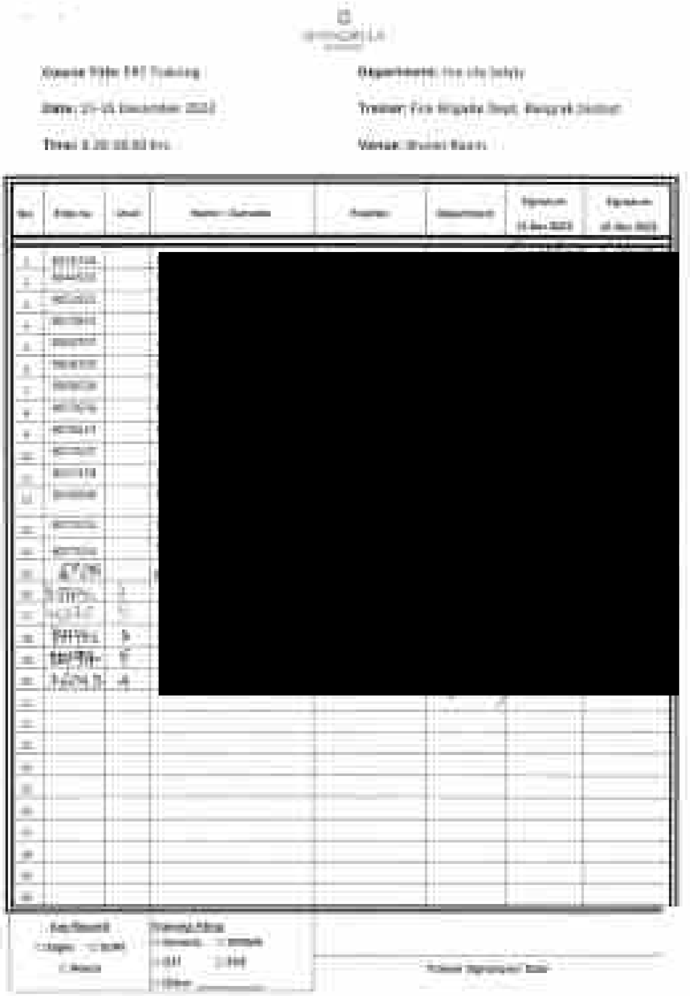

Course Title: ERT Training
Department: Fire Life Safety
Date: 15-16 December 2022
Trainer: Fire Brigade Dept. Bangrak District
Time: 8.30-16.30 Hrs
Venue: Brunei Room

No.	Employee ID	Level	Name - Surname	Position	Department	Signature	Signature
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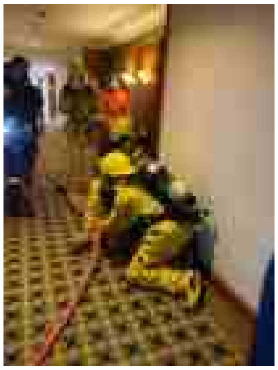
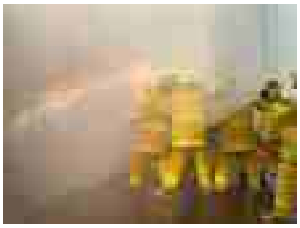
Trainer Signature/ Date





ภาคผนวก ค
อุปกรณ์เก็บตัวอย่างและเครื่องมือตรวจวัด

	
(ก) เครื่องวัดค่าความเป็นกรด-ด่าง (pH Meter)	(ข) อุปกรณ์เก็บตัวอย่างแบบเชือก
	
(ค) ถุงมือยาง	(ง) ภาชนะบรรจุตัวอย่าง

อุปกรณ์เก็บตัวอย่าง และเครื่องมือตรวจวัด

ภาคผนวก ง

ใบรายงานผลการตรวจวิเคราะห์

ANALYSIS REPORT

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SAMPLING DATE	[illegible]	ANALYTICAL DATE	[illegible]
SAMPLING TIME	[illegible]	REPORT NO.	[illegible]
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ANALYSIS REPORT

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[illegible]	mg/l	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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ANALYSIS REPORT

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PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT		PERMISSIBLE STANDARD	MINIMUM LIMIT
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PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT		PERMISSIBLE STANDARD	MINIMUM LIMIT
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ANALYSIS REPORT

PARAMETER	UNIT	METHOD OF ANALYSIS	RESULT		PERMISSIBLE STANDARD	MINIMUM LIMIT
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[illegible]		[illegible]	[illegible]	[illegible]		
[illegible]	°C	[illegible]		[illegible]		
[illegible]	mg/l	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	mg/l	[illegible]		[illegible]		[illegible]
[illegible]	mg/l	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	mg/l	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	µS/cm	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	mg/l	[illegible]		[illegible]		[illegible]
[illegible]	mg/l	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	mg/l	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

- [illegible]
- [illegible]

ANALYSIS REPORT

ภาคผนวก จ
เอกสารสอบเทียบเครื่องมือ

ภาคผนวก จ-1
เอกสารสอบเทียบเครื่องมือวิเคราะห์

รายการใบรับรองสอบเทียบ ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับคุณภาพน้ำ

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์สำหรับคุณภาพน้ำ									
1	pH Meter	อุณหภูมิ (Temperature) ความเป็นกรดและด่าง (pH)	Mettler-Toledo	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2201793-001-01	1 Mar 22	1 Mar 23	-
2	pH Meter		Mettler-Toledo	Seven Easy S20 / 1230525212	National Food Institute, Ministry of Industry, Thailand	2202093-001-01	16 Mar 22	16 Mar 23	-
3	UV-VIS Spectrophotometer	ซัลไฟด์ (Sulphide), ซีโอดี (COD)	Agilent Technologies	Cary60 G6860A / MY15410009	DQE Services Co.,Ltd.	SP22-016	31 May 22	30 May 23	
4	UV-VIS Spectrophotometer		Hitachi	U-1900 / 2021-064	DQE Services Co.,Ltd.	SP22-007	20 Jan 22	19 Jan 23	-
5	UV-VIS Spectrophotometer		Hitachi	U-2900 / 21E22-009	DQE Services Co.,Ltd.	SP22-008	20 Jan 22	20 Jan 23	-
6	Analytical Balance (Repeatability 0.01 mg)	สารแขวนลอย (Total Suspended Solids) สารที่ละลายได้ทั้งหมด (TDS)	Mettler-Toledo	XSR205DU / C009071872	Technology Promotion Association (Thailand-Japan)	22MM210	26 Apr 22	25 Apr 23	-
7	Hot Air Oven		Memmert	UF55 / B212.0411	Technology Promotion Association (Thailand-Japan)	22TM304	7 Apr 22	6 Apr 23	-
8	Analytical Balance (Repeatability 0.1 mg)	น้ำมันและไขมัน (Fat,Oil & Grease)	Mettler-Toledo	AB-204S/FACT / 1129361010	National Food Institute, Ministry of Industry, Thailand	2203120-001-01	1 Jun 22	31 May 23	-
9	BOD Incubator	บีโอดี (BOD)	Arco	UC4-1320 / (UAE.WAO.015/2561)	Technology Promotion Association (Thailand-Japan)	22TM90	17 Feb 22	16 Feb 23	-
10	BOD Incubator		Arco	UR-1320 / (UAE.WAO.006/2553)	Technology Promotion Association (Thailand-Japan)	22TM306	7 Apr 22	6 Apr 23	-
11	BOD Incubator		Arco	UR-1320 / (UAE.WAO.018/2551)	Technology Promotion Association (Thailand-Japan)	22TM305	7 Apr 22	7 Apr 23	-
12	COD Reactor (Heating Block)	ซีโอดี (COD)	Hanna	HI839800-02 / 4500052101	Hanna Instruments (Thailand) Ltd.	HIT-2219-0480	9 May 22	8 May 23	-

รายการใบรับรองสอบเทียบ ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับคุณภาพน้ำ

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์สำหรับคุณภาพน้ำ									
13	COD Reactor (Heating Block)	ซีโอดี (COD)	Hanna	HI839800-02 / 4500052101	Hanna Instruments (Thailand) Ltd.	HIT-2219-0480	9 May 22	9 May 23	-
14	Digestor Unit	ทีเคเอ็น (Total Kjeldahl Nitrogen)	FOSS TECATOR	2520auto / 91794469	National Food Institute, Ministry of Industry, Thailand	2202361-001-01	4 Apr 22	4 Apr 23	-
15	Digestor Unit		Velp	DKL20 / 213517	National Food Institute, Ministry of Industry, Thailand	2203368-001-01	23 Jun 22	22 Jun 23	-
16	Distillation Unit (Kjeldahl Method)		FOSS TECATOR	KT200 / 91790524	FOSS South East Asia	5874	30 Nov 21	29 Nov 22	-
17	Distillation Unit (Kjeldahl Method)		FOSS TECATOR	KT8100 / 91889052	FOSS South East Asia	6623	25 Jul 22	24 Jul 23	-
18	Incubator (Cooled Incubator)	แบคทีเรียกลุ่มฟีคอลโคลิฟอร์ม (Fecal Coliform Bacteria)	Memmert	IPP 260 / V616.0066	Technology Promotion Association (Thailand-Japan)	22TM672	5 May 22	4 May 23	-
19	Incubator (Cooled Incubator)		Memmert	IPP 260 / V618.0033	Technology Promotion Association (Thailand-Japan)	22TM503	3 May 22	2 May 23	-
20	Incubator		Memmert	IF 75 / D317.0305	Technology Promotion Association (Thailand-Japan)	22TM670	3 May 22	3 May 23	-
21	Incubator		Memmert	IN 75 / D317.0307	Technology Promotion Association (Thailand-Japan)	22TM671	3 May 22	3 May 23	-
22	Water Bath		Memmert	WNE 14 / L416.0606	Technology Promotion Association (Thailand-Japan)	22TM333	17 Feb 22	17 Feb 23	-
23	Water Bath		Memmert	WNE 14 / L416.0612	Technology Promotion Association (Thailand-Japan)	22TM334	17 Feb 22	17 Feb 23	-

รายการใบรับรองสอบเทียบ ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับคุณภาพน้ำ

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์สำหรับคุณภาพน้ำ									
24	Water Bath	แบคทีเรียกลุ่มฟีคอลโคลิฟอร์ม (Fecal Coliform Bacteria)	Memmert	WNE 14 / L414.1407	Technology Promotion Association (Thailand-Japan)	22TM565	7 Apr 22	7 Apr 23	-
25	Water Bath		Memmert	WNE 14 / L414.1410	Technology Promotion Association (Thailand-Japan)	22TM564	7 Apr 22	7 Apr 23	-
26	Water Bath		Memmert	WNE 14 / L416.0614	Technology Promotion Association (Thailand-Japan)	22TM332	17 Feb 22	17 Feb 23	-
27	Analytical Balance		Mettler-Toledo	MS603S / B0070110311	Mettler-Toledo (Thailand) Ltd.	TH2058-096-040722-ACC-TH	7 Apr 22	6 Apr 23	-
28	Autoclave		ALP	CL-40L / 807298	Technology Promotion Association (Thailand-Japan)	22TM1121	11 Jul 22	10 Jul 23	-
29	Autoclave		ALP	CL-40L / 808763	Technology Promotion Association (Thailand-Japan)	22TM681	27 May 22	26 May 23	-
30	Refrigerator	เก็บรักษาตัวอย่างสำหรับวิเคราะห์ทางจุลชีวิทยา	Sanyo	SBC-337KD(GYN) / 71100607	Technology Promotion Association (Thailand-Japan)	22TM562	7 Apr 22	7 Apr 23	-

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

Calibration Certificate

Certificate No.:
Client name:
Address:

Equipment:
Manufacturer:
Model:
Serial No.:
ID No.:
Order No.:
Operation No.:
Date of Receipt:
Date of Calibration:

Calibrated by:
Approved by:

Date of Issue:

เอกสารไม่ควบคุม

Calibration Report

Certificate No.:
Equipment:

Date of Calibration:

Equipment	Serial No.	Manufacturer	Certificate No.	Due date

Calibrated Measurement	Unit (%)	Resolution	DUT	Error (%)

เอกสารไม่ควบคุม

Calibration Report

Certificate No.:
Equipment:

Date of Calibration:

Nominal (mV)	DC Voltage Standard (mV)	Converter under Testing (mV)		Accuracy (%FS)	Coverage factor (k)
		up	down		

Calibration Value (mV)	Converter under Testing (mV)		Temperature (°C)	Accuracy (%FS)	Coverage factor (k)
	up	down			

เอกสารไม่ควบคุม

Calibration Report

Certificate No.:
Equipment:

Date of Calibration:

Condition:
Environment Condition:

Equipment	Model	Serial No.	Calibration No.	Due Date	Remark

เอกสารไม่ควบคุม

Calibration Report

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.:
Client name:
Address:

Equipment:
Manufacturer:
Model:
Serial No.:
ID No.:
Order No.:
Operation No.:
Date of Receipt:
Date of Calibration:

Calibrated by: Approved by:

เอกสารไม่ควบคุม

Calibration Report

เอกสารไม่ควบคุม

Calibration Report

เอกสารไม่ควบคุม

Calibration Report

เอกสารไม่ควบคุม

Calibration Report

เอกสารไม่ควบคุม

CERTIFICATE OF CALIBRATION

Certificate No. :

Page : 1 of 1

Customer :

Address :

Location of calibration :

Equipment :

Manufacturer :

Model :

Serial No. :

ID No. :

Received Date :

Calibration Date :

Issue Date :

Condition Instrument :

Calibrated by :

Approved by :

Technical Manager

Quality Manager

เอกสารไม่ควบคุม

REPORT OF CALIBRATION

Certificate No. :

Page 1 of 1

Environment Condition :

Calibration method :

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date

Traceability :

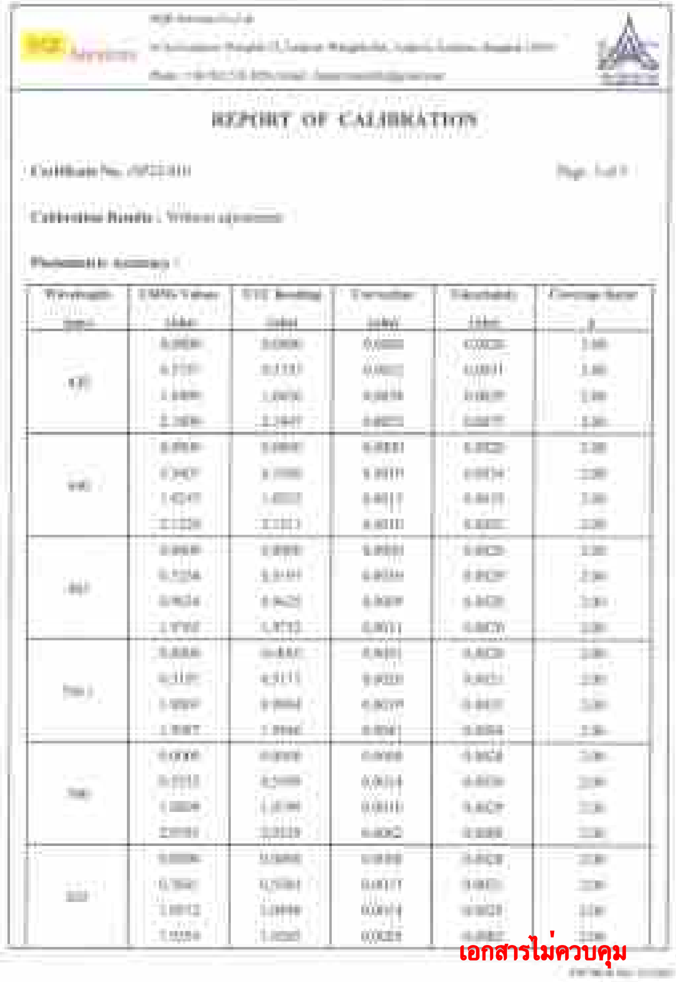
Spectral Band Width (FWHM) :

Scan Speed of UV :

Scan Interval of UV :

Resolution of UV :

เอกสารไม่ควบคุม



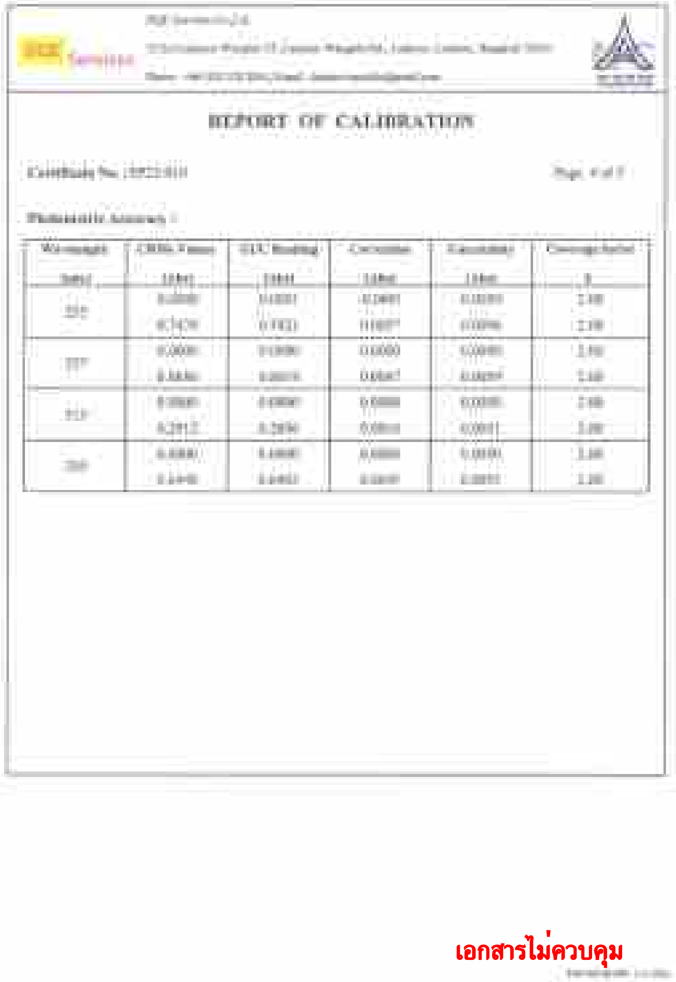
REPORT OF CALIBRATION

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k

เอกสารไม่ควบคุม

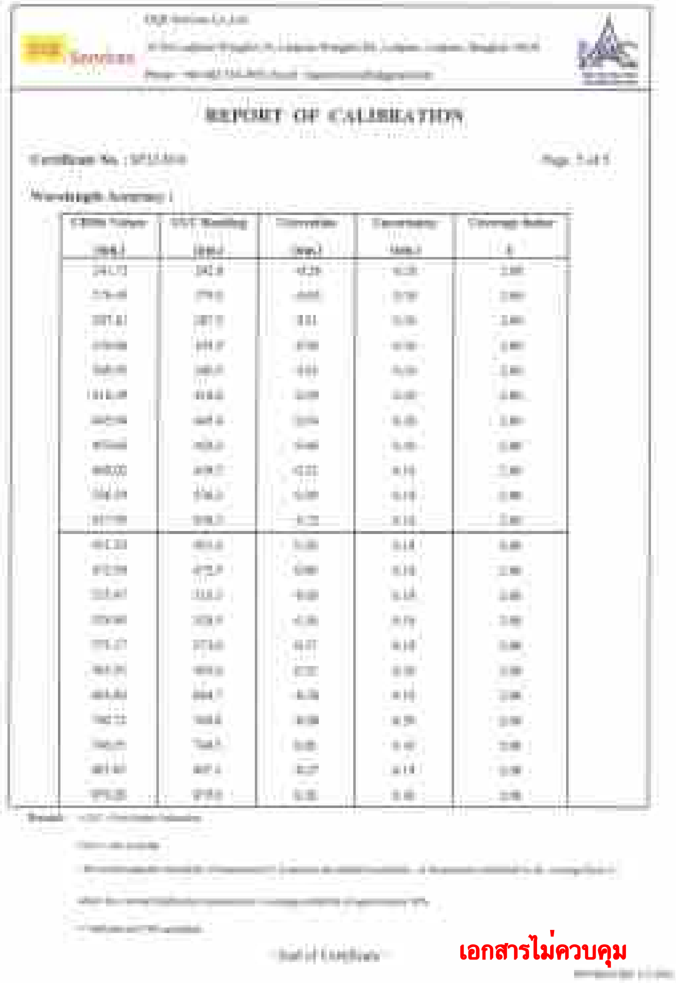


REPORT OF CALIBRATION

Photometric Accuracy :

Wavelength (nm)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k

เอกสารไม่ควบคุม



REPORT OF CALIBRATION

Wavelength Accuracy :

CRMs Values (nm)	UUC Reading (nm)	Correction (nm)	Uncertainty (nm)	Coverage factor k

End of Certificate

เอกสารไม่ควบคุม

CERTIFICATE OF CALIBRATION

Certificate No. :

Customer :

Address :

Location of Calibration :

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model :

Serial No. :

ID No. :

Received Date :

Calibration Date :

Issue Date :

Condition Instrument : Good

Calibrated by :

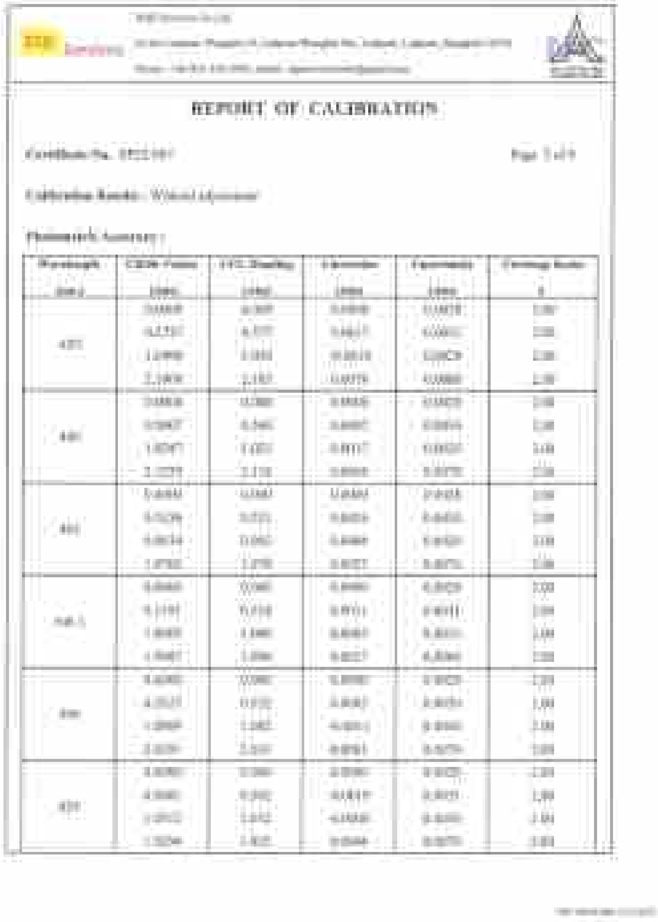
Technical Manager

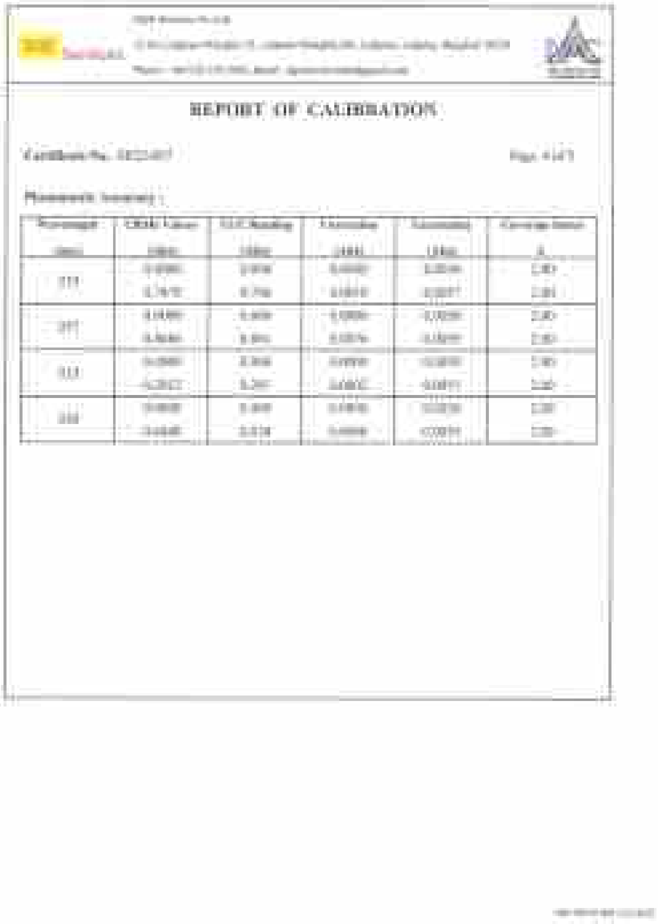
Approved by :

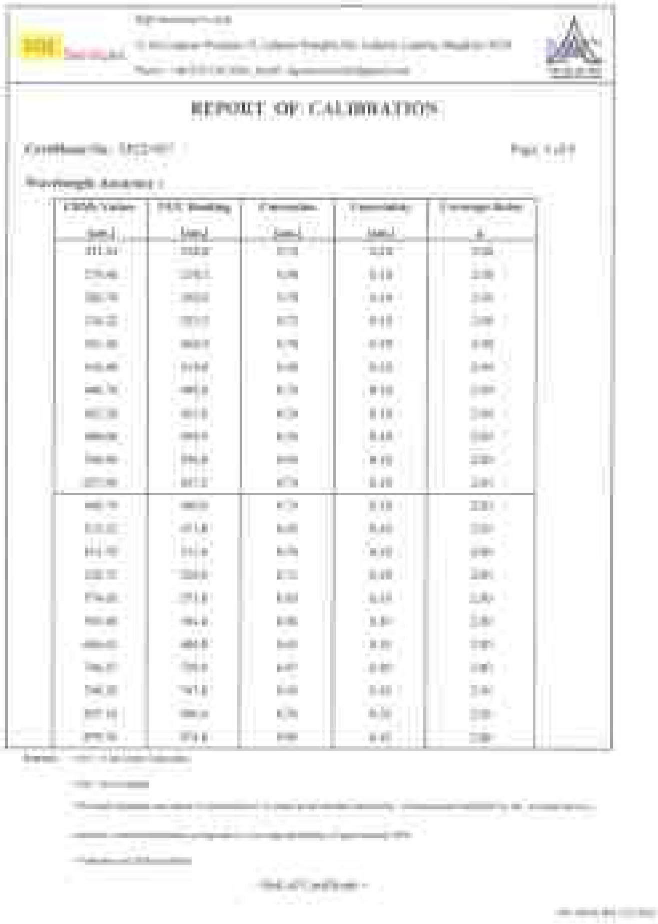
Quality Manager

เอกสารไม่ควบคุม


REPORT OF CALIBRATION


REPORT OF CALIBRATION


REPORT OF CALIBRATION

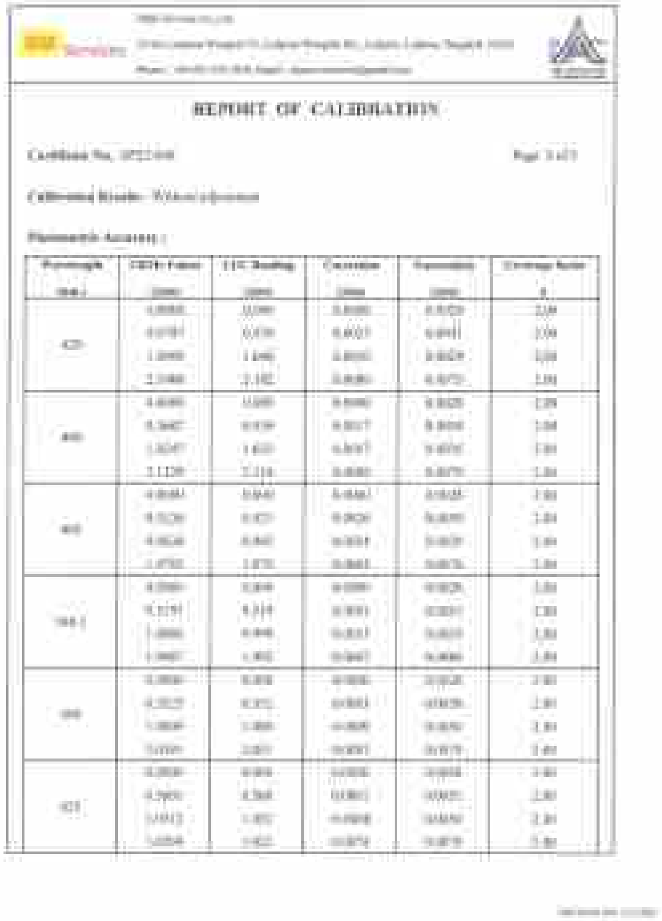

REPORT OF CALIBRATION

CERTIFICATE OF CALIBRATION

เอกสารไม่ควบคุม

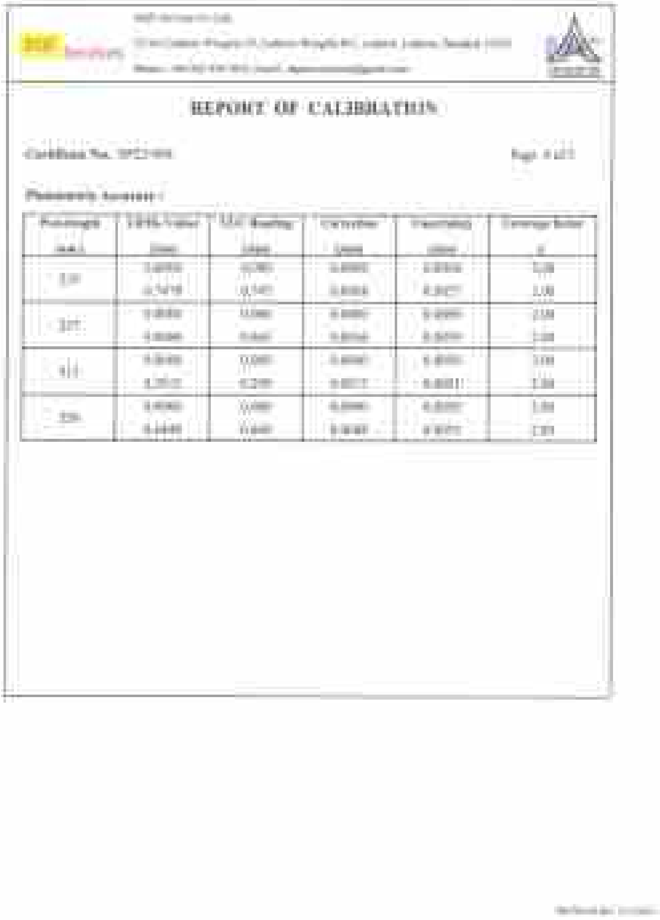
REPORT OF CALIBRATION

เอกสารไม่ควบคุม



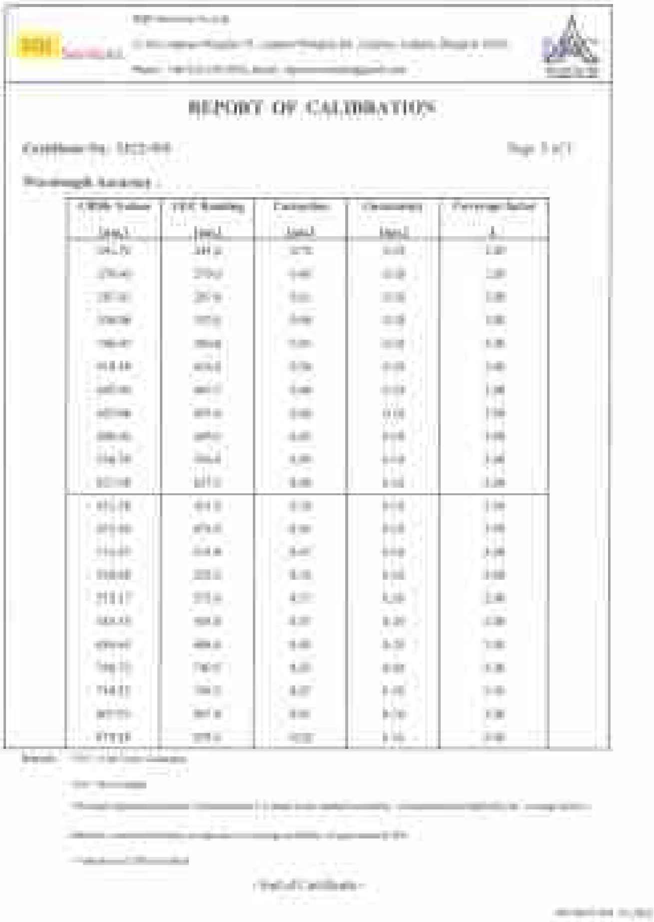
REPORT OF CALIBRATION

เอกสารไม่ควบคุม



REPORT OF CALIBRATION

เอกสารไม่ควบคุม



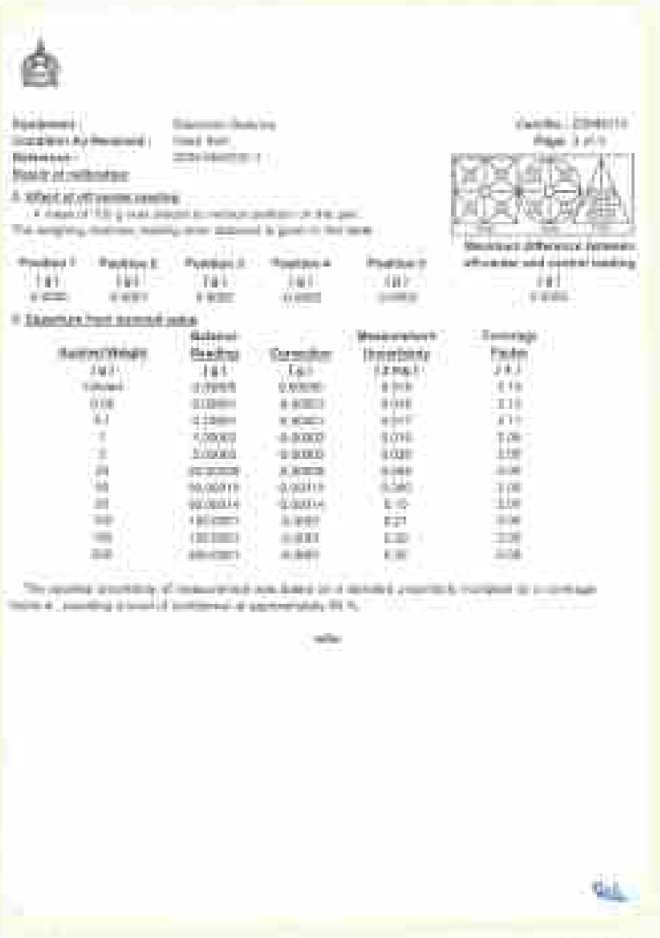
REPORT OF CALIBRATION

เอกสารไม่ควบคุม

Certificate of Calibration

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



เอกสารไม่ควบคุม

Certificate of Calibration

Equipment:

Manufacturer:

Model:

Serial No.:

ID No.:

Submitted by:

Location:

Received Date:

Calibration Date:

Ambient Temperature:

Relative Humidity:

Calibrated by:

Approved by:

Issue Date:

เอกสารไม่ควบคุม

Equipment:

Condition As-Received:

Reference:

Procedure Used:

Traceability of the equipment used in calibration

Instrument	Model	Serial No.	Cert. No.	Due Date
1. Data Acquisition	34970A	MY41021841	2211M	10 Jan 2023

2. The certificate is valid only at the time calibrated or date and place of calibration.
3. The certification is traceable to the International System of Units

Result of Calibration: (✓) Without Adjustment

Function of UUT: Temperature Source

Fixed or setting: Close

Environment during calibration		
	Beginning	Finishing
Temp. (°C)	25	25
RH. (Relative) (%)	55	55
AC Power (Volt)	221	224

Dimension of Chamber

D =	0.85	m
W =	0.80	m
H =	0.70	m
Capacity =	0.42	m^3

Position	Calibration Point (°C) (-150 -100)	(-100)
1	21-04TC-01	18-04TC-01
2	21-04TC-02	18-04TC-02
3	21-04TC-03	18-04TC-03
4	21-04TC-04	18-04TC-04
5	21-04TC-05	18-04TC-05
6	21-04TC-06	18-04TC-06
7	21-04TC-07	18-04TC-07
8	21-04TC-08	18-04TC-08
9 (ref)	21-04TC-09	18-04TC-09

เอกสารไม่ควบคุม

Equipment:

Condition As-Received:

Reference:

Result of Calibration: (✓) Without Adjustment

Function of UUT: Temperature Source

Fixed or setting: Close

Calibration Point (°C)	UUT Setting	UUT Reading	Temperature stability	Temperature uniformity	Overall Variation	Uncertainty	Coverage Factor
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration Point (°C)	Measured Temperature (°C) Position 1	2	3	4	5	6	7	8	9 (ref)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Average: The average of 30 values in each position.

Temperature stability: One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity: The maximum difference of measured temperatures at any sensor and the measured temperature at the reference location, which are obtained at the same time or at an date or observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation: The difference of the maximum and minimum measured temperatures throughout observation period. (UUT: Unit under Calibration)

Note: The overall variability of measurement was found reliability and accuracy efficiency.

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

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.:

Client name:

Address:

Equipment:

Manufacturer:

Model:

Serial No.:

ID No.:

Order No.:

Operation No.:

Date of Receipt:

Date of Calibration:

Calibrated by:

Approved by:

Date of Issue:

เอกสารไม่ควบคุม

Calibration Report

เอกสารไม่ควบคุม

Calibration Report

เอกสารไม่ควบคุม

Certificate of Calibration

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

Equipment : [illegible]
Condition As Received : [illegible]
Reference : [illegible]
Report of Calibration : (*) Without Adjustment
Function of UUT : Temperature Source
Fresh air setting : Not Available

Cert. No. : [illegible]
Page : [illegible]

Calibration Point (°C)	UUT Setting (°C)	UUT Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Average* : The average of 10 values in each position.
Temperature stability : Overall of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperature at any position and the measured temperature of the reference location, which are obtained at the same time or at an identical time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout deviation.
UUT : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and included uniformity.

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

เอกสารไม่ควบคุม

* 1020047

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

Cert. No. : [illegible]
Page : [illegible]

Certificate of Calibration

Equipment : [illegible]
Manufacturer : [illegible]
Model : [illegible]
Serial No. : [illegible]
ID No. : [illegible]
Submitted by : [illegible]
Location : [illegible]
Received Date : [illegible]
Calibration Date : [illegible]
Ambient Temperature : [illegible] °C
Relative Humidity : [illegible] %
Calibrated by : [illegible]
Approved by : [illegible]
Approved Signatory
( ) Certificate Temperature
( ) Above Reference
( ) Exact Hole
Next Date : [illegible]

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

เอกสารไม่ควบคุม

* 1010247

Equipment : [illegible]
Condition As Received : [illegible]
Reference : [illegible]
Procedure used :
Calibration was conducted using calibration procedure [illegible] according to direct measurement method with Data Acquisition which connected with Reference Temperature Sensor (RTD).
The temperature scale used was based on ITS-90.
Condition of the chamber at calibration
1. Reference standard instrument

Instrument	Model	Serial No.	Cert. No.	Due Date
( ) Data Acquisition	[illegible]	[illegible]	[illegible]	[illegible]

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

Report of Calibration : (*) Without Adjustment
Function of UUT : Temperature Source
Fresh air setting : Not Available

Cert. No. : [illegible]
Page : [illegible]

Environment during calibration		
	Beginning	Finished
Temp. (°C)	[illegible]	[illegible]
RH. Humid. (%)	[illegible]	[illegible]
AC Supply (Volt)	[illegible]	[illegible]

Position	Ref. Sensor ID No.
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
5	[illegible]
6	[illegible]
7	[illegible]
8	[illegible]
9 (ref)	[illegible]

Table Installation Details

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Chamber of Chamber

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Capacity =	[illegible]	[illegible]

เอกสารไม่ควบคุม

* 1014312

Equipment : [illegible]
Condition As Received : [illegible]
Reference : [illegible]
Report of Calibration : (*) Without Adjustment
Function of UUT : Temperature Source
Fresh air setting : Not Available

Cert. No. : [illegible]
Page : [illegible]

Calibration Point (°C)	UUT Setting (°C)	UUT Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Average* : The average of 10 values in each position.
Temperature stability : Overall of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperature at any position and the measured temperature of the reference location, which are obtained at the same time or at an identical time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout deviation.
UUT : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and included uniformity.

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

เอกสารไม่ควบคุม

* 1014311

Certificate of Calibration

Equipment :

Manufacturer :

Model :

Serial No. :

ID No. :

Customer by :

Location :

Received Date :

Calibration Date :

Ambient Temperature :

Relative Humidity :

Calibrated by :

Approved by :

Authorised Signatory

Next Date :

เอกสารไม่ควบคุม

Equipment :

Condition As-Received :

Reference :

Procedure Used :

Condition of the Result of calibration

Instrument	Model	Serial No.	Cert. No.	Due Date
1				

Result of Calibration : (✓) Without Adjustment

Finish or coating :

Dimensions during calibration

	Beginning	Finished
Temp. (°C)		
RH. (%RH) (%)		
VAC Gauge (mm)		

Position	Ref. Std. ID No.
1	
2	
3	
4	
5	
6	
7	
8	
9 (CW)	

Probe Installation Details

Dimension of Chamber

เอกสารไม่ควบคุม

Equipment :

Condition As-Received :

Reference :

Result of Calibration : (✓) Without Adjustment

Function of SAT : Temperature Sensor

Finish or coating :

Calibration Point (°C)	SAT Setting (°C)	SAT Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k

Calibration Point (°C)	Measured Temperature (°C) Position								Average
	1	2	3	4	5	6	7	8	9 (CW)

Average : The average of 10 values in each position

Temperature stability : Overall is the greatest maximum difference of measured temperature at any one time

Temperature uniformity : The maximum difference of measured temperature at any moment and the measured temperature at the reference location, which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under stated state conditions

Overall variation : The difference of the maximum and minimum measured temperatures throughout observation

SAT : Unit Under Calibration

Note : The reported uncertainty of measurement was provided mainly and calculated arbitrarily

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

เอกสารไม่ควบคุม

HANNA instruments

Hanna Instruments (Thailand) Ltd.

CERTIFICATE OF CALIBRATION

Equipment :

Model :

Serial No. :

Accuracy :

Temperature Range :

Temperature of Operation :

Ambient Temperature :

Relative Humidity :

Manufacturer :

Made in :

Condition As-Received :

Reference :

Customer name :

Received date :

Calibrated date :

Issue date :

Calibrated Location :

Calibration Procedure :

Calibrated by :

Approved by :

Calibration Engineer

Authorised Signatory

เอกสารไม่ควบคุม

HANNA instruments

Instruments	Model	Serial No.	Calibration No.	Traceable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Capacity (Vol)	Standard Value	Average Value	Uncertainty	Tolerance of [illegible]	Acceptance Criteria
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

เอกสารไม่ควบคุม

HANNA instruments

Hanna Instruments (Thailand) Ltd.

CERTIFICATE OF CALIBRATION

Equipment:

Maker/Model:

Serial No.:

Color Meter:

Resolution:

Temperature Range:

Temperature of Operation:

Ambient Temperature:

Relative Humidity:

Manufacturer:

Made in:

Condition as Received:

Reference:

Customer name:

Received date:

Calibration date:

Issue date:

Calibrated Location:

Calibration Procedure:

Calibrated by:

Approved by:

Calibration Engineer

Authorized Signatory

เอกสารไม่ควบคุม

HANNA instruments

Instruments	Model	Serial No.	Calibration No.	Traceable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Capacity (Vol)	Standard Value	Average Value	Uncertainty	Tolerance of [illegible]	Acceptance Criteria
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

เอกสารไม่ควบคุม

Verification Certificate

Certificate No.:

Client name:

Address:

Equipment:

Manufacturer:

Model:

Serial No.:

ID No.:

Order No.:

Operation No.:

Date of Receipt:

Date of Calibration:

Calibrated by:

Approved by:

Date of Issue:

เอกสารไม่ควบคุม

Verification Report

Certificate No.:
Equipment:
Date of Calibration:

Location:
Environment Condition:

Condition of this equipment of Calibration:

Instrument	Model	Serial No.	Certificate No.	Due Date	Traceable
Digital Thermometer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Data Thermometer	[illegible]	[illegible]			

1. This certificate is traceable to International system of units (SI Units).
2. The certificate was verified and the final result was calculated.
3. The result of calibration was due to accuracy of device of date and asset of calibration only.
4. Condition of calibration item : Good

Time of Issue : Hour 30 Minute 41 , 28 %

5. Result of calibration : [x] Without adjustment [ ] After adjustment

เอกสารไม่ควบคุม

Verification Report

Certificate No.:
Equipment:
Date of Calibration:
Calibration point: 100 °C
Calibration result:

Reporting of Temperature

Device No.	IUT° Reading (°C)	IUT° Reading (°C)	Stability (±°C)	Accuracy Thermometer (°C)	Uncertainty (±°C)
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Note:
IUT° = Unit under Calibration
Accuracy depth of standard thermometer is one-half (½) of least a equal based state of IUT.
Stability = One-half of the greatest observed difference of measured temperature at any position.
No of dead half or more after reading steady state.

เอกสารไม่ควบคุม

Verification Report

Certificate No.:
Equipment:
Date of Calibration:
Calibration point: 100 °C
Calibration result:

Figure 1. Location of Reference Standard and Stack Sensors of Equipment Unit

TOP VIEW

Source: Controlled Location

Note:
IUT° = Unit Under Calibration
Accuracy depth of standard thermometer is one-half (½) of least a equal based state of IUT.
Stability = One-half of the greatest observed difference of measured temperature at any position.
No of dead half or more after reading steady state.

The report provide of measurements may based in standard conditions, indicated as average value +- 2, providing a level of confidence of approximately 95 %.

เอกสารไม่ควบคุม

Verification Certificate

Certificate No.: [illegible]
Client name: [illegible]
Address: [illegible]

Equipment: [illegible]
Manufacturer: [illegible]
Model: [illegible]
Serial No.: [illegible]
ID No.: [illegible]
Order No.: [illegible]
Operation No.: [illegible]
Date of Receipt: [illegible]
Date of Calibration: [illegible]

Calibrated by [illegible]
Approved by [illegible]
Date of Issue [illegible]

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

เอกสารไม่ควบคุม

Verification Report

Certificate No.:

Equipment:

Date of Calibration:

Location:

Environmental Condition:

Condition of the equipment of Calibration

Equipment	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
with Thermocouple	[illegible]	[illegible]			

เอกสารไม่ควบคุม

Verification Report

Certificate No.:

Equipment:

Date of Calibration:

Calibrated parts:

Calibration result:

Table 1 : Reading of Temperature

Stock No.	UUT* Setting (°C)	UUT* Reading (°C)	Stability (±°C)	Standard Temperature (°C)	Uncertainty (±°C)
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

เอกสารไม่ควบคุม

Verification Report

Certificate No.:

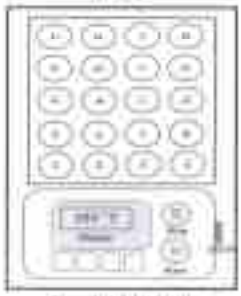
Equipment:

Date of Calibration:

Calibrated parts:

Calibration result:

Figure 1 : Location of Reference Sensor and Block Adaptor of Digatron unit



Sensor Installation Location

เอกสารไม่ควบคุม

SITHIPORN

Preventive Maintenance Protocol

Instrument: Digatron™ 2100	Model [redacted] S/N:
Customer:	Job No.:
Certified performed PM interval (weeks/years) (only for calibration interval and no. of samples analysed)	☐ Months / No. of samples analysed (if applicable):

Introduction

A maintenance protocol provides a systematic and functional means of maintaining a specific instrument type. The certified performed PM interval depends on the operational conditions, and is based on our technical experience and knowledge of Hanna/Digatron and analyzing practical instruments.

Apart from periodic therapists, the environmental conditions also need to be taken into account. Demanding environments, such as high ambient temperature, humidity, dirtiness etc. can impact the solution consumed interval and the maintenance and component replacement intervals.

The content of this protocol is subject to change and refinement by analysis via the service team, please make sure to indicate serial number and date of installation when contacting our PTOM representatives.

Maintenance Procedure

Parts to be Exchanged

Step	Action	Part	P/N	OK
1	Replace	Adaptor for pig, tube (PU) 4x1	[illegible]	☐
2	Replace	Blue silicon tube	[illegible]	☐
3	Replace valve in shell pump	Inlet-off Magnet/Outlet Valve	[illegible]	☐
4	Replace drain tubing	Silicone tubing 8/12 mm	[illegible]	☐
5	Replace vent tubing	Tubing reinforced for vent	[illegible]	☐
6	Replace water tubing	Tubing PVC 8/12 mm	[illegible]	☐
7	Cleaning	Drain grooves		☐
8	Cleaning	Valve base		☐

EMAIL: center@sithiporn.com www.sithiporn.com

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SITHIPORN

Check and Adjustment

Step	Action	Tolerance	Measured	Where	OK
1	Check [illegible]	[illegible]	[illegible]	[illegible]	☐
2	Check distillation volume		[illegible]	120 - 125 ml/min	☐
3	Check front panel switches				☐
4	Check [illegible] power supply AC 220 VAC				☐
5	Check level alfa in water generator				☐
6	Check safety door switch				☐

Remark _____

_____ Customer's Signature

_____ Engineer's Signature

Date _____

[illegible] Tel/Fax : [illegible] www.sithiporn.com

เอกสารไม่ควบคุม

FOSS

Customer Service Report

Report No: 8622

Date

Customer

Address

Contact Person

Phone

Model

Serial No.

Hour Meter

Check

Other

Total Time Expense

Job Type

Application	Model	Installation	Training
Service	Kjeltec FOSS	Service	Training
Installation	Kjeltec Tecator	Repair	Tecator
Training	FOSS/Tc	Tecator	FOSS
Repair Service	Other Equipment	Service	Other

Product Serial Number

Fault Type

Problem No.

Description of Work / Task

Installation / Service

Spare Parts Used / Fit Date

Qty

Sub Total

Part No.	Model	Description	Qty.

I certify the report is accurate and complete

Signed FSE

Signed Customer

Name

Name

Would you be willing to participate in a brief survey in order to rate our service quality?

เอกสารไม่ควบคุม

FOSS

Customer Service Report

Report No: 8534

Date

Customer

Address

Contact Person

Phone

Model

Serial No.

Hour Meter

Check

Other

Total Time Expense

Job Type

Application	Model	Installation	Training
Service	Kjeltec FOSS	Service	Training
Installation	Kjeltec Tecator	Repair	Tecator
Training	FOSS/Tc	Tecator	FOSS
Repair Service	Other Equipment	Service	Other

Product Serial Number

Fault Type

Problem No.

Description of Work / Task

Installation / Service

Spare Parts Used / Fit Date

Qty

Sub Total

Part No.	Model	Description	Qty.

I certify the report is accurate and complete

Signed FSE

Signed Customer

Name

Name

Would you be willing to participate in a brief survey in order to rate our service quality?

เอกสารไม่ควบคุม

FOSS Installation Qualification

Kjeltec™ 8100 Distillation Unit

This IQ applies to Kjeltec™ 8100 Distillation Unit manufactured by FOSS Analytical. The installation is performed by FOSS trained service personnel.

1 Intended Use

Kjeltec 8100 is intended for automatic steam distillation operations as specified in FOSS Analytical AB's Application Notes.

2 Purpose

This Installation Qualification is designed to assure that

- The Kjeltec instrument is received complete, with all required parts in good condition
- The location of the instrument is environmentally and ergonomically acceptable
- The instrument is assembled and configured correctly
- Suitable electricity and water are supplied to the instrument, see table 1 for requirements

3 Identification

Description	Serial Number
Kjeltec FOSS Distillation Unit	[illegible]

Tecator AB, A Subsidiary of FOSS Electric

FOSS Analytical AB
Box 70 [illegible]
[illegible]
Sweden

FOSS Analytical AB
Box 70 [illegible]
[illegible]
Sweden

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4 Control of Received Equipment

4.1 Verify that the correct instrument type and accessory kit items are received and in proper condition

[illegible]

Packing List Item	Acceptance Criteria	Pass (Y/N)
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y

5 Installation

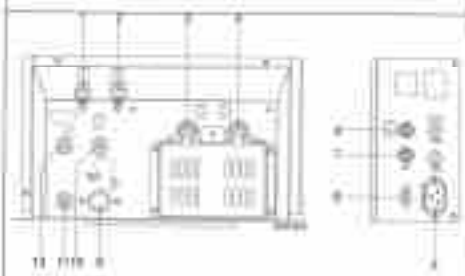
5.1 The equipment must be installed in a suitable location with power, water and draining available

[illegible]

Location Requirements	Acceptance Criteria	Pass (Y/N)
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y

5.2 The instrument must be assembled correctly

[illegible]

Instrument Tubing Connections	Acceptance Criteria	Pass (Y/N)
	Pass all checkpoints in module	Y

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]
9. [illegible]
10. [illegible]
11. [illegible]
12. [illegible]

[illegible]

5.3 The instrument should be assembled and powered up

[illegible]

Action	Expected Response	Pass (Y/N)
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y
[illegible]	[illegible]	Y

6 Summary of Deviations/Comments

Deviation	Action	Comment

7 IQ Documentation

Completed by: [illegible]

Company: [illegible]

Customer Name: [illegible]

Company: [illegible]

Date completed: [illegible]

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เอกสารไม่ควบคุม

4 Performance

4.1 Verify the dispensed volumes of reagents

Note: To verify the dispensed volumes of reagents a triple test should be done to be reliable correct. First calculate a mean value.

1. Choose "Manual" in the menu. (When using in the Automatic Program / a method)
2. Open the valve: hold "or pressing **Open** and place a tube in the instrument. Close the valve [illegible]

Water

1. Press **Water** (at first press Water 30 ml of water will be filled into the tube)
2. Measure the collected water in a graduated measuring glass and write the result in table 1 below.
3. Check acceptance criteria in the table and make the judgment (Passed or not)

Note: If the water volume needs to be corrected, go to: CEC Digital Pump Calibration to find Fine Manual

Alkali

1. Press **Alkali** and then press Start. 30 ml of alkali will be filled into the tube.
2. Measure the collected alkali in a graduated measuring glass and write the result in table 1 below.
3. Check acceptance criteria in the table and make the judgment (Passed or not)

Table 1 Volume control

Test	Result	Expected result	Passed (Y/N)
Water volume	[illegible] ml [illegible] ml [illegible] ml Mean: [illegible] ml	25.00 ml	Y
Alkali volume	[illegible] ml [illegible] ml [illegible] ml Mean: [illegible] ml	67.50 ml	Y

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4.2 Verify the distillation procedure, accuracy and precision

The distillation principle is to convert ammonium (NH_4^+) into ammonia (NH_3) by using an alkali (NaOH) and therefore must dilute it into a mixture flask containing boric acid and phenol red standard acid solution using a phenolic and glass stopper. A measurement algebra, a calibrated with phenol solution control, and be used to check the accuracy of the distillation. The amount is calculated from obtained result.

The way to perform this test will be described in the following.

Chemical Check

Use ammonium sulphate ($(NH_4)_2SO_4$) purity = 99.5 %.

Mol weight = 132.14 g/mol, Nitrogen content in ammonium sulphate (N) 21 % = 21.00 %.

Analysis conditions according to AS 300

Water	80 ml
Alkali	30 ml NaOH (400 g/l)
Receiving solution	30 ml boric acid (4%)
Distillation time	7 minutes
Acid	5 minutes
Titrant	0.1N HCl

For reagent preparation see Appendix A

1. Start the instrument and run one blank, reference standards according to stress analysis (methods: alkali free, a neutral flask containing 5 ml of acid. Titrate with a standard acid solution using a colorimetric end point detection. If the blank are less than 0.1 ml continue with the recovery test.
2. Weight (1 g) ammonium sulphate into a tube. Prepare 5 samples (mean).
3. Run the six samples according to above analysis conditions. Titrate with a standard acid solution using a colorimetric end point detection.
4. Calculate the recovery according to below equations. Expected results of recovery should be 100±2 %.

Recovery test	Result	Expected result	Passed (Y/N)
Blank value (water blank)	1. [illegible] ml 2. [illegible] ml	0.00-0.10 ml	Y
Recovery	1. [illegible] % 2. [illegible] % 3. [illegible] % 4. [illegible] % 5. [illegible] % 6. [illegible] %		
Accuracy	Mean value: [illegible]	98-102 %	Y
Precision	SD: [illegible]	2.0-2.5 %	Y

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*) Note: Please the note that the factor calculations may be adjusted if other purity levels of determination are used. A certificate for the standard supplier should be available.

Purity	Nitrogen content
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

$$\% \text{ Nitrogen} = \frac{[illegible]}{[illegible]} \quad [illegible]$$

(*) Normally of Sheet to 4 places of decimal.

$$\% \text{ Recovery} = \frac{\% \text{ Nitrogen}}{[illegible]} \times 100$$

[illegible]

5 Summary of Deviations/Comments

The following lists where requirements are specified below and any corrective actions are noted.

Deviation	Action	Comment

6 OQ Documentation

I have successfully completed of tests above, sign and date this sheet below. If required by customer, have one signed copy in the instrument.

If customer's internal procedures require further reporting or evaluating of results, execute those procedures as required.

Performed by: _____

Company: _____

Customer Name: _____

Company: _____

Date completed: _____

7 Appendix A

7.1 Preparation of Reagents

7.1.1 Alkali

To correct concentration can represent an excess of sodium hydroxide is necessary.

Use 400 g (not 50 per liter of solution. Commercially available is concentration up to 50 %. The use concentrations above 40 % as other will lead to crystal formation requiring the function of the pumps. If you use only low concentrations < 40 %, dilute is better too.

7.1.2 Titrant acid, determination of concentration

To be able to achieve accurate nitrogen (protein results), one must be sure that the HCl (hydrochloric acid) concentration is what it is supposed to be. A titration against a predistilled solution of sodium carbonate as described below is thus necessary. Incorrect HCl concentration can otherwise cause unbearable errors.

- **Standard solution**
  Weigh approx. 1.0 g of anhydrous sodium carbonate (Na_2CO_3). Use a mortar to make a fine powder. Dry it for 1 h at 250 °C or 2 h at 200 °C. After cooling in a desiccator, transfer the sodium carbonate to a beaker with a cover lid. Place it in a desiccator.
- **Indicator solution**
  Dissolve 0.1 g methyl red in 100 ml methanol. Dissolve 0.1 g bromocresol green in 100 ml methanol.
- **Procedure**
  Weigh approx. 0.1 g of the standard substance using an analytical balance, note the weight (W_1). Transfer the sodium carbonate to a receiver flask and add 10 ml of H_2O (distilled or demineralized). Add 8 drops from each of the indicator solutions. Titrate to pink. Place the mixture in oil bath (A_1), then take solution for a few minutes. The solution will turn green. Cool rapidly to room temperature under running water. Continue the titration until the next pink colour change occurs. Note also this volume.

  (A_2). Boil the solution for a few minutes. Cool rapidly to room temperature under running water. Continue the titration until the next pink colour occurs. Note also this volume (A_3).

  Note: Temperature changes will influence the volume and the concentration of the titrant solution. The working temperature of the titrant should approximate that of the temperature during standardization. If temperature corrections are necessary, sufficient accuracy may be obtained by use of a correction table (ASTM E542-2).

7.2 Calculation

$$\text{Molarity (M)} = \frac{[1.0 \times W_1]}{[A_1 + A_2 + A_3]}$$

Note: Concentration must be accurate to four digits, i.e., 0.[illegible] M.

Note: The colour change of this titration procedure (ASTM E542-2) may be difficult to see. Therefore a pH meter or a mixed indicator (e.g. 0.1 g Methyl red and 0.1 g Bromocresol green in 100 ml methanol) will make it much easier to perform.

7.3 Receiver Solution

Boric acid 4 % with bromocresol green / methyl red indicator solution

In order to obtain accurate results the receiver solution is adjusted to that a small (0.05-0.20 ml) positive blank is obtained when running a blank sample. The 4 % boric acid receiver solution is prepared by dissolving 400 g of boric acid in about 5-6 l (ca) hot demineralized water. Mix well and dilute demineralized water to a volume of about 9 l. Cool the solution to room temperature and add 100 ml of bromocresol green solution (100 mg in 100 ml methanol) and 70 ml of methyl red solution (100 mg in 100 ml of methanol). Dilute to 10 l with distilled water and mix carefully.

Note: The addition of alkali is to achieve a positive blank value. This should, however, be kept between 0.05 - 0.20 ml blank, to obtain good reproducibility when testing blanks.

Adjustment of the boric acid is made by the following procedure:

1. Transfer 25 ml boric acid solution to a receiver flask and add 100 ml of distilled water. If the solution in the flask is acid red, titrate with 0.1 M sodium hydroxide solution until a second grey colour is obtained. Calculate the amount of sodium hydroxide solution necessary to adjust the boric acid solution to the 10 l flask with the formula: ml 0.1 M alkali = ml titrant x 40
2. Add the calculated amount of 0.1 M alkali solution to the boric acid solution. Mix.
3. To check proceed as follows using 25 ml of the boric acid solution. Run a blank. If the value of the blank is high (0.2 ml of 0.2 M HCl) the boric acid is incorrectly adjusted. This might occur, irregular blanks. For correction add HCl directly into the boric acid tank, mix a carefully and repeat until a reading of 0.05 - 0.20 ml HCl is obtained. If a positive blank is not achieved, add further small quantities of 0.1 M NaOH but remove the check until a satisfactory value is achieved.

Kjeltec™ 8100 Distillation Unit
Tecator™ 2508/2520 Digestor

1 Scope

[illegible]

2 Intended Use

[illegible]

3 Purpose

[illegible]

- [illegible]
- [illegible]

[illegible]

4 Definition of Test Procedures

4.1 Preventive Maintenance

[illegible]

[illegible]

4.2 Ongoing Qualification Tests

Block Temperature

[illegible]

Note: The above chemical is easily readily available with a certificate specifying the purity.

[illegible]

Blank Tests

[illegible]

Note: The amount of titrant used in the blank test should always be greater than 0.0 ml. Blanks within the same laboratory should be consistent across time.

4.3 Recovery Tests

[illegible]

- [illegible]
- [illegible]
- [illegible]

Note: Results less than 98.0 % or more than 101.0 % in either of the recovery tests indicate failures in the procedure and/or inaccurate concentration of the standard volumetric hydrochloric acid solution (should be adjusted to four decimals accuracy according to procedure in Ch. [illegible])

External Quality Control Program

[illegible]

Calculation and Expression of Results

$$[illegible]$$

Where:

[illegible]

5 Maintenance

5.1 Maintenance Kjeltec™ 8100

See instructions in User Manual - Kjeltec 8100/8200, chapter 7 Maintenance.

5.2 Maintenance Tecator™ Digestor

See instructions in User Manual - Tecator Digestor, chapter 7 Maintenance.

6 The Maintenance Record Charts

[illegible]

6.1 FossCing™ Service Log

Date	Block temperature	Blank titration	Recovery test	Service performed	Next service date

6.2.2 Weekly Maintenance

Date														
[illegible]														
[illegible]														
[illegible]														
Signature														
Number of workers														

Date	Work Performed and Exceptions	FCSS Representative	Customer Representative	Customer Signature Received By

Applicable for FCSS active call service contracts

6.2.3 Every 1-2 Months Maintenance

Date														
[illegible]														
[illegible]														
[illegible]														
[illegible]														
Signature														
Number of workers														

6.2 FossCare™ Customer Log

6.2.1 Daily Maintenance

Date														
[illegible]														
[illegible]														
[illegible]														
[illegible]														
[illegible]														
Signature														
Number of workers														

6.3.4 Additional Maintenance

Date	Description	Reason

เอกสารไม่ควบคุม

6.3.5 Yearly Maintenance

Date	Description	Reason

เอกสารไม่ควบคุม

6.3.6 Exchange of Parts and Reagents Maintenance

Date	Description of Parts and Reagents	Page/Line

เอกสารไม่ควบคุม

Certificate of Calibration

Equipment :

Manufacturer :

Model :

Serial No. :

ID No. :

Submitted by :

Location :

Received Date :
Calibration Date :
Ambient Temperature :
Relative Humidity :

Calibrated by :

Approved by :

Approved Signatory

Issue Date :

เอกสารไม่ควบคุม

Equipment : Incubator
Condition As Received : Good Item
Reference : [illegible]
Procedure Used :
Calibration was conducted using calibration procedure CP-0702 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90

Condition of the result of calibration :
1. Reference standard instrument :

Instrument	Model	Serial No.	Cert. No.	Due Date
1 (Data Acquisition)	[illegible]	[illegible]	[illegible]	[illegible]

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

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

Environment during calibration		
	Beginning	Finished
Temp. (°C)	[illegible]	[illegible]
RH. (Rand. (%)	[illegible]	[illegible]
AC Supply (Volt)	[illegible]	[illegible]

Probe installation Details :
[illegible]

Dimensions of Chamber :
[illegible]

Position :	Ref. Pin (D No.)
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
5	[illegible]
6	[illegible]
7	[illegible]
8	[illegible]
9 (ref)	[illegible]

เอกสารไม่ควบคุม

Equipment : Incubator
Condition As Received : Good Item
Reference : [illegible]
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh-air setting : Not Available

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Digital Variation (°C)	Uncertainty (±°C)	Coverage Factor k
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration Point (°C)	Measured Temperature (°C) Position								
	1	2	3	4	5	6	7	8	9 (ref)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperatures at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location, which are observed at the same time or at as close an interval as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
(UUC* : Unit Under Calibration)
Note : The reported uncertainty of measurement was in-house validity and accurate uncertainty.
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

-end-

เอกสารไม่ควบคุม

Certificate of Calibration

Cert. No. : [illegible]
Page : 1 of 1

Equipment : Incubator
Manufacturer : [illegible]
Model : [illegible]
Serial No. : [illegible]
ID No. : [illegible]
Submitted by : United Analytical and Engineering Consultant Co. Ltd.
3 Soi Udomsuk 14, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (KB)
Received Date : [illegible]
Calibration Date : [illegible]
Ambient Temperature : ([illegible]) °C
Relative Humidity : ([illegible]) %
Calibrated by : [illegible]
Approved by : [illegible]
Approved Signatory
( ) Participate Temperature
( ) Water Activity
( ) Shelf Life
Issue Date : [illegible]

เอกสารไม่ควบคุม

Equipment : Incubator
Condition As Received : Good Item
Reference : [illegible]
Procedure Used :
Calibration was conducted using calibration procedure CP-0702 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90

Condition of the result of calibration :
1. Reference standard instrument :

Instrument	Model	Serial No.	Cert. No.	Due Date
1 (Data Acquisition)	[illegible]	[illegible]	[illegible]	[illegible]

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

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

Environment during calibration		
	Beginning	Finished
Temp. (°C)	[illegible]	[illegible]
RH. (Rand. (%)	[illegible]	[illegible]
AC Supply (Volt)	[illegible]	[illegible]

Probe installation Details :
[illegible]

Dimensions of Chamber :
[illegible]

Position :	Ref. Pin (D No.)
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
5	[illegible]
6	[illegible]
7	[illegible]
8	[illegible]
9 (ref)	[illegible]

เอกสารไม่ควบคุม

Equipment :
Condition As Received :
Reference :
Result of Calibration :
Function of UUT : Temperature Source
Fresh air setting :

Calibration Point (°C)	UUT Setting (°C)	UUT Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (±°C)	Coverage Factor k
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration Point (°C)	Measured Temperature (°C) Position								
	1	2	3	4	5	6	7	8	9 (ref.)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Average* : The average of 9 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperature at any sensors and the measured temperature at the reference location, which are measured at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The difference of the maximum and minimum measured temperatures throughout observation.
UUT : Unit Under Calibration.
Note : The reported uncertainty of measurement was includes stability and overall uniformity.

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

-xlsx-

เอกสารไม่ควบคุม

Certificate of Calibration

Cert. No. :
Page : 1 of 1

Equipment :
Manufacturer :
Model :
Serial No. :
ID No. :
Submitted by :
Location :
Received Date :
Calibration Date :
Ambient Temperature :
Relative Humidity :
Calibrated by :
Approved by :
Issue Date :

เอกสารไม่ควบคุม

Equipment :
Condition As Received :
Reference :
Procedure Used :
Condition of the result of calibration
Result of Calibration :
Function of UUT : Temperature Source
Fresh air setting :

Environment during calibration	Beginning	Finished
Temp. (°C)	23	23
RH. (Humid. (%))	50	50
AC Supply (Volt.)	220	220

Position	Ref. Std. ID No.
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
5	[illegible]
6	[illegible]
7	[illegible]
8	[illegible]
9 (ref.)	[illegible]

Probe Installation Details :
Dimension of Chamber :

เอกสารไม่ควบคุม

Equipment :
Condition As Received :
Reference :
Result of Calibration :
Function of UUT : Temperature Source
Fresh air setting :

Calibration Point (°C)	UUT Setting (°C)	UUT Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (±°C)	Coverage Factor k
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration Point (°C)	Measured Temperature (°C) Position								
	1	2	3	4	5	6	7	8	9 (ref.)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Average* : The average of 9 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperature at any sensors and the measured temperature at the reference location, which are measured at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The difference of the maximum and minimum measured temperatures throughout observation.
UUT : Unit Under Calibration.
Note : The reported uncertainty of measurement was includes stability and overall uniformity.

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

-xlsx-

เอกสารไม่ควบคุม

Certificate of Calibration

Cert. No. :
Page : 1 of 1

Equipment :
Manufacturer :
Model :
Serial No. :
ID No. :
Submitted by :
Location :
Received Date :
Calibration Date :
Ambient Temperature :
Relative Humidity :
Calibrated by :
Approved by :
Approved Signatory
( ) Portable Temperature
( ) Water Bubbler
( ) Sand bath
Issue Date :

เอกสารไม่ควบคุม

Equipment :
Condition As Received :
Reference :
Procedure Used :
Cert. No. :
Page :

Certificate of Calibration

1. Reference standard instrument

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A			

2. This calibration is valid only for the item calibrated on date and state of calibration
3. This certificate is traceable to the International System of Units

Result of Calibration : (✓) Without Adjustment
Function of UUC : Temperature Source
Fresh air setting : Close

Environment during calibration	Beginning	Finished
Temp. (°C)		
RH. (Rural) (%)		
AC Supply (Volt)		

Position	Ref. Std. ID No.
1	
2	
3	
4	
5	
6	
7	
8	
9 (ref.)	

Probe validation Centre :
Dimension of Chamber :

เอกสารไม่ควบคุม

Equipment :
Condition As Received :
Reference :
Cert. No. :
Page : 1 of 1
Result of Calibration : (✓) Without Adjustment
Function of UUC : Temperature Source
Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Probe Variation (± °C)	Uncertainty (± °C)	Coverage Factor k
38.0	38.0	38.0	0.000	0.00	0.00	0.00	2

Calibration Point (°C)	Measured Temperature (°C) Position								
	1	2	3	4	5	6	7	8	9 (ref.)
38.0	38.000	38.000	38.000	38.000	38.000	38.000	38.000	38.000	38.000

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

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

-xxx-

เอกสารไม่ควบคุม

Certificate of Calibration

Cert. No. :
Page : 1 of 1

Equipment :
Manufacturer :
Model :
Serial No. :
ID No. :
Submitted by :
Location :
Received Date :
Calibration Date :
Ambient Temperature :
Relative Humidity :
Calibrated by :
Approved by :
Approved Signatory
( ) Portable Temperature
(✓) Water Bubbler
Issue Date :

เอกสารไม่ควบคุม

Equipment :
Condition As-Received :
Reference :
Procedure Used :

Cert. No. :
Page : 2 of 2

Calibration was conducted using in-house calibration procedure CP-0704, according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The acceptance scale used was based on ITS-90.

Condition of the used of calibration

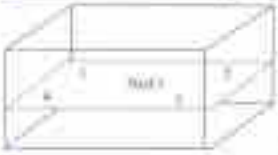
1. Reference standard instrument :

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	[illegible]	[illegible]	[illegible]	[illegible]

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

Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(VAC)
Beginning of Calibration	21	65	229
Finished of Calibration	22	66	229



Top view

Position	Ref. Std. ID No.
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
Shelf 1	[illegible]

Equipment :
Condition As-Received :
Reference :
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No. :
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading : (°C) Position 1	2	3	4	5 (ref.)
22.5	22.5	22.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
22.5	[illegible]	[illegible]	[illegible]	2

Average* : The average of 30 values in each position.
Uniformity : The maximum difference of measured temperatures at any position and the measured temperature in the reference position, which are observed at the same time in as close as reasonable time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Stability : One-half of the greatest maximum difference of measured temperature at any one point.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was includes stability and expanded uncertainty.

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

-end-

Certificate of Calibration

Cert. No. :
Page : 1 of 1

Equipment : Water Bath
Manufacturer : [illegible]
Model : [illegible]
Serial No. : [illegible]
ID No. : [illegible]
Submitted by : [illegible]
Location : Microbiology Laboratory
Received Date : [illegible]
Calibration Date : [illegible]
Ambient Temperature : [illegible]
Relative Humidity : [illegible]
Calibrated by : [illegible]
Approved by : Approved Signature
( ) Purchase Transaction
( ) Water Software
Issue Date : [illegible]

Equipment :
Condition As-Received :
Reference :
Procedure Used :

Cert. No. :
Page : 1 of 2

Calibration was conducted using in-house calibration procedure CP-0704, according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The acceptance scale used was based on ITS-90.

Condition of the used of calibration

1. Reference standard instrument :

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	[illegible]	[illegible]	[illegible]	[illegible]

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

Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(VAC)
Beginning of Calibration	21	65	229
Finished of Calibration	22	66	229

Top view

Position	Ref. Std. ID No.
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
Shelf 1	[illegible]

Equipment : Water Bath
Condition As Received : Used Item
Reference : [illegible]
Result of Calibration : (✓) Without Adjustment
Function of UUC* : Temperature Source

Cert. No. : [illegible]
Page : [illegible]

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C) Position 1	2	3	4	5 (opt.)
40.0	40.0	40.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration point (°C)	Uniformity (°C)	Stability (±°C)	Uncertainty (±°C)	Coverage Factor k
40.0	[illegible]	[illegible]	[illegible]	2

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

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

-end-

เอกสารไม่ควบคุม

Cert. No. : [illegible]
Page : 1 of 1

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Harmony
Model : [illegible]
Serial No. : [illegible]
ID No. : [illegible]
Submitted by : [illegible] Engineering Consultant Co.,Ltd.
[illegible] Soi Udomsuk 47, Sukhumvit Road,
Bangchak, Phrakanong
Bangkok 10260
Location : Workshop Laboratory
Received Date : 1 April 2020
Calibration Date : 1 April 2020
Ambient Temperature : (20 ± 10) °C
Relative Humidity : (50 ± 20) %
Calibration by : [illegible]
Approved by : [illegible]
( ) Worapongs Tanayabej
(✓) Manit Rattanak
( ) Sueb Inga
Issue Date : 10 April 2020

The Calibration has the a confidence probability of approximately 95 %

เอกสารไม่ควบคุม

Equipment : Water Bath
Condition As Received : Used Item
Reference : [illegible]
Procedure Used :
Calibration were conducted using in-house calibration procedure [illegible], according to client measurement method and Data Acquisition which connected with Industrial Platinum Resistance Thermometer (PRT).
The temperature mode used was based on [illegible]

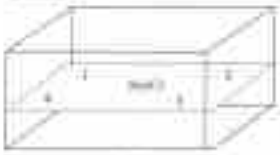
Condition of the Item at Calibration
1. Reference standard instrument :

Instrument	Model	Serial No.	Cert. No.	Due Date
1 Data Acquisition	[illegible]	[illegible]	[illegible]	[illegible]

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

Result of Calibration : (✓) Without Adjustment
Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	[illegible]	[illegible]	[illegible]
Finished of Calibration	[illegible]	[illegible]	[illegible]



Front

Position	Ref. Std. ID No.
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
Shelf 1	[illegible]

เอกสารไม่ควบคุม

Equipment : Water Bath
Condition As Received : Used Item
Reference : [illegible]
Result of Calibration : (✓) Without Adjustment
Function of UUC* : Temperature Source

Cert. No. : [illegible]
Page : 1 of 1

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C) Position 1	2	3	4	5 (opt.)
40.0	40.0	40.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration point (°C)	Uniformity (°C)	Stability (±°C)	Uncertainty (±°C)	Coverage Factor k
40.0	[illegible]	[illegible]	[illegible]	2

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

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

-end-

เอกสารไม่ควบคุม

Certificate of Calibration

Cert. No. : [illegible]
Page : 1 of 3

Equipment :	Water Bath
Manufacturer :	[illegible]
Model :	WNE 14
Serial No. :	[illegible]
ID No. :	[illegible]
Submitted by :	United Analysis and Engineering Consultant Co.,Ltd. [illegible] Bangkok, Phrakhanong Bangkok 10260
Location :	Microbiology Laboratory
Received Date :	7 April 2022
Calibration Date :	7 April 2022
Ambient Temperature :	(20 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	[illegible]
Approved by :	Approved Signatory

( ) Pornthipa Tanayong
( ) Mana Subcharn
( ) Kwan Inga

Issue Date : 11 April 2022

This measurement are for a confidence probability of approximately 95%

Equipment : Water Bath
Condition As Received : Good Item
Reference : [illegible]
Procedure Used :-

Calibration was performed using in house calibration procedure [illegible] according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (PRT).

The temperature scale used was based on ITS-90

Condition of the result of calibration

1. Reference standard instrument

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	[illegible]	[illegible]	[illegible]	[illegible]

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

Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	[illegible]	[illegible]	[illegible]
Finished of Calibration	[illegible]	[illegible]	[illegible]

Position	Ref. Std. ID No.
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
Bath	[illegible]

Equipment : Water Bath
Condition As Received : Good Item
Reference : [illegible]
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No. : [illegible]
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C) Position 1	2	3	4	5 (ref.)
44.0	44.0	44.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
44.0	[illegible]	[illegible]	[illegible]	2

Average* : The average of 30 values in each position
Uniformity : The maximum difference of measured temperatures at any position and the measured temperature at the reference location, which was observed at the same time or at as close an observation time as possible, to determine the temperature pattern or homogeneity within the chamber under steady-state conditions
Stability : One-half of the greatest maximum difference of measured temperatures at any one probe
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was includes stability and periodic uniformity

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

Certificate of Calibration

Cert. No. : [illegible]
Page : 1 of 3

Equipment :	Water Bath
Manufacturer :	[illegible]
Model :	WNE 14
Serial No. :	[illegible]
ID No. :	[illegible]
Submitted by :	United Analysis and Engineering Consultant Co.,Ltd. [illegible] Bangkok, Phrakhanong Bangkok 10260
Location :	Microbiology Laboratory
Received Date :	17 February 2021
Calibration Date :	17 February 2021
Ambient Temperature :	(20 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	[illegible]
Approved by :	Approved Signatory

( ) Pornthipa Tanayong
( ) Mana Subcharn

Issue Date : 22 February 2022

The measurement are for a confidence probability of approximately 95%

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

METTLER TOLEDO

Accuracy Calibration Certificate

เอกสารไม่ควบคุม

METTLER TOLEDO Service

Measurement Results

เอกสารไม่ควบคุม

METTLER TOLEDO Service

Error of Indication

เอกสารไม่ควบคุม

METTLER TOLEDO Service

Test Equipment

Remarks

เอกสารไม่ควบคุม

METTLER TOLEDO Service

Measurement Uncertainty of the Weighing Instrument in Use

เอกสารไม่ควบคุม

Certificate of Calibration

Equipment :

Manufacturer :

Model :

Serial No. :

ID No. :

Name/Address :

Location :

Received Date :

Calibration Date :

Ambient Temperature :

Relative Humidity :

Calibrated by :

Approved by :

Issue Date :

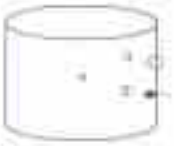
เอกสารไม่ควบคุม

Equipment : Autoclave
Condition As Received : Clean Item
Reference : 2207/2240/OC-F
Procedure Used :-
Calibration were conducted using in-house calibration procedure CP-0703 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T.
The accuracy of each data was based on ITS-90

Condition of the result of calibration
1. Reference standard instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1. Data Acquisition	34970A	MY44043040	2210466	28 Mar 2023

2. The certificate is valid only to the item indicated on date and place of calibration.
3. The certification is traceable to the International System of Unit.
4. The result of calibration covers laboratory accuracies for the sterilization of goods and material which used for infusion with organisms categorized as Hazard Group 1, 2 and 3**
(** = Categorization of pathogens according to hazard and categories of containment, second edition, 1995.)
It does not cover accuracies for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infected consumable is considered to be essential.
This result of calibration does not apply to sterilizers or distillers used for medical, dental, pharmaceutical or veterinary purposes which are directly concerned with patient care, or those used for fabrics subjected to sterilization which are intended to be dry at the end of cycle.
Result of Calibration : [ ] Without Adjustment
Function of UUC** : Temperature Source



	Environmental		
	(°C)	(%R.H.)	(mm)
Beginning of Calibration	24	60	1000
Finished of Calibration	24	60	1000

Position	Description	Ref. No. ID No.
1 =	Center of chamber	22-1470-07
2 =	Temperature sensor	22-1470-08
3 =	Exhaust port	22-1470-09

เอกสารไม่ควบคุม

Equipment : Autoclave
Condition As Received : Clean Item
Reference : 2207/2240/OC-F
Result of Calibration : [ ] Without Adjustment
Operating parameter Set : Temperature = 121 °C
Sterilization period = 30 minute

UUC* Setting (°C)	UUC* Reading (°C)	Position	Average* Standard Reading (°C)	Stability (± °C)	Pressure Reading (MPa)	Uncertainty (± °C)	Coverage Factor k
121	121	1	121.000	0.10	0.08	0.00	2
		2	121.000				
		3	121.000				

Operating parameter Set : Temperature = 134 °C
Sterilization period = 30 minute

UUC* Setting (°C)	UUC* Reading (°C)	Position	Average* Standard Reading (°C)	Stability (± °C)	Pressure Reading (MPa)	Uncertainty (± °C)	Coverage Factor k
134	134	1	134.000	0.10	0.20	0.00	2
		2	134.000				
		3	134.000				

Average* : The average of 10 value in each position
Stability : Deviation of the greatest maximum difference of measured temperature at any one place
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

เอกสารไม่ควบคุม

Cert. No. : 2210001
Page : 1 of 1

Certificate of Calibration

Equipment : Autoclave
Manufacturer : ALP
Model : CL-40L
Serial No. : 003783
ID No. : LAB-AIC-2200783
Submitted by : Lotus Analys and Engineering Consultant Co.,Ltd.
2 Rd Ratchaprasit 01, Rattanakosin Road,
Bangmak, Phrakhanong,
Bangkok, 10260
Location : Microbiology Laboratory (2F01)
Received Date : 27 May 2022
Calibration Date : 27 May 2022
Ambient Temperature : (24 ± 3) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Prachya Kaew
Approved by : Approved Signatory
( ) Pornthipa Tanasatit
( ) Nitas Rukwan
( ) Sirat Vijit
Issue Date : 2 June 2022
The Temperature profile a uniformity availability of approximately 30 °C

เอกสารไม่ควบคุม

Equipment : Autoclave
Condition As Received : Clean Item
Reference : 2208/2240/OC-F
Procedure Used :-
Calibration were conducted using in-house calibration procedure CP-0703 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T.
The accuracy of each data was based on ITS-90

Condition of the result of calibration
1. Reference standard instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1. Data Acquisition	34970A	MY44043040	2210466	28 Mar 2023

2. The certificate is valid only to the item indicated on date and place of calibration.
3. The certification is traceable to the International System of Unit.
4. The result of calibration covers laboratory accuracies for the sterilization of goods and material which used for infusion with organisms categorized as Hazard Group 1, 2 and 3**
(** = Categorization of pathogens according to hazard and categories of containment, second edition, 1995.)
It does not cover accuracies for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infected consumable is considered to be essential.
This result of calibration does not apply to sterilizers or distillers used for medical, dental, pharmaceutical or veterinary purposes which are directly concerned with patient care, or those used for fabrics subjected to sterilization which are intended to be dry at the end of cycle.
Result of Calibration : [ ] Without Adjustment
Function of UUC** : Temperature Source

	Environmental		
	(°C)	(%R.H.)	(mm)
Beginning of Calibration	27	55	1000
Finished of Calibration	27	55	1000

Position	Description	Ref. No. ID No.
1 =	Center of chamber	22-1470-07
2 =	Temperature sensor	22-1470-08
3 =	Exhaust port	22-1470-09

เอกสารไม่ควบคุม

Equipment : Refrigerator
Condition As Received : Used item
Reference :
Result of Calibration : (✓) Without Adjustment

Operating environment for : Temperature = [illegible] °C
Stabilization period = [illegible] minutes

UUT' Setting (°C)	UUT' Reading (°C)	Position	Average' Standard Reading (°C)	Stability (± °C)	Pressure Reading (MPa)	Uncertainty (± °C)	Coverage Factor k
[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	2
		2	[illegible]				
		3	[illegible]				

Operating parameter for : Temperature = [illegible] °C
Stabilization period = [illegible] minutes

UUT' Setting (°C)	UUT' Reading (°C)	Position	Average' Standard Reading (°C)	Stability (± °C)	Pressure Reading (MPa)	Uncertainty (± °C)	Coverage Factor k
[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	2
		2	[illegible]				
		3	[illegible]				

Average' : The average of 30 values in each position
Stability : One half of the greatest maximum difference of measured temperature in any one probe
UUT' : Unit Under Calibration
Note : The reported uncertainty of measurement was includes stability and standard uncertainty

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

-end-

เอกสารไม่ควบคุม

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

Cert. No. : [illegible]
Page : 1 of 2

Certificate of Calibration

Equipment : Refrigerator
Manufacturer : Sanyo
Model : [illegible]
Serial No. : [illegible]
ID No. : [illegible]
Submitted by : Lumen Analysis and Engineering Consultant Co., Ltd.
3 Soi Lasalle 41, Bangkaew Road,
Bangchak, Phrakhanong
Bangkok 10260
Location : Microbiology Laboratory
Received Date : 7 April 2022
Calibration Date : 7 April 2022
Ambient Temperature : (20 ± 5) °C
Relative Humidity : (50 ± 20) %
Calibrated by : Prasit Sawadchin
Approved by : Approved Signatory
( ) Prototype Temporary
(✓) Within Tolerance
( ) Out of Use
Issue Date : 16 April 2022
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

เอกสารไม่ควบคุม

Equipment : Refrigerator
Condition As Received : Used item
Reference :
Procedure Used :
Calibration was conducted using calibration procedure [illegible] according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature probe used was based on ITS-90.
Condition of the result of calibration
1. Reference standard equipment

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	[illegible]	[illegible]	[illegible]	[illegible]

2. The certificate is valid only to the item calibrated on date and place of calibration
3. The certificate is invalid if the instrument failed at use
Result of Calibration : (✓) Without Adjustment
Function of UUT' : Temperature Source
Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	[illegible]	[illegible]
RH. Humid. (%)	[illegible]	[illegible]
AC Supply (Volt)	[illegible]	[illegible]

Position	Ref. Std. ID No.
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]
5	[illegible]
6	[illegible]
7	[illegible]
8	[illegible]
9 (ref.)	[illegible]

Probe installation details :

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Dimension of Chamber :

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Capacity :	[illegible]	[illegible]	[illegible]

เอกสารไม่ควบคุม

Equipment : Refrigerator
Condition As Received : Used item
Reference :
Result of Calibration : (✓) Without Adjustment
Function of UUT' : Temperature Source
Fresh air setting : Not Available

Calibration Point (°C)	UUT' Setting (°C)	UUT' Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Display Variation (°C)	Uncertainty (± °C)	Coverage Factor k
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Calibration Point (°C)	Measured Temperature (°C) Position								
	1	2	3	4	5	6	7	8	9 (ref.)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Average' : The average of 30 values in each position
Temperature stability : One half of the greatest maximum difference of measured temperature in any one series
Temperature uniformity : The maximum difference of measured temperature in any moment and the measured temperature of the reference location, which are observed at the same time in an any place in chamber, this be possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation
UUT' : Unit Under Calibration
Note : The reported uncertainty of measurement was includes stability and standard uncertainty

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

-end-

เอกสารไม่ควบคุม

ภาคผนวก จ-2
เอกสารสอบเทียบเครื่องมือตรวจวัด

List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	pH100A JC03354	Technology Promotion Association (Thailand-Japan)	22CH60	13 Jan 22	13 Jan 23	-
2	DO Meter	DO	YSI	Pro 20i 18K104053	Technology Promotion Association (Thailand-Japan)	22TW168	24 Jul 22	25 Jul 23	-

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484

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NSC-TISI-TIS17025 CALIBRATION 0008

Cert.No.: 22CH60
Page.: 1 of 3

Certificate of Calibration

Equipment :	pH Meter
Manufacturer :	EcoSence
Model :	pH100A
Serial No. :	JC03354
ID No. :	UAE.EFM.063/2562(ENV.pH 03/62)
Condition As-Received:	Used Item
Received Date :	12 January 2022
Calibration Date :	13 January 2022
Reference :	2201-0350WSC-1
Submitted by :	United Analyst and Engineering Consultant Co.,Ltd. 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure :	In - house method . - CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM) - CP-CH8 by comparison with standard thermometer
Calibrated by :	Warakorn Lerngagtrakul
Approved by :	Approved Signatory

(✓) Malee Butkruea
( ) Saithip Meangmai
( ) Warakorn Lerngagtrakul

Issue Date : 17 January 2022

The Uncertainties are for a confidence probability of approximately 95%

Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	21E2682	25 Aug 2022
2) Ref. Standard Thermometer	4982054	110RC044	21I1201	26 Oct 2022

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

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	766820	23 Sep 2023
pH 6.982	CPA chem	761017	02 Aug 2022
pH 10.015	CPA chem	766824	04 Sep 2022

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

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	(±mV)	k
pH Meter S/N. JC03354	4.00	177.48	177	4.01	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-178	10.01	0.58	2.00

Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N.:200729SIA605377	4.008	4.01	144	0.0079	2.00
	6.982	6.98	-28	0.011	2.00
	6.982	6.98	-27	0.0099	2.00
	10.015	10.01	-200	0.0096	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe:
- Model : -
- Serial No. 200729SIA605377

Dimension of probe:
- Length : 112 mm.
- Diameter : 12 mm.
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.003	25.1	0.097	0.13	2.00
30.0	30.002	30.1	0.098	0.13	2.00
35.0	35.004	35.0	-0.004	0.13	2.00

Remark : - UUC* = Unit Under Calibration

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

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Cert.No.: 21TW158
Page.: 1 of 2

Certificate of Testing

Equipment :	DO Meter
Manufacturer :	YSI
Model :	Pro 20i
Serial No. :	18H110457
ID No. :	UAE.EFM.202/2561(ENV.DO.06/61)
Received Date :	27 July 2021
Test Date :	30 July 2021
Reference :	2107-0695WSC-3
Submitted by :	United Analyst and Engineering Consultant Co.,Ltd. 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Laboratory Condition :	Temperature (25 ± 5) °C Humidity (50 ± 20) %
Test Procedure :	In - house method : CP-CH9 by Comparison Technique with Azide Modification Method
Tested by :	Walalak Sirithean
Approved by :	Approved Signatory

( ) Malee Butkruea
(✓) Saithip Meangmai
( ) Warakorn Lerngagtrakul

Issue Date : 4 August 2021

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 18H110457

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.04	8.03	0.0055

This report was certified only for the instrument we tested.It is allowable to use for study the system efficiency,The environmental impact control and present to organization it may concerned Intend to use for advertising and referral purpose is prohibited.This report may not be reproduced other in full without written approval of the laboratory

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เอกสารไม่ควบคุม

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL.: 0-2717-3000-27 FAX: 0-2719-9484

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NSC-TISI-TIS17021 CALIBRATION 0008

Certificate of Calibration

Equipment :	DO Meter With Sensor
Manufacturer :	YSI
Model :	Pro 20i
Serial No. :	18H110457
ID No. :	UAE.EFM.202/2561 (ENV.DO.06/61)
Submitted by :	United Analyst and Engineering Consultant Co.,Ltd. 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Location :	TPA On Site Calibration Laboratory
Received Order :	2 August 2021
Calibrated Date :	2 August 2021
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
AC Line Voltage :	(220 ± 22) V
Calibrated by :	Preecha Hlahib
Approved by :	Approved Signatory

( ) Pornthippa Tameyakul
( ) Malee Butkruea
(✓) Suwit Imjai

Issue Date : 10 August 2021

The Uncertainties are for a confidence probability of approximately 95 %

เอกสารไม่ควบคุม

Equipment : DO Meter With Sensor
Condition As-Received : Used Item
Reference : 2107-0695WSC-4

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Digital Thermometer	1502A	A52847	20I1246	14 Oct 2021

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

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor. S/N.: 18H100722

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (±°C)	Coverage Factor *k*
25.0	100	25.005	25.0	-0.005	0.16	2.00
30.0	100	30.009	30.0	-0.009	0.16	2.00
35.0	100	35.003	35.0	-0.003	0.16	2.00

UUC* : Unit Under Calibration

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

-o0o-

เอกสารไม่ควบคุม

ภาคผนวก ฉ

หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

[illegible]

[illegible] กุมภาพันธ์ [illegible]

[illegible]

[illegible]

[illegible] กุมภาพันธ์ [illegible]

[illegible]

[illegible]

[illegible]

[illegible] กุมภาพันธ์ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
1	[illegible]	Liquid-Liquid Extraction, Gas Chromatographic Method
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method 2) Digestion, Inductively Coupled Plasma Method
3	Barium	Digestion, Inductively Coupled Plasma Method
4	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method
5	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method
6	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method
7	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method 2) 5-Day BOD Test, Membrane Electrode Method
9	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method 3) Digestion, Inductively Coupled Plasma Method
10	Chemical Oxygen Demand	1) Closed Reflux, Titrimetric Method 2) Closed Reflux, Colorimetric Method 3) Open Reflux, Titrimetric Method
11	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method
12	Chromium	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method 3) Digestion, Inductively Coupled Plasma Method
13	Color	ADMI Weighted-Ordinate Spectrophotometric Method
14	Copper	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method 3) Digestion, Inductively Coupled Plasma Method
15	Cyanide	1) Distillation, Colorimetric Method 2) Flow Injection Analysis Method

[illegible]

[illegible]	[illegible]	[illegible]
16	[illegible]	Liquid-Liquid Extraction, Gas Chromatographic Method
17	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method
18	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method
19	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method
20	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method
21	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method
22	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method
23	Endosulfan sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method
24	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method
25	Endrin aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method
26	Formaldehyde	Distillation, Colorimetric Method
27	Free Chlorine	1) Iodometric Method 2) DPD Ferrous Titrimetric Method
28	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method
29	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method
30	Hexavalent Chromium	1) Colorimetric Method 2) Extraction, Direct Air-Acetylene Flame Method
31	Lead	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method 3) Digestion, Inductively Coupled Plasma Method
32	Manganese	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method 3) Digestion, Inductively Coupled Plasma Method
33	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method
34	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method
35	Nickel	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method 3) Digestion, Inductively Coupled Plasma Method

[illegible]

ลำดับ	พารามิเตอร์	วิธีวิเคราะห์
39	Oil & Grease	1) Liquid-Liquid Partition Gravimetric Method 2) Soxhlet Extraction Method
40	pH	Potentiometric Method
41	Phenols	1) Distillation, Chloroform Extraction Method 2) Distillation, Direct Photometric Method
42	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method 2) Digestion, Inductively Coupled Plasma Method
43	Sulfide	1) Iodometric Method 2) Methylene Blue Method
44	Temperature	Laboratory and Field Method
45	Total Dissolved Solids	Dried at 180 °C
46	Total Kjeldahl Nitrogen	Semi-Micro-Kjeldahl Method
47	Total Suspended Solids	Dried at 103-105 °C
48	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method, Colorimetric Method, Calculation 2) Digestion, Inductively Coupled Plasma Method, Colorimetric Method, Calculation
49	Zinc	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method 3) Digestion, Inductively Coupled Plasma Method

[illegible]

ลำดับ	พารามิเตอร์	วิธีวิเคราะห์
1	Acenaphthene	1) Liquid-Liquid Extraction, Gas Chromatographic Method 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method
2	Acetone	Purge and Trap Gas Chromatographic/Mass Spectrometric Method
3	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method (ต่อ)

4. Anthracene...

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

15. Benzo(g,h,i)perylene...

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

30. Chlorodibromomethane...

ลำดับ	พารามิเตอร์	วิธีวิเคราะห์
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method
31	Chloroform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method
33	Chromium	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method 3) Digestion, Inductively Coupled Plasma Method
34	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method, Colorimetric Method, Calculation 2) Digestion, Inductively Coupled Plasma Method, Colorimetric Method, Calculation
35	Chromium (VI)	1) Colorimetric Method 2) Extraction, Air-Acetylene Flame Method
36	Chrysene	1) Liquid-Liquid Extraction, Gas Chromatographic Method 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method
37	Cyanide	Distillation, Colorimetric Method
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method
39	DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method
40	DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method
41	DDT	1) Liquid-Liquid Extraction, Gas Chromatographic Method 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method (ต่อ)

42. Dibenzo(a,h)anthracene...

ลำดับ	รายการ	วิธีการ
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	Trichloromethane Methanol [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]	(1) Liquid-liquid Extraction, Gas Chromatography Method[illegible] (2) Liquid-liquid Extraction, Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Pentachlorophenol	Liquid-liquid Extraction, Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	pH	Electrometric Method[illegible]
[illegible]	Trichlorethylene	(1) Liquid-liquid Extraction, Gas Chromatography Method[illegible] (2) Liquid-liquid Extraction, Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Mercury	(1) Dithizone, Chloroform Extraction Method[illegible] (2) Liquid-liquid Extraction, Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Phenol	(1) Liquid-liquid Extraction, Gas Chromatography Method[illegible] (2) Liquid-liquid Extraction, Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Selenium	(1) Diazinon, Hydride Generation-Atomic Absorption Spectrometry Method[illegible] (2) Diazinon, Industrially Coupled Plasma Method[illegible]
[illegible]	Silver	Diazinon, Industrially Coupled Plasma Method[illegible]
[illegible]	Sulfide	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Tetrachloroethylene	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Toxaphene	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	Trichloromethane	(1) Liquid-liquid Extraction, Gas Chromatography Method[illegible] (2) Liquid-liquid Extraction, Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	[illegible]	(1) Purge and Trap Gas Chromatography Method[illegible] (2) Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	[illegible]	Separatory Funnel Liquid-liquid Extraction, Gas Chromatography Method[illegible]
[illegible]	[illegible]	Separatory Funnel Liquid-liquid Extraction, Gas Chromatography Method[illegible]
[illegible]	1,1,1,2-Tetrachloroethane	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	1,1,1-Trichloroethane	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	1,1,2-Trichloroethane	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Trichloroethylene	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	2,4,6-Trichlorophenol	Liquid-liquid Extraction, Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	2,4,5-Trichlorophenol	Liquid-liquid Extraction, Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	1,2,3-Trichlorobenzene	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Selenium	Diazinon, Industrially Coupled Plasma Method[illegible]
[illegible]	Vinyl acetate	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Vinyl chloride	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	m-Xylene	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	o-Xylene	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	p-Xylene	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Sulfide Sulfide	Purge and Trap Gas Chromatography-Mass Spectrometry Method[illegible]
[illegible]	Zinc	(1) Diazinon, Direct Air-Acetylene Flame Method[illegible] (2) Diazinon, Electrothermal Atomic Absorption Spectrometry Method[illegible] (3) Diazinon, Industrially Coupled Plasma Method[illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible]	[illegible]	[illegible]
1	Antimony	Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
2	Arsenic	(1) Automatic Sampling Diazinon, Hydride Generation-Atomic Absorption Spectrometry Method[illegible] (2) Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
3	Cadmium	(1) Automatic Sampling Diazinon, Direct Air-Acetylene Flame Method[illegible] (2) Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
4	Cobalt-60 radioactivity	Instrumental Analysis Method[illegible]
5	Chromium	Automatic Sampling Ion Chromatography Method[illegible]
6	Chromium	(1) Automatic Sampling Diazinon, Direct Air-Acetylene Flame Method[illegible] (2) Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
7	Copper	Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
8	Fluoride	(1) Automatic Sampling Diazinon, Direct Air-Acetylene Flame Method[illegible] (2) Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
9	Cyanide	Automatic Sampling Gas Chromatography Method[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	Cadmium	Automatic Sampling[illegible]
[illegible]	Hydrogen Chloride	Automatic Sampling Ion Chromatography Method[illegible]
[illegible]	Hydrogen Fluoride	Automatic Sampling Ion Chromatography Method[illegible]
[illegible]	Hydrogen Sulfide	Methylene Sampling Iodometric Method[illegible]
[illegible]	Lead	(1) Automatic Sampling Diazinon, Direct Air-Acetylene Flame Method[illegible] (2) Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
[illegible]	Manganese	(1) Automatic Sampling Diazinon, Direct Air-Acetylene Flame Method[illegible] (2) Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
[illegible]	Mercury	Automatic Sampling Diazinon, Cold-vapor Atomic Absorption Spectrometry Method[illegible]
[illegible]	Nickel	(1) Automatic Sampling Diazinon, Direct Air-Acetylene Flame Method[illegible] (2) Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
[illegible]	Nitrogen	Phenolsulfonic Method[illegible]
[illegible]	Oxides of Nitrogen	(1) Phenolsulfonic Sampling Phenolsulfonic Acid Method[illegible] (2) Chemiluminescence Analysis Method[illegible]
[illegible]	Ozone	(1) Iodometric Sampling Diazinon, Hydrogen Peroxide Absorption Spectrometry Method[illegible] (2) Iodometric Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
[illegible]	Particulate Matter	(1) Microscopic Sampling Sedimentation Method[illegible] (2) Chemiluminescence Analysis Method[illegible]
[illegible]	Sulfuric Acid	Automatic Sampling Barium Chloride Titration Method[illegible]
[illegible]	Total Suspended Particulate	Automatic Sampling Gravimetric Method[illegible]
[illegible]	Selenium	Automatic Sampling Diazinon, Industrially Coupled Plasma Method[illegible]
[illegible]	Xylene	(1) Gas Sampling Gas Chromatography Method[illegible] (2) Adsorption Sampling Gas Chromatography Method[illegible]

[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]
2	[illegible]	[illegible]
3	[illegible]	[illegible]
4	[illegible]	[illegible]
5	[illegible]	[illegible]
6	[illegible]	[illegible]
7	[illegible]	[illegible]
8	[illegible]	[illegible]
9	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]
10	[illegible]	[illegible]
11	[illegible]	[illegible]
12	[illegible]	[illegible]
13	[illegible]	[illegible]
14	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]
16	[illegible]	[illegible]
17	[illegible]	[illegible]
18	[illegible]	[illegible]
19	[illegible]	[illegible]
20	[illegible]	[illegible]
21	[illegible]	[illegible]
22	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]
24	[illegible]	[illegible]
25	[illegible]	[illegible]
26	[illegible]	[illegible]

ลำดับ	สารเคมีอันตราย	วิธีตรวจวิเคราะห์
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
	[illegible]	
27	[illegible]	1) Headspace Extraction, Separation, Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
28	[illegible]	Spectrometry Method[illegible]
29	[illegible]	1) Headspace Extraction, Separation, Inductively Coupled Plasma Atomic Emission Spectrometry Method[illegible] 2) Headspace Extraction, Separation, Inductively Coupled Plasma Method[illegible] 3) Digestion, Atomic Absorption Spectrometry Method[illegible] 4) Digestion, Inductively Coupled Plasma Method[illegible]

ลำดับ	สารเคมีอันตราย	วิธีตรวจวิเคราะห์
30	[illegible]	1) Headspace Extraction, Separation, Inductively Coupled Plasma Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible]
31	[illegible]	1) Headspace Extraction, Separation, Inductively Coupled Plasma Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible]
32	[illegible]	1) Headspace Extraction, Separation, Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible] 2) Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]
33	[illegible]	1) Headspace Extraction, Separation, Inductively Coupled Plasma Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible]
34	[illegible]	1) Headspace Extraction, Separation, Atomic Absorption Spectrometry Method[illegible] 2) Headspace Extraction, Separation, Inductively Coupled Plasma Method[illegible] 3) Digestion, Atomic Absorption Spectrometry Method[illegible] 4) Digestion, Inductively Coupled Plasma Method[illegible]

[illegible] (3 รายการ)

ลำดับ	สารเคมีอันตราย	วิธีตรวจวิเคราะห์
1	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
2	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]

ลำดับ	สารเคมีอันตราย	วิธีตรวจวิเคราะห์
1	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
2	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
3	[illegible]	Digestion, Inductively Coupled Plasma Method[illegible]
4	[illegible]	1) Digestion, Hydride Generation/Atomic Absorption Spectrometry Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible]
5	[illegible]	Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
6	[illegible]	Digestion, Inductively Coupled Plasma Method[illegible]
7	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
8	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]
9	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
10	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
11	[illegible] acid	Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
12	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]

ลำดับ	สารเคมีอันตราย	วิธีตรวจวิเคราะห์
13	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
14	[illegible]	Digestion, Inductively Coupled Plasma Method[illegible]
15	[illegible]	Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
16	[illegible]	Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
17	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]
18	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]
19	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]
20	[illegible]	Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
21	[illegible]	1) Digestion, Atomic Absorption Spectrometry Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible]
22	[illegible]	Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
23	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]
24	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]
25	[illegible]	1) Ultrasonic Extraction, Gas Chromatography Method[illegible] 2) Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
26	[illegible]	Ultrasonic Extraction, Gas Chromatography/Mass Spectrometry Method[illegible]
27	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]
28	[illegible]	Purge and Trap, Gas Chromatography/Mass Spectrometry Method[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

ลำดับ	[illegible]	วิธีวิเคราะห์
[illegible]	Mercury	1) Digestion, Cold Vapor Atomic Absorption Spectrometric Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible] 3) Thermal Decomposition, Amalgamation and Atomic Absorption Spectrometric Method[illegible]
[illegible]	Methanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Methoxychlor	1) Ultrasonic Extraction, Gas Chromatographic Method[illegible] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Methyl bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	[illegible]	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	[illegible]	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Naphthalene	1) Ultrasonic Extraction, Gas Chromatographic Method[illegible] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible]
[illegible]	Nitrobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	[illegible]	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	[illegible]	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]

[illegible] Polychlorinated Biphenyls...

ลำดับ	[illegible]	วิธีวิเคราะห์
[illegible]	Polychlorinated Biphenyls Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260	1) Ultrasonic Extraction, Gas Chromatographic Method[illegible] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
	[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]	Ultrasonic Extraction, Gas Chromatographic Method[illegible]

[illegible]...

ลำดับ	[illegible]	วิธีวิเคราะห์
	[illegible] Hexachlorobiphenyl [illegible] Hexachlorobiphenyl)	
[illegible]	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Phenanthrene	1) Ultrasonic Extraction, Gas Chromatographic Method[illegible] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Pyrene	1) Ultrasonic Extraction, Gas Chromatographic Method[illegible] 2) Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Selenium	1) Digestion, Hydride Generation Atomic Absorption Spectrometric Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible]
[illegible]	Silver	Digestion, Inductively Coupled Plasma Method[illegible]
[illegible]	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Toxaphene	Ultrasonic Extraction, Gas Chromatographic Method[illegible]
[illegible]	TPH ([illegible])	1) Purge and Trap, Gas Chromatographic Method[illegible] 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	TPH ([illegible])	Ultrasonic Extraction, Gas Chromatographic Method[illegible]
[illegible]	TPH ([illegible])	Ultrasonic Extraction, Gas Chromatographic Method[illegible]
[illegible]	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]

[illegible] 1,1,1-Trichloroethane...

ลำดับ	[illegible]	วิธีวิเคราะห์
[illegible]	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	[illegible]	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Vanadium	Digestion, Inductively Coupled Plasma Method[illegible]
[illegible]	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method[illegible]
[illegible]	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method[illegible] 2) Digestion, Inductively Coupled Plasma Method[illegible]

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1. [illegible]

2. [illegible]

[illegible]

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