



ตารางที่ 4-3 (ต่อ)

สถานีตรวจวัด		ระดับเสียง [dB(A)]
		Leq-5 min
Cellar Deck (ต่อ)		
18. จุดตรวจวัดที่ 18 (N18)		84.2
19. จุดตรวจวัดที่ 19 (N19)		84.5
20. จุดตรวจวัดที่ 20 (N20)		83.8
21. จุดตรวจวัดที่ 21 (N21)		84.8
22. จุดตรวจวัดที่ 22 (N22)		82.3
23. จุดตรวจวัดที่ 23 (N23)		81.8
24. จุดตรวจวัดที่ 24 (N24)		82.1
25. จุดตรวจวัดที่ 25 (N25)		82.8
26. จุดตรวจวัดที่ 26 (N26)		84.7
27. จุดตรวจวัดที่ 27 (N27)		83.9
28. จุดตรวจวัดที่ 28 (N28)		84.0
29. จุดตรวจวัดที่ 29 (N29)		80.0
30. จุดตรวจวัดที่ 30 (N30)		82.0
31. จุดตรวจวัดที่ 31 (N31)		82.6
32. จุดตรวจวัดที่ 32 (N32)		84.6
33. จุดตรวจวัดที่ 33 (N33)		81.8
34. จุดตรวจวัดที่ 34 (N34)		81.4
35. จุดตรวจวัดที่ 35 (N35)		82.8
36. จุดตรวจวัดที่ 36 (N36)		81.0
37. จุดตรวจวัดที่ 37 (N37)		75.4
38. จุดตรวจวัดที่ 38 (N38)		75.3
39. จุดตรวจวัดที่ 39 (N39)		79.3
Sub-Cellar Deck		
1. จุดตรวจวัดที่ 1 (N1)		78.8
2. จุดตรวจวัดที่ 2 (N2)		77.0
3. จุดตรวจวัดที่ 3 (N3)		74.6
4. จุดตรวจวัดที่ 4 (N4)		75.0
5. จุดตรวจวัดที่ 5 (N5)		80.4
6. จุดตรวจวัดที่ 6 (N6)		74.3
7. จุดตรวจวัดที่ 7 (N7)		78.8
8. จุดตรวจวัดที่ 8 (N8)		72.2
9. จุดตรวจวัดที่ 9 (N9)		70.8
10. จุดตรวจวัดที่ 10 (N10)		71.6
11. จุดตรวจวัดที่ 11 (N11)		73.4
มาตรฐานสำหรับการทำงาน 8 ชั่วโมงต่อวัน <sup>1/</sup>		85

ที่มา : <sup>1/</sup> ประกาศกรมสวัสดิการและคุ้มครองแรงงาน เรื่อง มาตรฐานระดับเสียงที่ยอมให้ลูกจ้างได้รับเฉลี่ยตลอดระยะเวลาการทำงานในแต่ละวัน  
ลงวันที่ 13 ธันวาคม 2560 ประกาศในราชกิจจานุเบกษา เล่ม 135 ตอนพิเศษ 19ง เมื่อวันที่ 26 มกราคม 2561

หมายเหตุ : ตัวเลขสีแดงแสดงถึงค่าที่ตรวจวัดได้ไม่ผ่านเกณฑ์มาตรฐานที่ใช้เทียบเคียง



จุดตรวจวัดที่ 2 (N2)



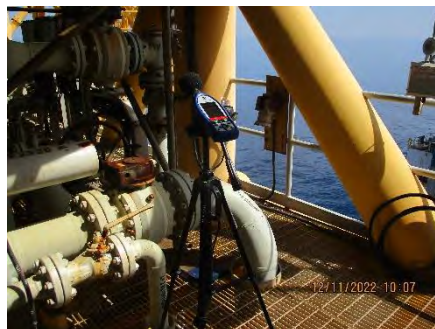
จุดตรวจวัดที่ 5 (N5)



จุดตรวจวัดที่ 8 (N8)



จุดตรวจวัดที่ 19 (N19)



จุดตรวจวัดที่ 17 (N17)

ภาพถ่ายที่ 4-1 ภาพการตรวจวัดระดับเสียงในสถานประกอบการ บริเวณแหล่งเบญจมาศ BEPP  
ที่ Cooler Deck



จุดตรวจวัดที่ 6 (N6)



จุดตรวจวัดที่ 10 (N10)



จุดตรวจวัดที่ 21 (N21)



จุดตรวจวัดที่ 25 (N25)



จุดตรวจวัดที่ 26 (N26)



จุดตรวจวัดที่ 33 (N33)



จุดตรวจวัดที่ 35 (N35)



จุดตรวจวัดที่ 38 (N38)

ภาพถ่ายที่ 4-2 ภาพการตรวจวัดระดับเสียงในสถานประกอบการ บริเวณแหล่งเบญจมาศ BEPP  
ที่ Main Deck





จุดตรวจวัดที่ 1 (N1)



จุดตรวจวัดที่ 2 (N2)



จุดตรวจวัดที่ 4 (N4)



จุดตรวจวัดที่ 6 (N6)

ภาพถ่ายที่ 4-3 ภาพการตรวจวัดระดับเสียงในสถานประกอบการ บริเวณแหล่งเบญจมาศ BEPP  
ที่ Mezzanine Deck





จุดตรวจวัดที่ 3 (N3)



จุดตรวจวัดที่ 8 (N8)



จุดตรวจวัดที่ 10 (N10)



จุดตรวจวัดที่ 22 (N22)

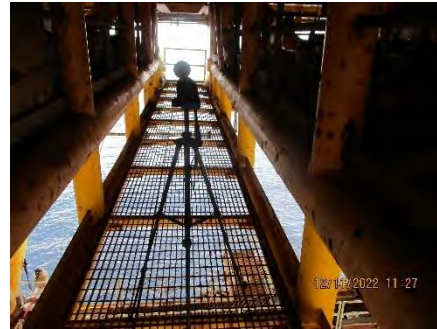


จุดตรวจวัดที่ 34 (N34)

ภาพถ่ายที่ 4-4 ภาพการตรวจวัดระดับเสียงในสถานประกอบการ บริเวณแหล่งเบญจมาศ BEPP  
ที่ Cellar Deck



จุดตรวจวัดที่ 2 (N2)



จุดตรวจวัดที่ 6 (N6)

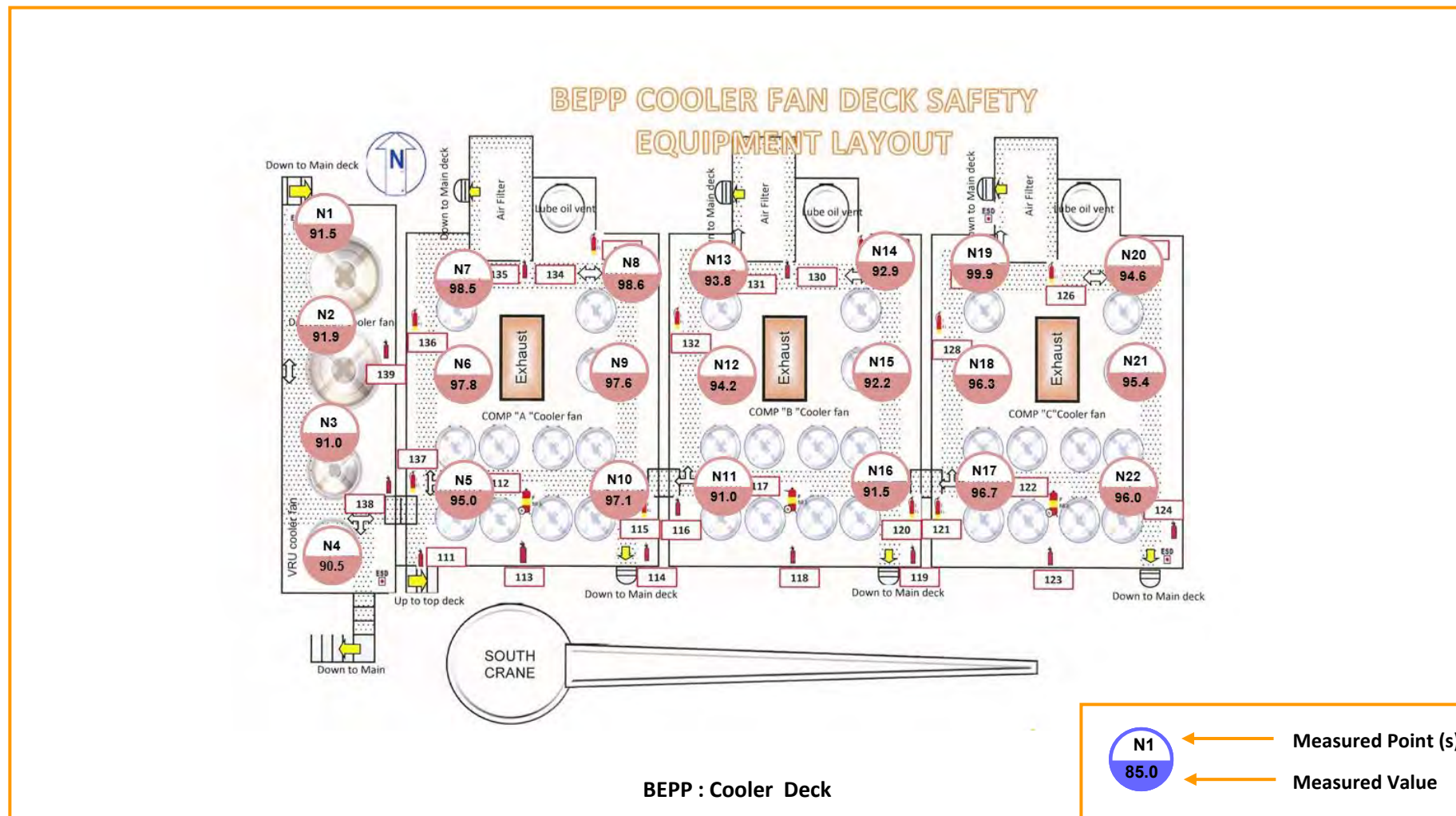


จุดตรวจวัดที่ 8 (N8)



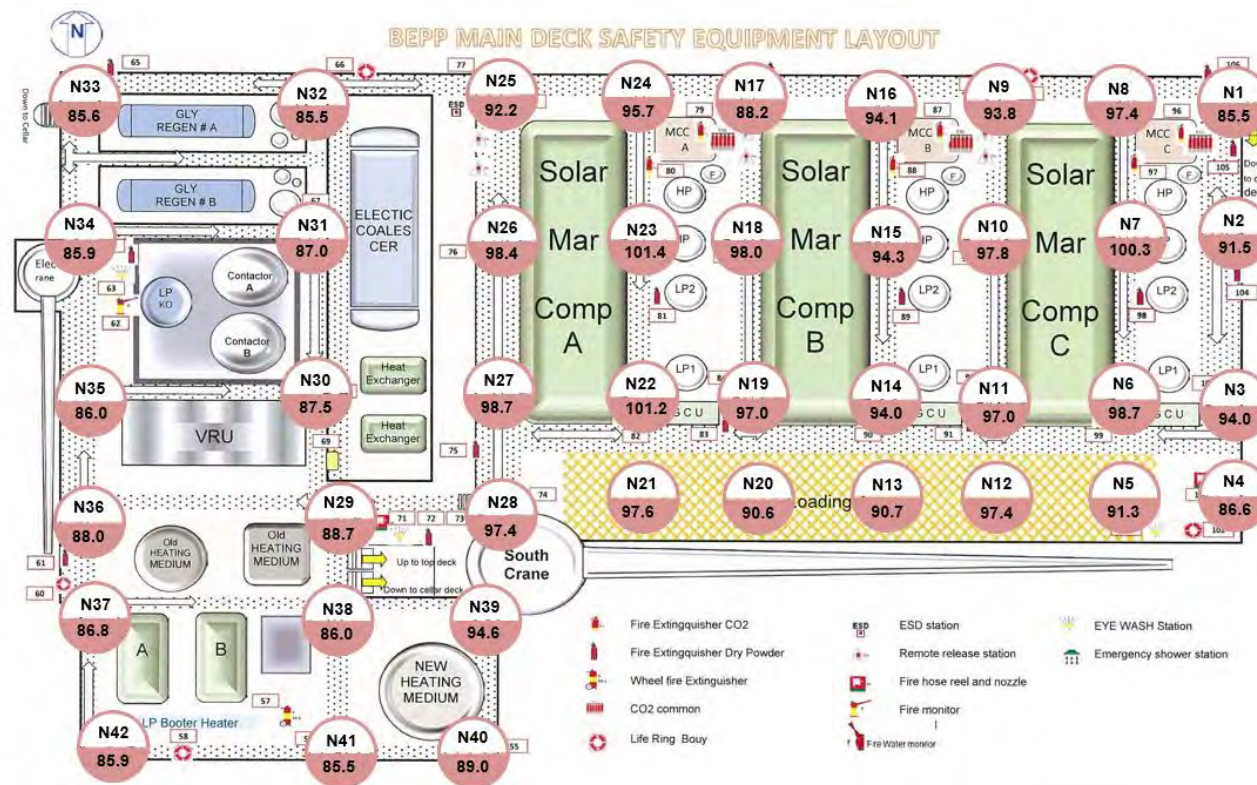
จุดตรวจวัดที่ 11 (N11)

ภาพถ่ายที่ 4-4 ภาพการตรวจวัดระดับเสียงในสถานประกอบการ บริเวณแหล่งเบญจมาศ BEPP  
ที่ Sup - Cellar Deck



รูปที่ 4-1 ตำแหน่งสถานีตรวจวัดระดับเสียงในสถานประกอบการ บริเวณแหล่งเบญจมาศ BEPP



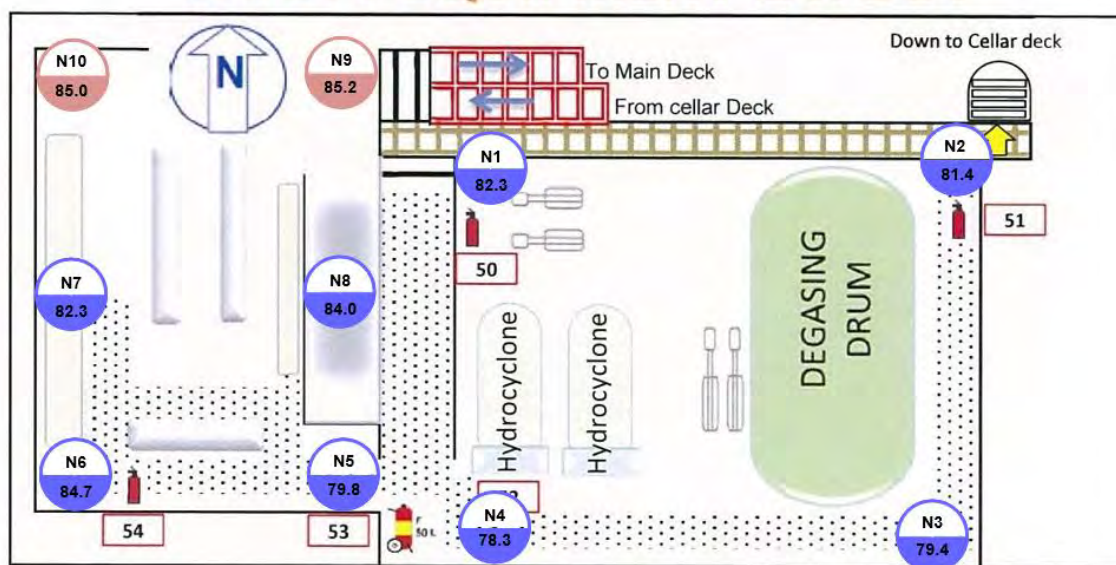


**BEPP: Main Deck**

**N1** ← Measured Point (s)  
**85.0** ← Measured Value

**รูปที่ 4-1 (ต่อ)**

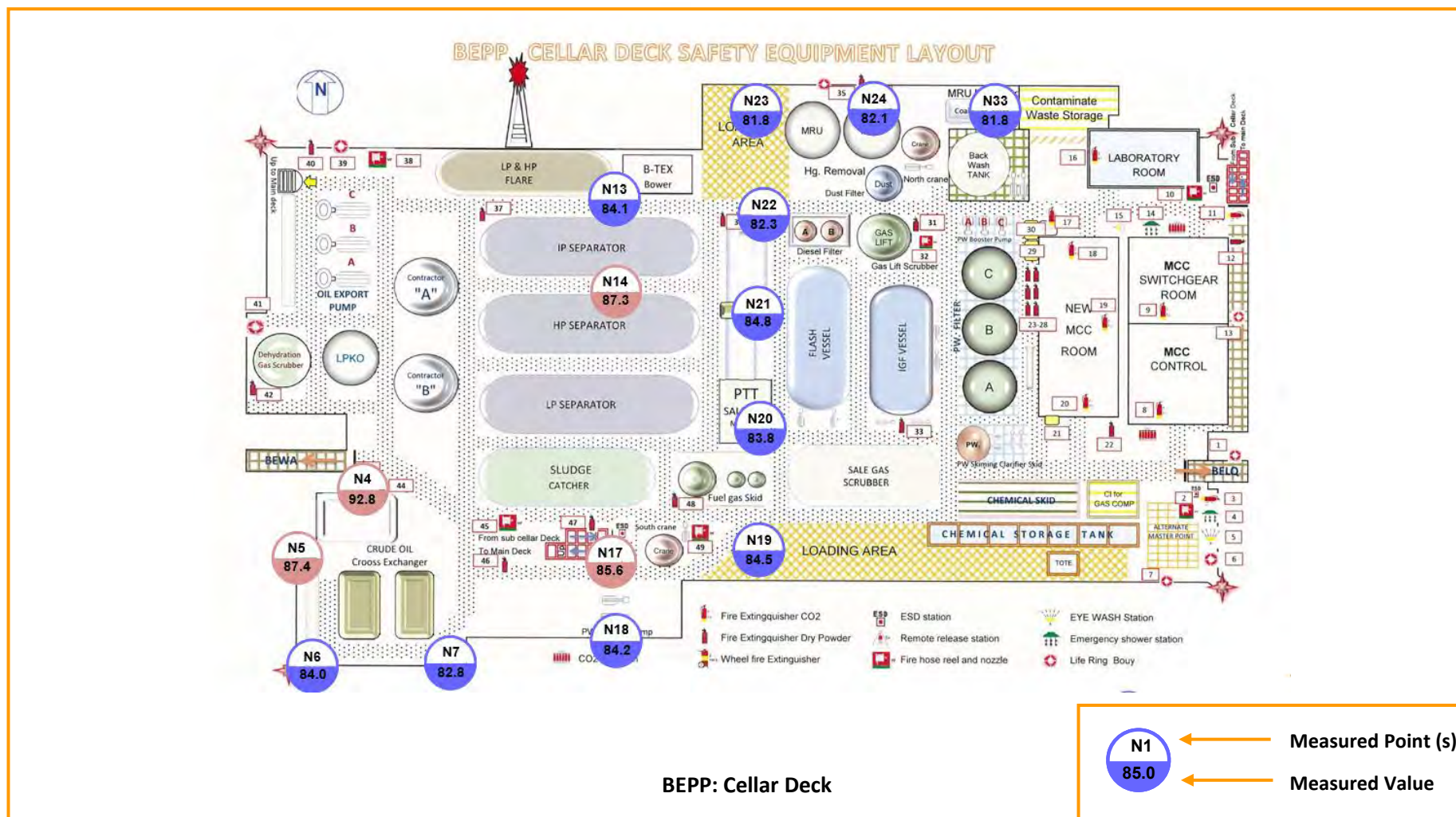
## MEZZANINE DECK (HYDROCYCLONE) SAFETY EQUIPMENT LAYOUT



BEPP : Mezzanine Deck

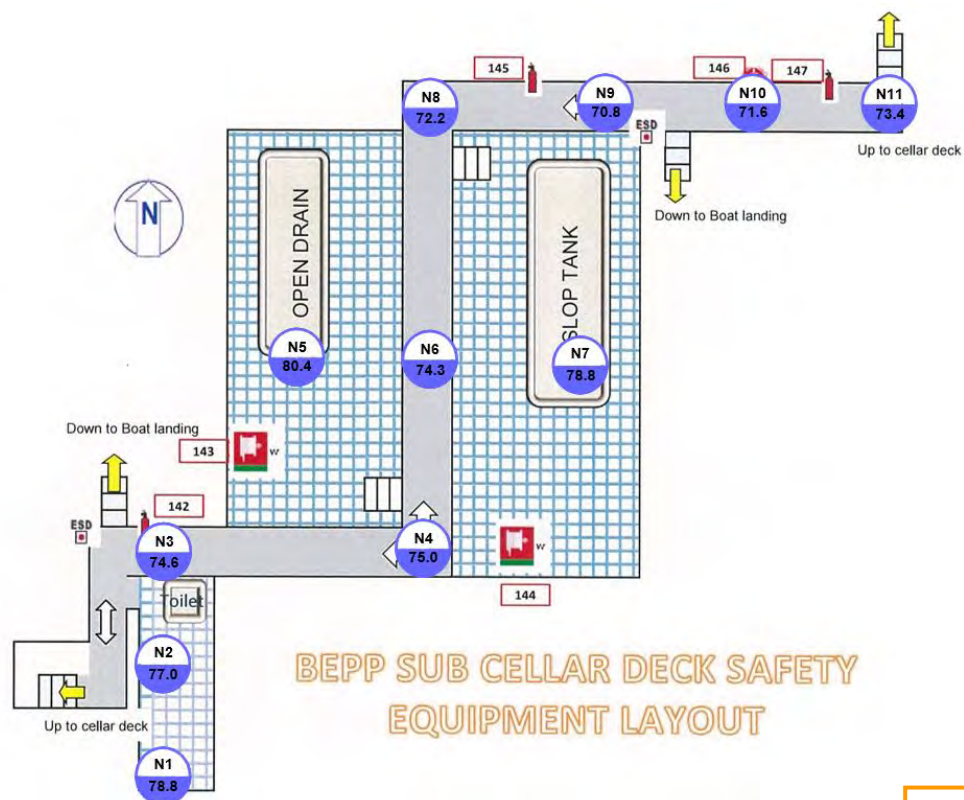
 Measured Point (s)  
 Measured Value

รูปที่ 4-1 (ต่อ)



รูปที่ 4-1 (ต่อ)



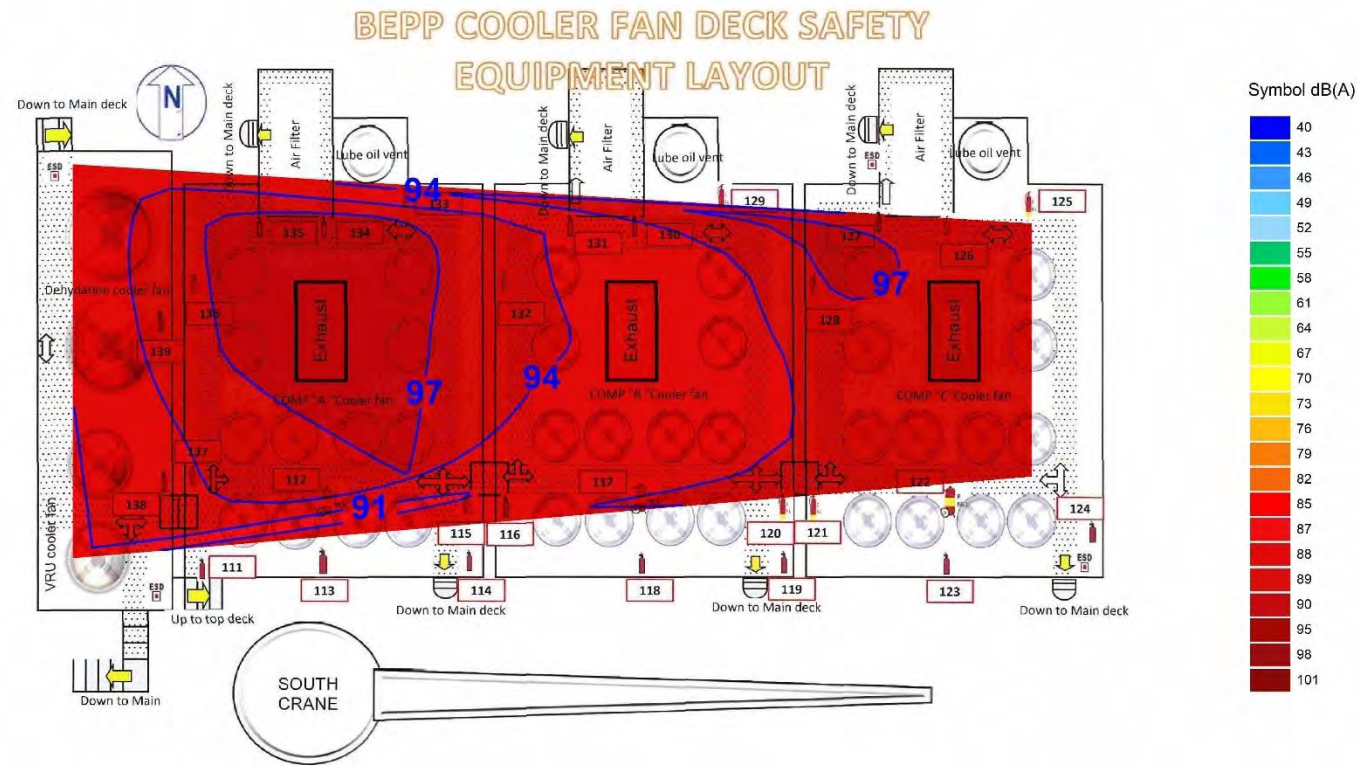


### BEPP SUB CELLAR DECK SAFETY EQUIPMENT LAYOUT

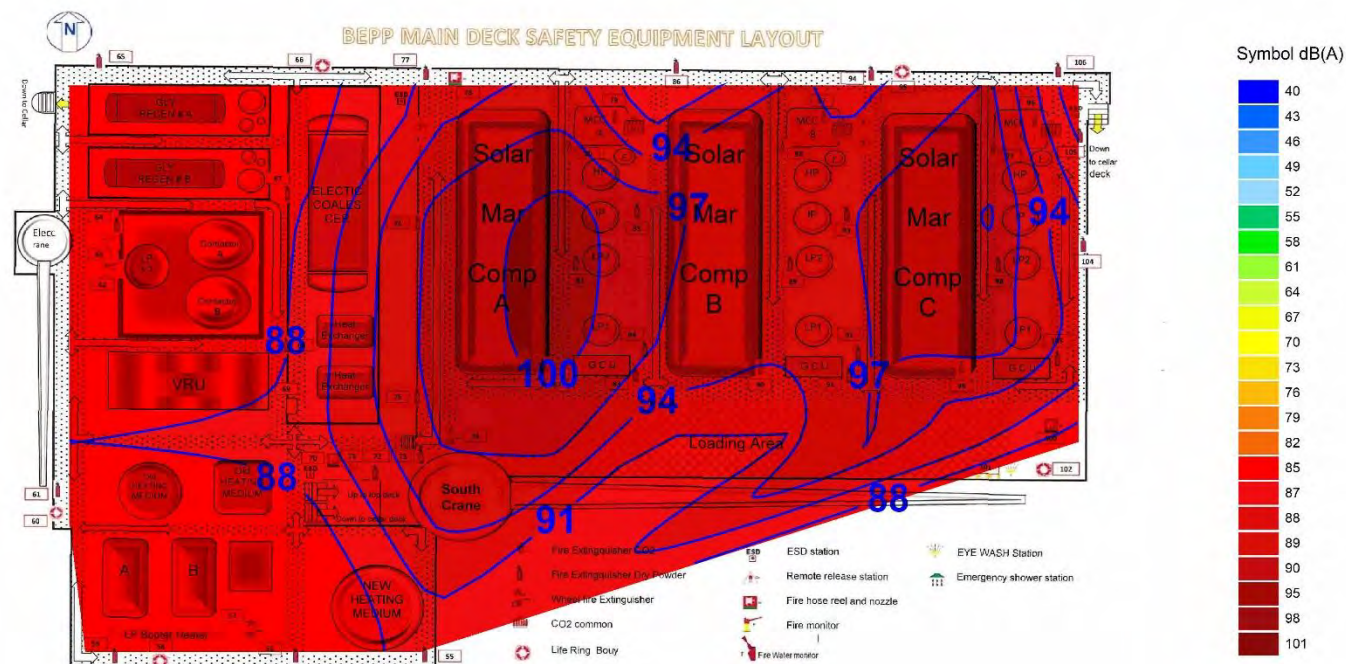
BEPP: Sub-Cellar Deck

N1	←	Measured Point (s)
85.0	←	Measured Value

รูปที่ 4-1 (ต่อ)



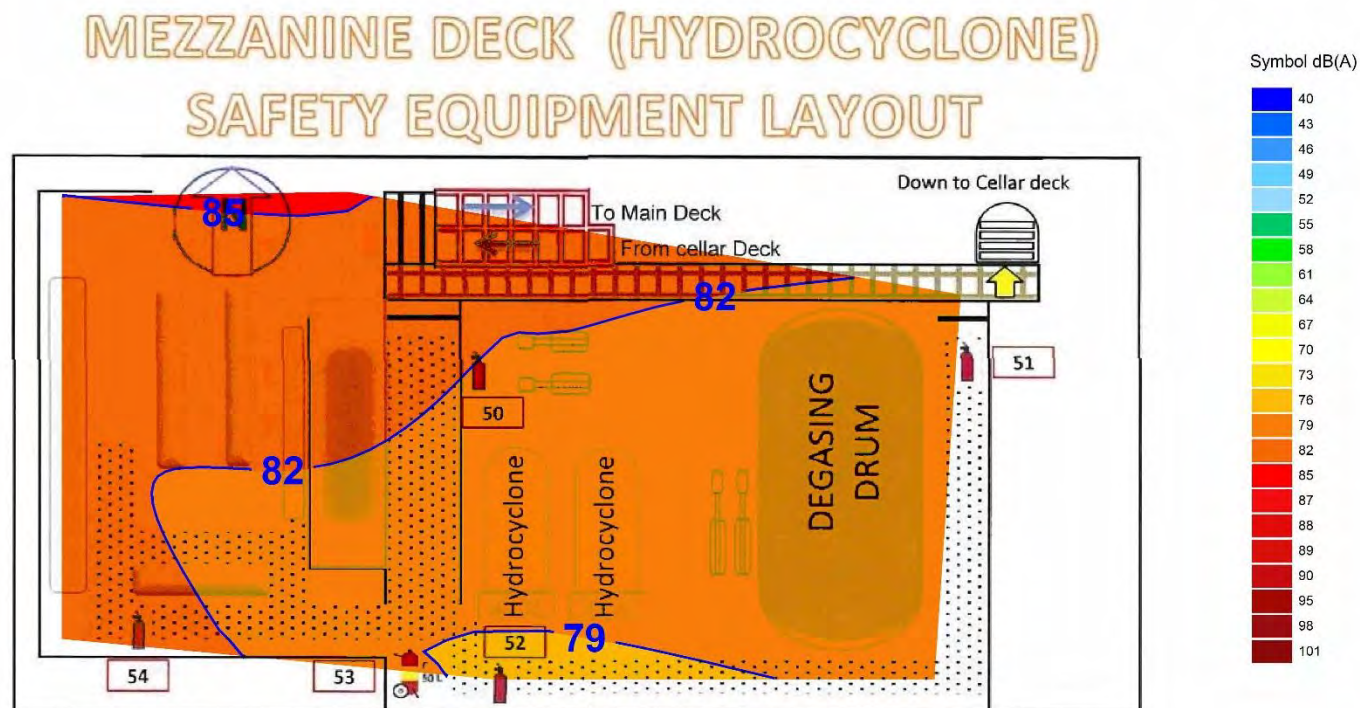
รูปที่ 4-2 แผนที่แสดงเส้นระดับเสียง บริเวณแหล่งเบญจมาศ BEPP



**BEPP: Main Deck**

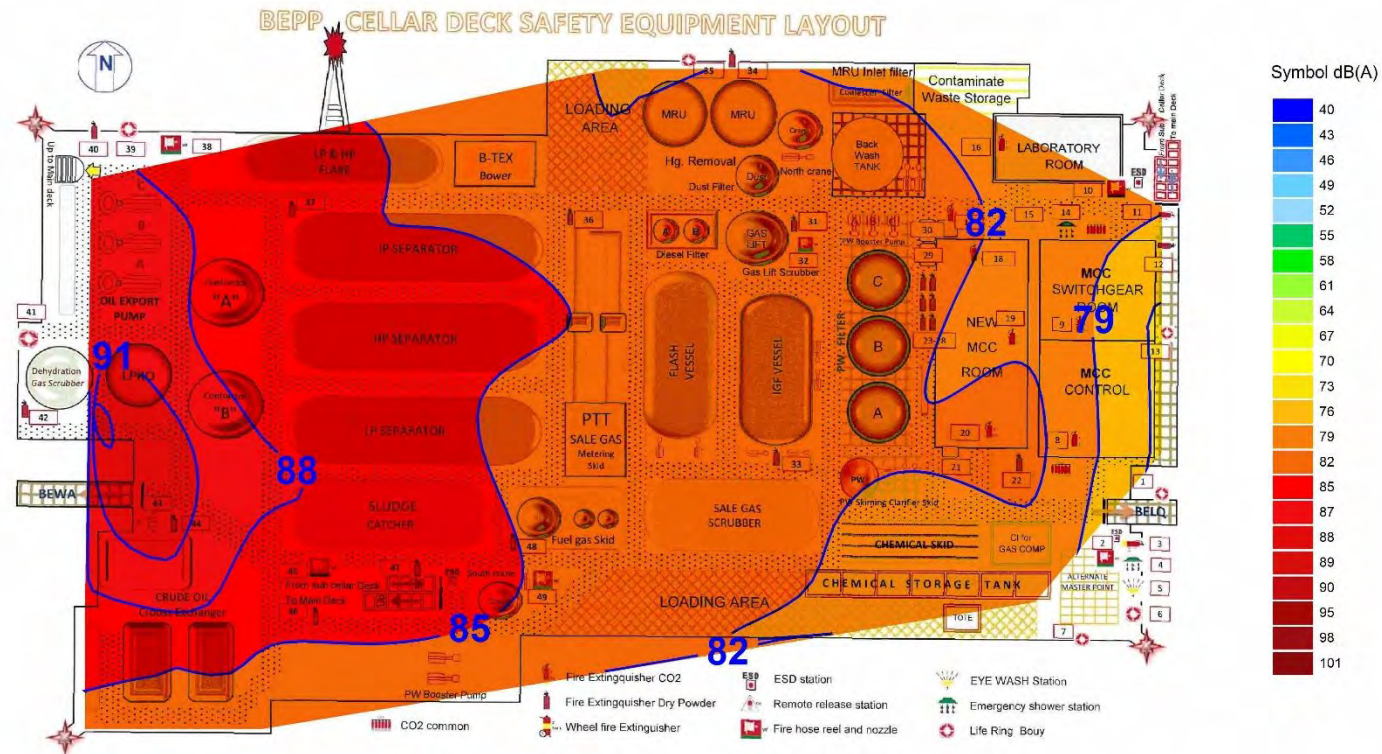
รูปที่ 4-2 (ต่อ)





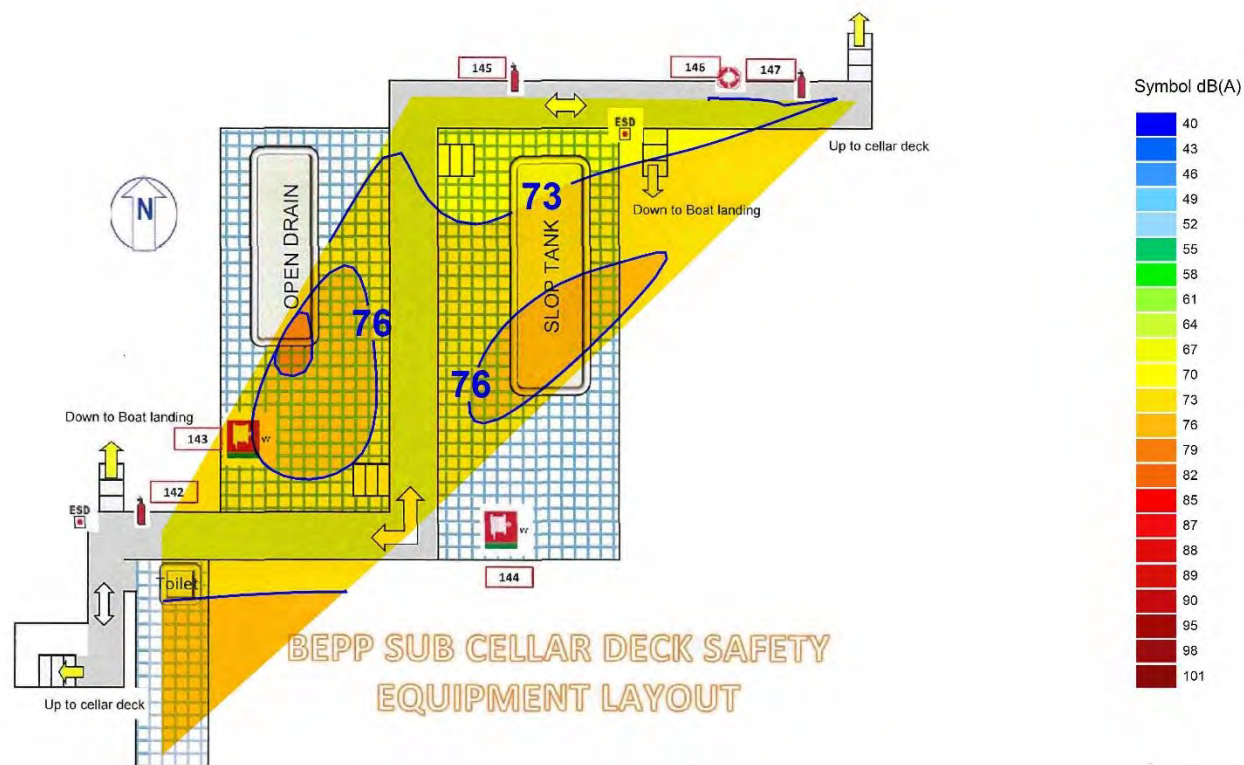
BEPP : Mezzanine Deck

รูปที่ 4-2 (ต่อ)



**BEPP: Cellar Deck**

รูปที่ 4-2 (ต่อ)



BEPP: Sub-Cellar Deck

รูปที่ 4-2 (ต่อ)





#### 4.3 สรุปผลการตรวจวัดระดับเสียงและข้อเสนอแนะ

ผลการตรวจวัดระดับเสียงเฉลี่ย 5 นาที (Leq-5 min) บริเวณ BEPP ของโครงการผลิตปิโตรเลียมแหล่งเบญจมาศ (Benchamas) บริษัท เชฟรอน ออฟชอร์ (ประเทศไทย) จำกัด เมื่อวันที่ 12 พฤศจิกายน 2565 พบว่ามีค่าอยู่ในเกณฑ์มาตรฐาน คิดเป็นร้อยละ 29.0 ของจำนวนจุดตรวจวัดทั้งหมด

สำหรับบริเวณที่มีเสียงดัง ควรมีมาตรการป้องกันและแก้ไขดังนี้

- 1) ควรมีการตรวจสอบอุปกรณ์/เครื่องจักรที่ใช้งานอย่างสม่ำเสมอ เพื่อป้องกันเสียงดังอันเกิดจากการทำงานของเครื่องจักรที่ไม่เต็มประสิทธิภาพ
- 2) ในกรณีที่พนักงานต้องทำงานในบริเวณที่มีเสียงดังเกิน 85 dB(A) ควรให้พนักงานใส่อุปกรณ์ป้องกันเสียงดัง เช่น Ear plugs หรือ Ear muffs ที่ทางบริษัทจัดไว้ให้
- 3) ติดตั้งป้ายหรือสัญลักษณ์เตือนบริเวณพื้นที่ที่มีเสียงดัง
- 4) จัดให้พนักงานที่ทำงานอยู่ในพื้นที่ที่เสียงดังกว่า 85 dB(A) เข้าโครงการอนุรักษ์การได้ยินและจัดให้มีการตรวจสมรรถภาพการได้ยินเป็นประจำทุกปี

## ส่วนที่ 5

### การตรวจวัดคุณภาพอากาศภายในอาคาร

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## การตรวจวัดคุณภาพอากาศภายในอาคาร

### 5.1 วิธีการตรวจวัดคุณภาพอากาศภายในอาคาร

การตรวจวัดคุณภาพอากาศภายในอาคาร อ้างอิงวิธีตามมาตรฐานการตรวจวิเคราะห์ที่ได้รับการรับรองจากหน่วยงานราชการของประเทศสิงคโปร์ ได้แก่ Code of Practice for Indoor Air Quality for Air-Conditioned Building, Singapore Standard SS 554:2009 สรุปดังตารางที่ 5-1 โดยมีรายละเอียดดังต่อไปนี้

#### ➤ อุณหภูมิ (Temperature)

อุณหภูมิเป็นปัจจัยสำคัญที่มีผลต่ออากาศที่กำลังสบายของคนที่อยู่ในอาคาร ความพึงพอใจกับอุณหภูมิยังขึ้นอยู่กับกิจกรรมของผู้ทำงาน และเสื้อผ้าที่สวมใส่ ASHRAE Standard 55-1992 กล่าวว่า อากาศที่เหมาะสมหมายถึง อุณหภูมิที่มีผู้ที่อยู่ในอาคารอย่างน้อย 80% ยอมรับ และมีความรู้สึกสบาย ซึ่งควรมีอุณหภูมิอยู่ในช่วง 24.0-26.0 °C

#### ➤ ความชื้นสัมพัทธ์ (Relative Humidity)

ความชื้นสัมพัทธ์ที่ต่ำกว่า 25%RH ทำให้คนที่ทำงานรู้สึกไม่สบายกาย ทำให้ผิวหนังและเยื่อผิวหนังแห้งที่ก่อให้เกิดการระคายเคืองและผิวหนังแห้ง อีกทั้งยังก่อให้เกิดเพิ่มไฟฟ้าสถิตย์ มีผลต่อการทำงานของคอมพิวเตอร์ หากมีปริมาณความชื้นสัมพัทธ์สูง จะสนับสนุนการเจริญเติบโตของแบคทีเรียและเชื้อรา สำหรับในประเทศไทยซึ่งเป็นประเทศในเขตร้อน ค่าที่เหมาะสมสำหรับผู้ทำงานในอาคาร ควรน้อยกว่า 70%RH

#### ➤ ก๊าซคาร์บอนไดออกไซด์ (Carbon Dioxide: CO<sub>2</sub>)

ก๊าซคาร์บอนไดออกไซด์ เป็นก๊าซที่ไม่มีสี และกลิ่น ในบรรยากาศทั่วไปจะมีประมาณ 330-350 ppm สำหรับในอาคารสำนักงานสามารถพบได้จากลมหายใจออกของคนในอาคาร ระดับความเข้มข้นของคาร์บอนไดออกไซด์ในอาคาร จะมีความหลากหลายขึ้นอยู่กับสถานที่หรือพื้นที่จำนวนคนที่อยู่ในอาคาร ยังมีแหล่งอื่นๆ ในสำนักงานที่ก่อให้เกิดก๊าซคาร์บอนไดออกไซด์ เช่น การเผาไหม้เชื้อเพลิงจากการประกอบอาหาร การหมักดองต่างๆ ในอาคารควรมีความเข้มข้นไม่เกิน 700 ppm หากมีค่าเกินคนในอาคารมีอาการปวดศีรษะ เหนื่อยล้า และมีปัญหาทางระบบทางเดินหายใจ

#### ➤ ฝุ่นละอองขนาดเล็กไม่เกิน 10 ไมครอน (Particulate matter less than 10 microns: PM-10)

อนุภาคในอากาศมีจำนวนมาก และมีขนาดที่แตกต่างกันไป อนุภาคขนาดเล็กไม่สามารถมองเห็นด้วยตาเปล่า และสามารถเข้าสู่ถึงหลอดลมได้ จากภายนอกอาคารสามารถเข้าสู่อาคารจากช่องหรือรอยรั่วหรือผ่านทางระบบปรับอากาศ สำหรับภายในอาคารอาจมาจากฝุ่นที่อยู่ตามกองเอกสาร หนังสือ หรือพื้นผิวที่ขาดการทำความสะอาด รวมไปถึงการติดต่อกับสิ่งของ เสื้อผ้าของคนทำงาน อนุภาคของฝุ่น สามารถทำให้เกิดผลเสียต่อสุขภาพคือ ไอ จาม หลอดลมอักเสบเรื้อรัง หอบหืด หากในอาคารมีปริมาณสูง สามารถก่อให้เกิดอาการแพ้ต่างๆ ได้ เช่น ตาแห้ง จมูก ล้าคอ และผิวหนังระคายเคือง เป็นต้น





➤ การเคลื่อนที่อากาศ (Air Movement)

การเคลื่อนที่ของอากาศ เป็นสิ่งหนึ่งที่แสดงถึงการแทนที่ของอากาศโดยการนำพาหรือการระบายอากาศ ถ้าหากการเคลื่อนที่ของอากาศในบริเวณที่มีคนอยู่ไม่เพียงพอ อาจจะมีผลให้ผู้ที่อยู่ในห้อง/อาคาร รู้สึกอึดอัด และสาเหตุจากความดันอากาศในท่ออาจน้อยเกินไป ทำให้การไหลของอากาศไม่เพียงพอ หรือมีผลทำให้การระบายอากาศไม่ทั่วถึงในแต่ละพื้นที่ ปัญหาอีกประการหนึ่งที่พบคือ ขณะที่อาคารมีการเปลี่ยนแปลงไม่ว่าจะเป็นการเปลี่ยนแปลงจำนวนคน การมีอุปกรณ์สำนักงาน เช่น เครื่องถ่ายเอกสาร คอมพิวเตอร์ พริ้นเตอร์ เป็นต้น เพิ่มมากขึ้น มักล้มที่จะปรับการจ่ายอากาศให้มีความเหมาะสมกับสิ่งที่ได้มีการเปลี่ยนแปลง

ตารางที่ 5-1 วิธีการตรวจวัดคุณภาพอากาศภายในอาคาร

พารามิเตอร์	หน่วย	วิธีการตรวจวัด / วิธีวิเคราะห์ตัวอย่าง
1. อุณหภูมิ	°C	Real-time Portable Meter, Thermistor Sensor
2. ความชื้นสัมพัทธ์	%RH	Real-time Portable Meter, Thin-film Capacitive Sensor
3. ก๊าซคาร์บอนไดออกไซด์	ppm	Real-time Portable Meter, Dual-wavelength NDIR (Non-Dispersive Infrared Sensor)
4. ฝุ่นละอองขนาดไม่เกิน 10 ไมครอน	µg/m <sup>3</sup>	Real-time Portable Meter, Optical Light Scattering
5. การเคลื่อนที่อากาศ	m/s	Real-time Portable Meter, Hot Wire



## 5.2 ผลการตรวจวัดคุณภาพอากาศภายในอาคาร

ผลการตรวจวัดคุณภาพอากาศภายในอาคาร บริเวณ BELQ จำนวน 18 สถานี และบริเวณ BEPP จำนวน 1 สถานี รวมทั้งสิ้นจำนวน 19 สถานี โดยมีการตรวจวัดคุณภาพอากาศนอกอาคาร จำนวน 1 สถานี เพื่อใช้เป็นจุดอ้างอิง เมื่อวันที่ 12 พฤศจิกายน 2565 สรุปได้ดังตารางที่ 5-2

ตารางที่ 5-2 สรุปผลการตรวจวัดคุณภาพอากาศภายในอาคาร เมื่อวันที่ 12 พฤศจิกายน 2565

สถานีตรวจวัด	จำนวนสถานีตรวจวัด ทั้งหมด (สถานี)	ผลการตรวจวัด (สถานี)	
		ผ่าน	ไม่ผ่าน
1. BELQ	18	0	18
2. BEPP	1	0	1
รวม	19	0 (0%)	19 (100%)

สำหรับรายละเอียดผลการตรวจวัด ภาพการตรวจวัด และตำแหน่งสถานีตรวจวัด แสดงดังตารางที่ 5-3 ภาพถ่ายที่ 5-1 และรูปที่ 5-1 ตามลำดับ ทั้งนี้พบว่า พารามิเตอร์ส่วนใหญ่มีค่าอยู่ในเกณฑ์มาตรฐานกำหนด ยกเว้น

- ผลการตรวจวัดอุณหภูมิ จำนวน 19 สถานี ที่มีค่าไม่อยู่ในเกณฑ์มาตรฐาน ซึ่งกำหนดไว้ว่า อุณหภูมิที่เหมาะสมควรมีค่าอยู่ในช่วง 24.0-26.0 °C
- ผลการตรวจวัดฝุ่นละอองขนาดเล็กไม่เกิน 10 ไมครอน จำนวน 1 สถานี ที่มีค่าไม่อยู่ในเกณฑ์มาตรฐาน ซึ่งกำหนดไว้ว่า ฝุ่นละอองขนาดเล็กไม่เกิน 10 ไมครอน ที่เหมาะสมควร น้อยกว่า 50 ppm
- ผลการตรวจวัดการเคลื่อนที่อากาศ จำนวน 1 สถานี ที่มีค่าไม่อยู่ในเกณฑ์มาตรฐาน ซึ่งกำหนดไว้ว่า การเคลื่อนที่อากาศ ที่เหมาะสมควรมีค่าอยู่ในช่วง 0.10-0.30 m/s



ตารางที่ 5-3 ผลการตรวจวัดคุณภาพอากาศภายในอาคาร บริเวณแหล่งเบญจมาศ (Benchamas)

สถานี	เวลา	ผลการตรวจวัด				
		อุณหภูมิ (°C)	ความชื้นสัมพัทธ์ (%RH)	คาร์บอนไดออกไซด์ (ppm)	PM-10 (µg/m³)	การเคลื่อนที่ อากาศ (m/s)
BELQ						
1 <sup>st</sup> Floor						
1. OIM Office (IEQ1)	09:40-09:45 น.	22.5	63.4	128	12.48	0.20
2. Maint Superintendent Office (IEQ2)	09:45-09:50 น.	22.5	61.1	150	5.80	0.08
3. Main Office (IEQ3)	09:52-09:57 น.	22.2	63.3	185	31.72	0.24
4. Prod Superintendent Office (IEQ4)	10:00-10:05 น.	22.2	64.0	123	7.80	0.19
5. Clinic (IEQ5)	10:15-10:20 น.	22.4	63.4	159	5.10	0.25
6. Meeting Room (IEQ6)	10:10-10:15 น.	22.4	61.0	141	4.91	0.18
7. FE Office (IEQ7)	10:05-10:10 น.	22.5	63.4	242	16.16	0.20
8. COG Office (IEQ8)	10:25-10:30 น.	23.7	59.8	256	49.92	0.12
2 <sup>nd</sup> Floor						
9. Game Room (IEQ9)	09:00-09:05 น.	22.5	64.5	195	28.27	0.22
10. Laundry Room (IEQ10)	09:25-09:30 น.	22.7	62.1	124	13.33	0.19
11. Dining Room (IEQ11)	09:30-09:35 น.	22.7	63.4	90	9.36	0.23
4 <sup>th</sup> Floor						
12. Exercise Room (IEQ12)	08:52-08:57 น.	22.7	52.6	122	28.82	0.18
13. Radio Room (IEQ13)	08:40-08:45 น.	23.0	51.9	126	17.07	0.20
Cellar Deck						
14. Mechanic Shop (IEQ14)	10:30-10:35 น.	21.8	61.6	51	8.51	0.18
15. RMT Shop (IEQ15)	10:25-10:30 น.	22.1	64.4	102	9.64	0.21
16. CSS Office (IEQ16)	10:40-10:45 น.	23.2	50.8	189	10.10	0.23
17. IE Shop (IEQ17)	10:45-10:50 น.	22.3	61.9	39	17.09	0.21
18. CCR (IEQ18)	10:55-11:00 น.	21.9	57.0	124	57.20	0.18
BEPP						
Cellar Deck						
19. Laboratory Room (IEQ19)	08:30-08:35 น.	19.8	53.2	89	22.88	0.18
20. Outdoor (BELQ)	11:10-11:15 น.	28.7	91.8	452	-	-
เกณฑ์แนะนำ*		24.0-26.0	<70 (Existing buildings)	700 above outdoor	<50	0.10-0.30

ที่มา: \* Code of Practice for Indoor Air Quality for Air-Conditioned Building, Singapore Standard SS 554:2009

- หมายเหตุ:
- ทุกพารามิเตอร์ของการตรวจวัดคุณภาพอากาศภายในอาคารใช้เครื่องมือวัดค่าโดยตรงทั้งหมด
  - ผลการตรวจวัดภายนอกอาคารไม่ได้นำมาเปรียบเทียบกับมาตรฐานดังกล่าว
  - ตัวเลขสีแดงแสดงถึงค่าที่ตรวจวัดได้ไม่ผ่านเกณฑ์มาตรฐานกำหนด





1. OIM Office (IEQ1)



2. Maint Superintendent (IEQ2)



3. Main Office (IEQ3)



4. Prod Superintendent Office (IEQ4)



5. Clinic (IEQ5)



6. Meeting Room (IEQ6)



7. FE Office (IEQ7)



8. COG Office (IEQ8)

ภาพถ่ายที่ 5-1 ภาพการตรวจวัดคุณภาพอากาศภายในอาคาร บริเวณแหล่งเบญจมาศ (Benchamas)



9. Game Room (IEQ9)



10. Laundry Room (IEQ10)



11. Dining Room (IEQ11)



12. Exercise Room (IEQ12)



13. Radio Room (IEQ13)



14. Mechanic Shop (IEQ14)



15. RMT Shop (IEQ15)



16. CSS Office (IEQ16)

ภาพถ่ายที่ 5-1 (ต่อ)





17. IE Shop (IEQ17)



18. CCR (IEQ18)



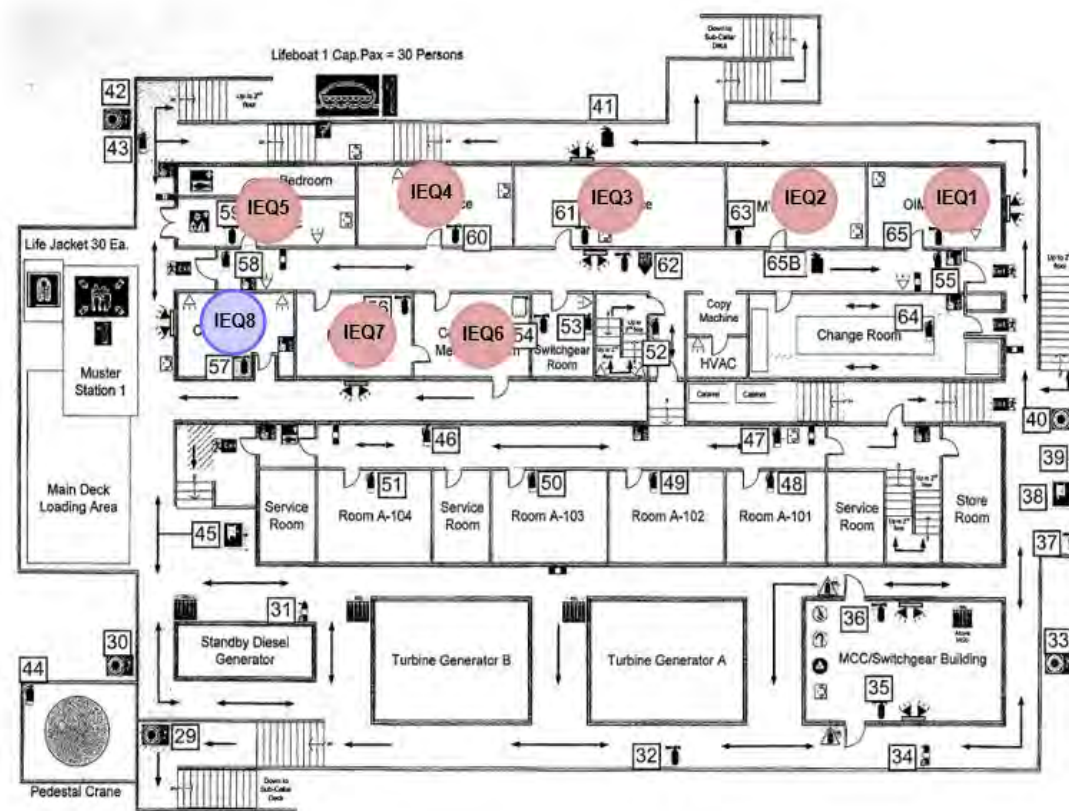
19. Laboratory Room (IEQ19)



20. Outdoor

ภาพถ่ายที่ 5-1 (ต่อ)



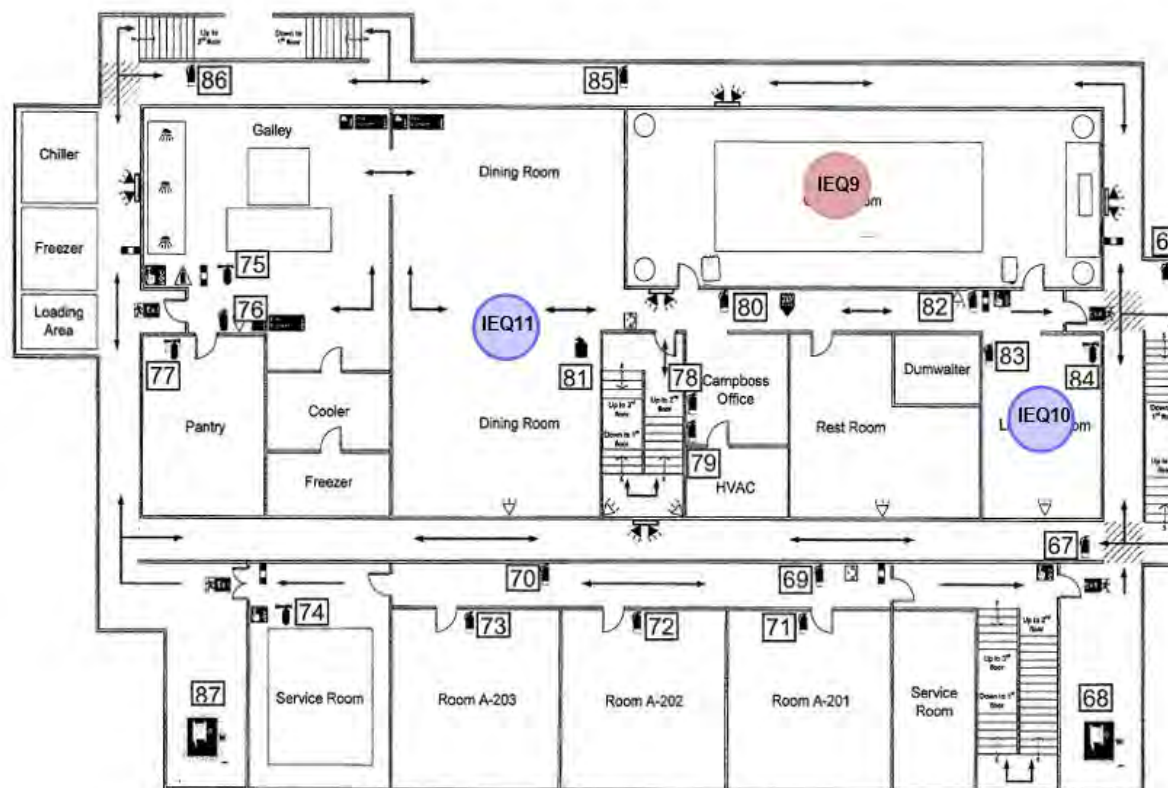


### BELQ : 1<sup>st</sup> Floor

IEQ1

- Measured Point (s)

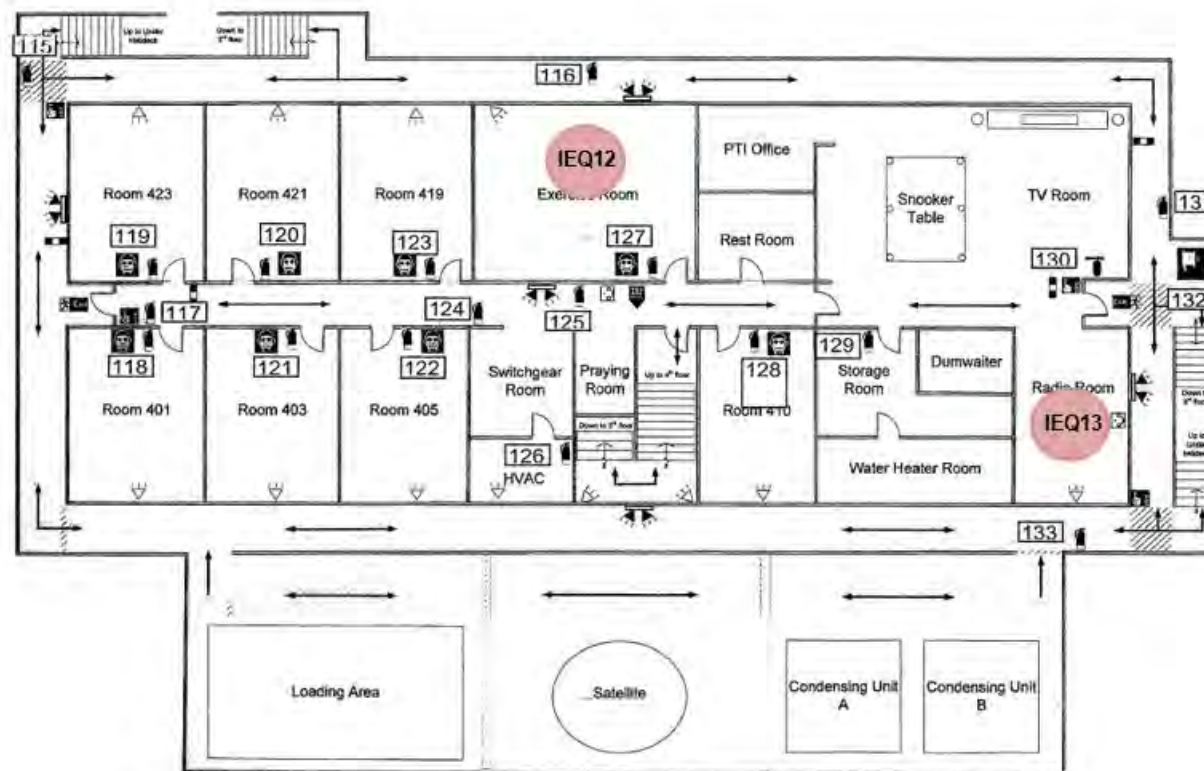
**รูปที่ 5-1 ตำแหน่งสถานีตรวจวัดคุณภาพอากาศภายในอาคาร บริเวณแหล่งเบญจมาศ (Benchamas)**



BELQ : 2<sup>nd</sup> Floor



รูปที่ 5-1 (ต่อ)

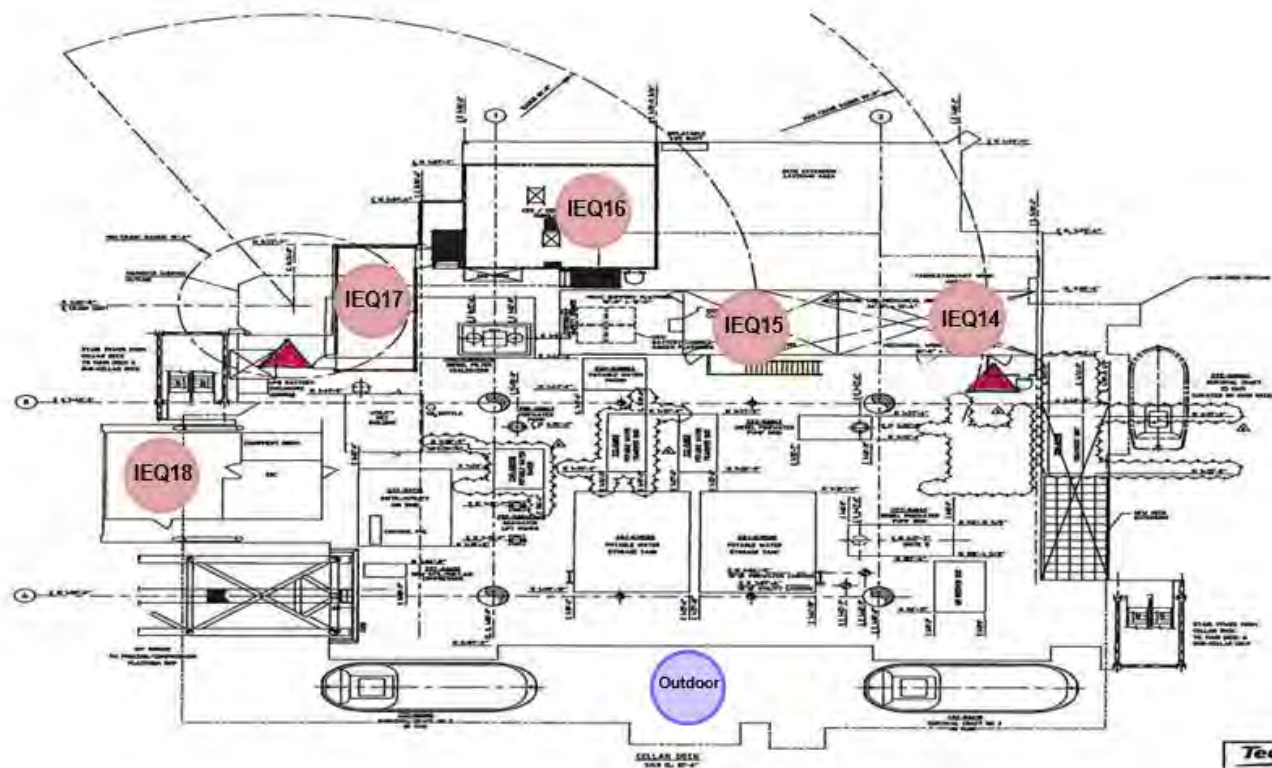


BELQ : 4<sup>th</sup> Floor



รูปที่ 5-1 (ต่อ)



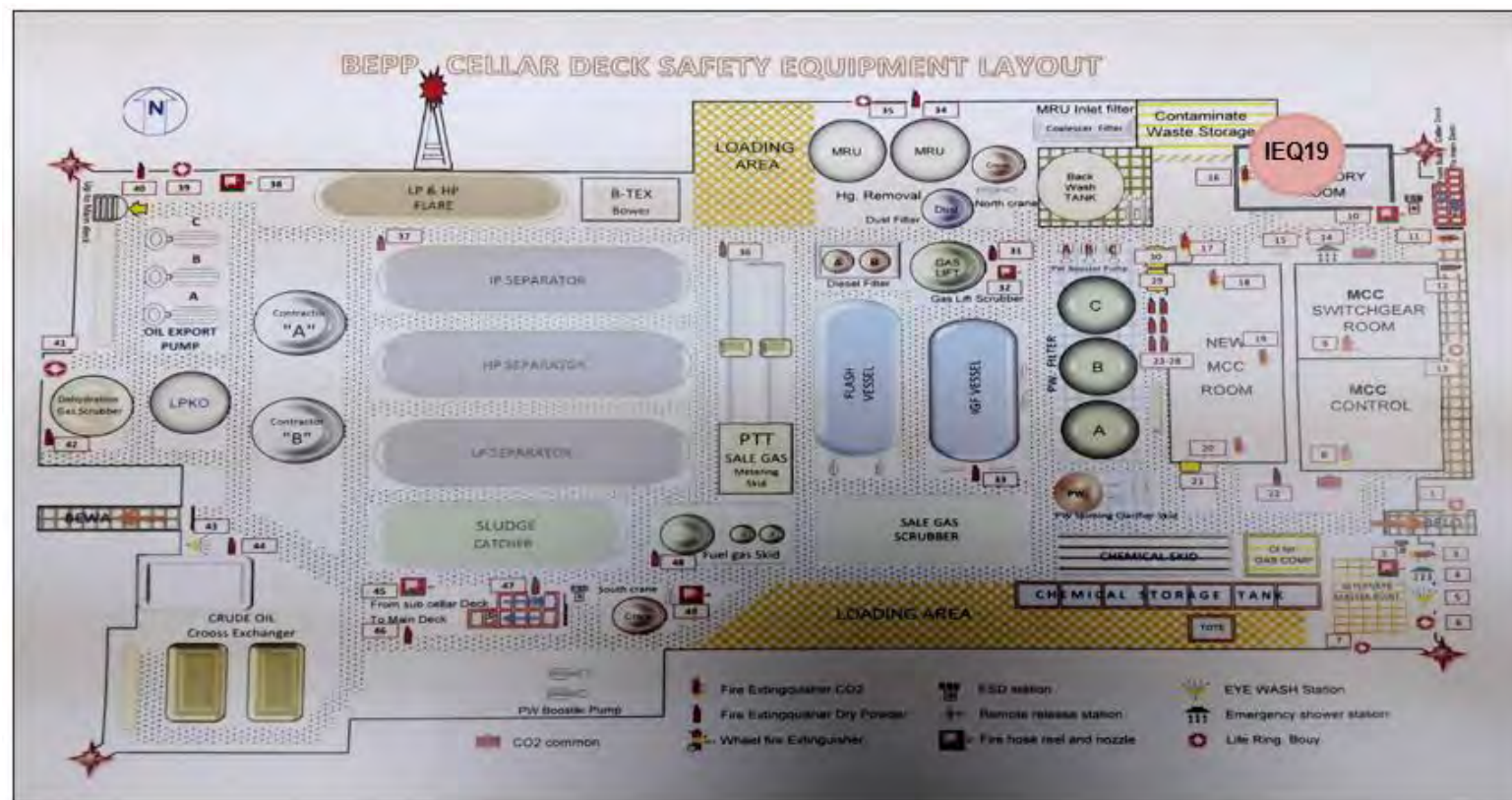


BELQ : Cellar Deck



← Measured Point (s)

รูปที่ 5-1 (ต่อ)



BEPP : Cellar Deck

IEQ1

Measured Point (s)

รูปที่ 5-1 (ต่อ)

### 5.3 สรุปผลการตรวจวัดคุณภาพอากาศภายในอาคาร และข้อเสนอแนะ

ผลการตรวจวัดคุณภาพอากาศภายในอาคาร บริเวณ BEPP และบริเวณ BELQ ของโครงการผลิตปิโตรเลียม แหล่งเบญจมาศ (Benchamas) บริษัท เชฟรอน ออฟชอร์ (ประเทศไทย) จำกัด เมื่อวันที่ 12 พฤศจิกายน 2565 พบว่า มีค่าไม่อยู่ในเกณฑ์มาตรฐานกำหนด คิดเป็นร้อยละ 100 ของจำนวนจุดตรวจวัดทั้งหมด

สำหรับบริเวณที่มีค่าไม่อยู่ในเกณฑ์มาตรฐาน ได้แก่ อุณหภูมิ ฝุ่นละอองขนาดเล็กไม่เกิน 10 ไมครอน และการเคลื่อนที่อากาศ ซึ่งปัจจัยเหล่านี้มีความสัมพันธ์ในลักษณะของความสบายกาย (Thermal Comfort) ของผู้ใช้อาคาร ดังนั้นจึงควรมีการจัดสภาพแวดล้อมที่อยู่อาศัยให้เหมาะสม ดังนี้

- 1) ตรวจสอบประสิทธิภาพการทำงานของระบบปรับอากาศ ที่แจกจ่ายความร้อน/เย็น ปรับเพิ่มหรือลดระดับความชื้นในพื้นที่ที่มีคนใช้งาน
- 2) ควรปิดช่องที่อากาศสามารถผ่านเข้าออกได้ เพราะอาจทำให้อุณหภูมิสูงหรือต่ำกว่าที่ควรจะเป็น
- 3) ควรเพิ่มการระบายอากาศในพื้นที่ที่เกิดปัญหา
- 4) ตรวจสอบพื้นที่ว่ามีการออกแบบหรือตกแต่งใหม่หรือไม่ เพราะเป็นสาเหตุทำให้การเคลื่อนที่อากาศเปลี่ยนแปลงจากเดิมที่เคยออกแบบไว้



## ส่วนที่ 6

### การตรวจวัดความเร็วลมหน้าตู้ดูดควันสารเคมี

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## การตรวจวัดความเร็วลมหน้าตู้ดูดควันสารเคมี

### 6.1 วิธีการตรวจวัดความเร็วลมหน้าตู้ดูดควันสารเคมี

การตรวจวัดความเร็วลมหน้าตู้ดูดควันสารเคมี อ้างอิงวิธีตามมาตรฐาน ANSI/ASHRAE 110-1995 : Method of Testing Performance of Laboratory Fume Hoods ซึ่งออกโดย American National Standards Institute และ American Society of Heating, Refrigerating and Air-Conditioning Engineers ของประเทศสหรัฐอเมริกา ดังตารางที่ 6-1 โดยมีรายละเอียดดังต่อไปนี้

#### ➤ ตู้ดูดควันสารเคมี

ตู้ดูดควันเป็นระบบระบายอากาศทั้ง มีการติดตั้งกรอบกันหน้าบานตู้ (Sash) ซึ่งทำหน้าที่เป็นกรอบป้องกันตัวผู้ใช้งาน อัตราความเร็วลมหน้าตู้ (Face Velocity) จะขึ้นอยู่กับหน้าบานตู้ ถ้าหน้าบานตู้อยู่ระดับต่ำลงอัตราความเร็วลมหน้าตู้ก็จะสูงขึ้น หากหน้าบานตู้อยู่ระดับสูง อัตราความเร็วลมหน้าตู้ก็จะต่ำลง ประสิทธิภาพของตู้ดูดควันควรทำงานได้ปกติ เมื่อมีการใช้งานเป็นประจำ ซึ่งการตรวจวัดความเร็วลมจากการดูดของพัดลมของตู้ดูดควันเป็นอีกวิธีทำให้ทราบถึงประสิทธิภาพของตู้ดูดควัน

ตารางที่ 6-1 วิธีการตรวจวัดความเร็วลมหน้าตู้ดูดควันสารเคมี

พารามิเตอร์	หน่วย	วิธีการตรวจวัด
ค่าเฉลี่ยความเร็วลมหน้าตู้ (Average Face Velocity)	ftpm	Real-time portable meter, hot wire

## 6.2 ผลการตรวจวัดความเร็วลมหน้าตู้ดูดควันสารเคมี

ผลการตรวจวัดความเร็วลมหน้าตู้ดูดควันสารเคมีที่ห้องปฏิบัติการ (Laboratory Room) บริเวณ Cellar Deck ที่ BEPP จำนวน 1 สถานี เมื่อวันที่ 14 พฤศจิกายน 2565 สรุปได้ดังตารางที่ 6-2 สำหรับตำแหน่งสถานีตรวจวัด แสดงดังรูปที่ 6-1 โดยรายละเอียดผลการตรวจวัด และภาพการตรวจวัด แสดงได้ดังนี้

ตารางที่ 6-2 สรุปผลการตรวจวัดค่าเฉลี่ยความเร็วลมหน้าตู้ดูดควัน เมื่อวันที่ 14 พฤศจิกายน 2565

สถานี	หน่วย	มาตรฐาน*	ค่า Average Face Velocity	ผลตรวจวัด
<b>Cellar Deck (Laboratory Room)</b>				
- 50% Sash Opening (Maximum Limit Position)	fpm	80-100	117	ไม่ผ่าน

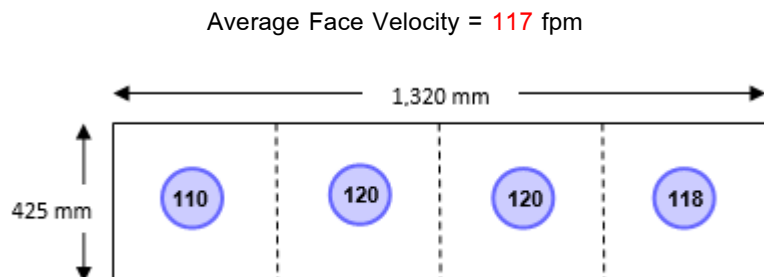
ที่มา: \* American National Standards for Laboratory Ventilation, ANSI/AIHA Z9.5-2003

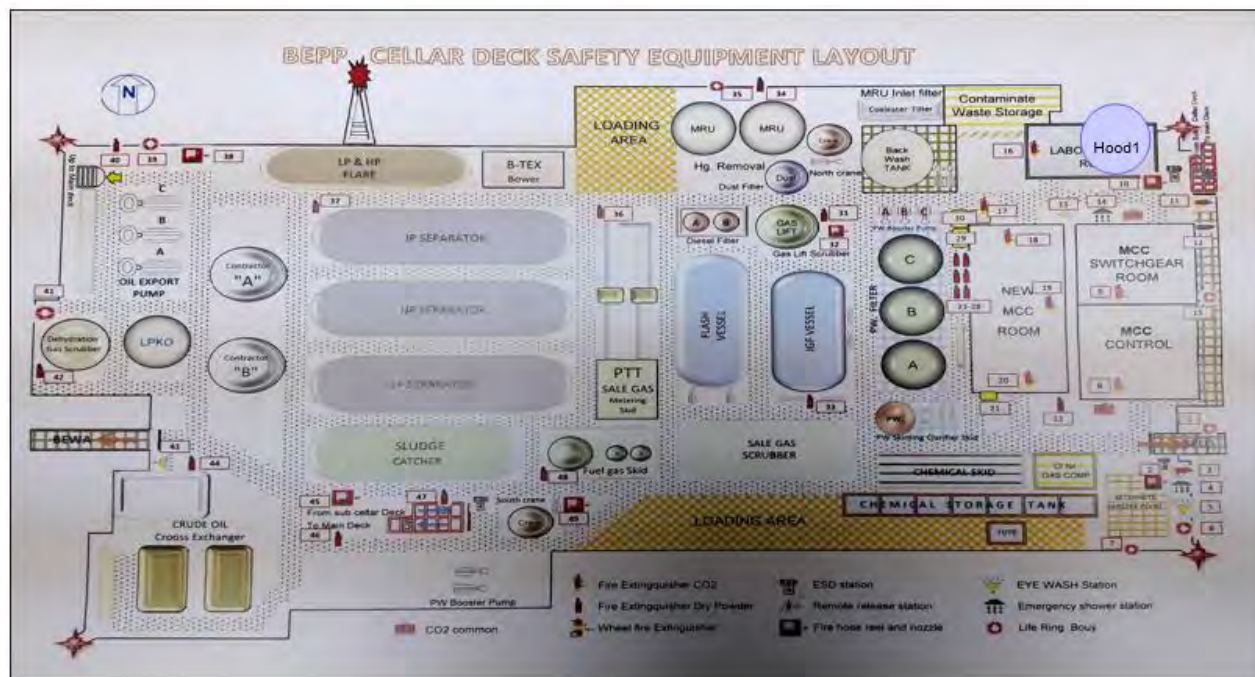
หมายเหตุ: การพิจารณาค่าที่เหมาะสมของตู้ดูดควันดังกล่าวควรอ้างอิงค่ามาตรฐานการออกแบบและการใช้งานของตู้ดูดควันดังกล่าวร่วมด้วย

สำหรับรายละเอียดผลการตรวจวัดความเร็วลมหน้าตู้ดูดควันในแต่ละจุด และภาพการตรวจวัด แสดงได้ดังนี้

### Cellar Deck (Laboratory Room)

- 50% Sash Opening





Cellar Deck

Hood 1

← Sampling Point

รูปที่ 6-1 ตำแหน่งสถานีตรวจวัดความเร็วลมหน้าตู้ดูดควัน บริเวณแหล่งเบญจมาศ (Benchamas)



### 6.3 สรุปผลการตรวจวัดความเร็วลมหน้าตู้ดูดควันสารเคมี และข้อเสนอแนะ

ผลการตรวจวัดความเร็วลมหน้าตู้ดูดควันที่ห้องปฏิบัติการ (Laboratory Room) บริเวณ Cellar Deck ที่ BEPP ของโครงการผลิตปิโตรเลียมแหล่งเบญจมาศ (Benchamas) บริษัท เชฟรอน ออฟชอร์ (ประเทศไทย) จำกัด เมื่อวันที่ 14 พฤศจิกายน 2565 พบว่า ที่ระดับการเปิดหน้าต่าง 50% ซึ่งเป็นตำแหน่งที่กำหนดให้เปิดได้สูงสุด มีค่าไม่อยู่ในเกณฑ์มาตรฐาน ANSI/AIHA Z9.5-2003 ทั้งนี้ ความเร็วลมที่สูงกว่า 100 fpm อาจส่งผลให้ประสิทธิภาพในการดูดดีขึ้น แต่จะส่งผลให้มีการสิ้นเปลืองพลังงานรวมถึงมีค่าใช้จ่ายสูงขึ้นด้วยเช่นกัน นอกจากนี้ ในกรณีที่อัตราความเร็วลมสูงเกินไป อาจทำให้เกิด Turbulent ได้

นอกจากการตรวจสอบประสิทธิภาพการทำงานของตู้ดูดควันอย่างสม่ำเสมอแล้ว ยังต้องคำนึงถึงการใช้อย่างถูกวิธีและปลอดภัย ดังนี้

- 1) ตรวจสอบตำแหน่งของ Fresh Air ควรอยู่ห่างจากตู้ดูดควันประมาณ 1.5 เมตร
- 2) ไม่ควรใช้ตู้ดูดควันเป็นที่เก็บสารเคมี ควรเก็บสารเคมีในตู้ Safety Cabinet ตามประเภทของสารเคมี
- 3) เมื่อใช้งานตู้ดูดควัน ควรปิดประตูและหน้าต่างทั้งหมดทุกครั้ง
- 4) ให้ความรู้กับผู้ปฏิบัติงานเกี่ยวกับการใช้งานตู้ดูดควันอย่างปลอดภัย

**ภาคผนวก 17**

**รายงานการตรวจสอบและบำรุงรักษาอุปกรณ์และเครื่องมือต่างๆ (Equipment PM)**



# PRE-LIFT PLANNING AND CRANE PRE/POST OPERATION CHECKLIST

วันที่ 17-4-22 ผู้ตรวจสอบ ก่อน / หลัง 1 แผนก CRANE  
 PTW No. .... สถานที่ตั้งของเครน BSL Q Eng. Run Hour/ เวลาเริ่มใช้งาน 16257 หลังใช้งาน 16259  
 PRE-LIFT PLANNING ชื่อ Signal Man Phasert ชื่อ Rigger Asoon

	Yes	No	N/A
1. ทีมงานมีการวางแผนการยก (Lifting Plan) และมีการสื่อสารกับผู้เกี่ยวข้องทั้งหมดก่อนทำการยก	/		
2. มีการตรวจสอบอุปกรณ์การยกและการผูกมัดว่าอยู่ในสภาพที่สมบูรณ์พร้อมใช้งานทั้งขนาดและน้ำหนัก SWL ที่ใช้ในการยก เช่น ป้ายชื่อสินค้า (nameplate), รหัสสี (color code) และเชือกเลี้ยง (tagline)	/		
3. ผู้ขับเครนต้องมีใบอนุญาตขับเครนตามประเภท (Class) ที่กำหนด มีความคุ้นเคยและมั่นใจกับการใช้งานเครนชนิดนี้เพื่อทำการยกได้อย่างปลอดภัย ผู้ให้สัญญาณ (signal man) และผู้ยึดเกาะวัสดุ (rigger) ต้องผ่านการฝึกอบรมและมีคุณสมบัติเหมาะสมที่จะปฏิบัติงาน	/		
4. กรณียกคน ตรวจสอบสภาพความพร้อมของกระเช้า personnel basket พื้นที่สำหรับขึ้น-ลง personnel basket มีความปลอดภัย และต้องตรวจสอบผู้โดยสารว่ามีความคุ้นเคยในการใช้ personnel basket มาก่อน และสวมใส่ work vest อย่างถูกต้อง แล้วหรือไม่	/		

CRANE PRE/POST OPERATION CHECK: ก ✓ เมื่อตรวจพบสภาพปกติ ก ✗ เมื่อตรวจพบสภาพผิดปกติ

\*\*\*แจ้งหัวหน้างานทันทีและบันทึกสิ่งผิดปกติที่พบในพื้นที่ด้านล่าง\*\*\*

	ก่อนใช้งาน	หลังใช้งาน
1. ตรวจสอบโครงสร้างทั่วไปของเครน, โครงสร้างบูมเครน, ฐานรื้อสลักบูมรวมถึง Bolt & Nut ฐานเครน (Pedestal bolts) และสลักข้อต่อบูมที่ใช้ในการต่อยึดว่ามีความเสียหาย, ถลอก, หลวม, สูญหาย, หมดตัวยึดสลักกร่อน และมีรอยร้าวหรือไม่ และตรวจสอบประตูทางเข้าและออกสำหรับคนขับเครนและต้องมีความปลอดภัย	/	/
2. ตรวจสอบสภาพอุปกรณ์การยก เช่น สลิง, ตะขอสลิง, shackles, stringer, crane hooks ตะขอเกี่ยว, safety latch ของตะขอเกี่ยวรอก, แผ่นป้องกันสลิงหลุดว่าอยู่ในสภาพพร้อมใช้งานหรือไม่ และตรวจสอบให้แน่ใจว่ามีหมุดล็อกในตะขอเกี่ยวสำหรับการยกคน	/	/
3. ตรวจสอบสภาพทั่วไปของเครื่องยนต์และตรวจสอบการรั่วไหล ตรวจสอบระดับน้ำ, น้ำมันเครื่อง, น้ำมันเชื้อเพลิง, น้ำมันไฮดรอลิก, สภาพของสายไฮดรอลิก, ไบพาส, สายพานต่างๆ ว่ามีสภาพพร้อมใช้งานหรือไม่ บันทึกระดับน้ำมันเชื้อเพลิงหลังการใช้งาน <u>80</u> % ระดับน้ำมันไฮดรอลิกหลังการใช้งาน <u>70</u> %	/	/
4. ตรวจสอบอุปกรณ์ป้องกันการเสียหายของเครื่องยนต์ (ถ้ามี) สวิตช์ตัดแรงดันน้ำมันหล่อลื่นว่าอยู่ในสภาพพร้อมใช้งานหรือไม่ ห้ามบายพาส และตรวจสอบฟังก์ชันและการทำงานของสตาร์ทและดับเครื่องยนต์ก่อนใช้งาน	/	/
5. ตรวจสอบการรั่วไหลของน้ำมันเกียร์ของเครื่องกว้าน(winch), ตรวจสอบสภาพการเสื่อมสภาพความเสียหายของสลิง และการเรียงเก็บว่าอยู่ในสภาพดีในเครื่องกว้าน(winch) และอยู่ในร่อง sheave ทุกตำแหน่งหรือไม่	/	/
6. ตรวจสอบคัมบังลิบต่างๆ ว่าสามารถกลิ้งกลับมาอยู่ในตำแหน่งปกติ (Natural Position) และมีป้ายบอกตำแหน่งการควบคุมทิศทางอยู่ครบถ้วนหรือไม่	/	/
7. ตรวจสอบกลไกการควบคุมรวมถึงเบรกและคลัตช์เพื่อพร้อมการทำงานที่เหมาะสม	/	/
8. ตรวจสอบสภาพและการทำงานของตัวบ่งชี้น้ำหนัก Load Indicator และ Load Chart ที่ติดอยู่ที่ถูกต้องตรงกับเครน รวมทั้งตัวบอกองศาของบูม (Boom Angle Indicator) ว่าอยู่ในสภาพพร้อมใช้งานหรือไม่	/	/
9. ตรวจสอบการรั่วไหลหรือความเสียหายของอุปกรณ์ที่ใช้อากาศ (ระบบสตาร์ท) และระบบที่ไม่ใช่กลไก, ติดเครื่องยนต์ และตรวจสอบการรั่วไหลโดยทั่วไปในขณะอุ่นเครื่อง	/	/
10. ตรวจสอบ safety device การทำงานของ Anti -2 block และ pawl ของบูม (ทุกครั้ง) และตรวจสอบ Height Boom limit switch (ในกรณีที่ต้องยกบูมสูงเกินกว่า 75 องศา) ว่าทำงานหรือไม่, ตรวจสอบไฟสัญญาณเตือนเครื่องบิน (ถ้าติดตั้ง) ไฟบูมและตาข่ายป้องกันการตก	/	/
11. เก็บเครนในตำแหน่งที่เหมาะสม หลังการใช้งาน ใส่ Lock หรืออุปกรณ์ ป้องกันการหมุน	/	/

ระบุสิ่งผิดปกติที่พบ:

ข้อปฏิบัติ ตรวจสอบสภาพ รายงานสิ่งผิดปกติ และกรอกแบบตรวจสอบทั้งก่อนและหลังการใช้เครน และส่งให้ Crane Mechanic เก็บไว้



# PRE-LIFT PLANNING AND CRANE PRE/POST OPERATION CHECKLIST

วันที่ 13/7/22 ผู้ตรวจสอบ ก่อน / หลัง Yuthana N. แผนก FE  
 PTW No. .... สถานที่ตั้งของเครน MAWB Eng. Run Hour/ เวลาเริ่มใช้งาน 09:40 หลังใช้งาน 15:40  
 PRE-LIFT PLANNING ชื่อ Signal Man Anusorn T ชื่อ Rigger Samai K

	Yes	No	N/A
1. ทีมงานมีการวางแผนการยก (Lifting Plan) และมีการสื่อสารกับผู้เกี่ยวข้องทั้งหมดก่อนทำการยก	<input checked="" type="checkbox"/>		
2. มีการตรวจสอบอุปกรณ์การยกและการผูกมัดว่าอยู่ในสภาพที่สมบูรณ์พร้อมใช้งานทั้งขนาดและน้ำหนัก SWL ที่ใช้ในการยก เช่น ป้ายชื่อสินค้า (nameplate), รหัสสี (color code) และเชือกคล้อง (tagline)	<input checked="" type="checkbox"/>		
3. ผู้ขับเครนต้องมีใบอนุญาตขับเครนตามประเภท (Class) ที่กำหนด มีความคุ้นเคยและมั่นใจกับการใช้งานเครนชนิดนี้เพื่อทำการยกได้อย่างปลอดภัย ผู้ให้สัญญาณ (signal man) และผู้ยึดเกาะวัสดุ (rigger) ต้องผ่านการฝึกอบรมและมีคุณสมบัติเหมาะสมที่จะปฏิบัติงาน	<input checked="" type="checkbox"/>		
4. กรณียกคน ตรวจสอบสภาพความพร้อมของกระเช้า personnel basket พื้นที่สำหรับขึ้น-ลง personnel basket มีความปลอดภัย และต้องตรวจสอบผู้โดยสารว่ามีความคุ้นเคยในการใช้ personnel basket มาก่อน และสวมใส่ work vest อย่างถูกต้อง แล้วหรือไม่			<input checked="" type="checkbox"/>

CRANE PRE/POST OPERATION CHECK: กา ✓ เมื่อตรวจพบสภาพปกติ กา ✗ เมื่อตรวจพบสภาพผิดปกติ

\*\*\*แจ้งหัวหน้างานทันทีและบันทึกถึงผิดปกติที่พบในพื้นที่ด้านล่าง\*\*\*

	ก่อนใช้งาน	หลังใช้งาน
1. ตรวจสอบโครงสร้างทั่วไปของเครน, โครงสร้างบูมเครน, ฐานร้อยสลักบูมรวมถึง Bolt & Nut ฐานเครน (Pedestal bolts) และสลักข้อต่อบูมที่ใช้ในการต่อเชื่อมมีความเสียหาย, คดงอ, หลวม, สดุดหาย, หมุดตัวยึดสลักกร่อน และมีรอยร้าวหรือไม่ และตรวจสอบประตูทางเข้าและออกสำหรับคนขับเครนและต้องมีความปลอดภัย	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2. ตรวจสอบสภาพอุปกรณ์การยก เช่น สลิง, ตะขอสลิง, shackles, stringer, crane hooks ตะขอเกี่ยว, safety latch ของตะขอเกี่ยวรอก, แผ่นป้องกันสลิงหลุดว่าอยู่ในสภาพพร้อมใช้งานหรือไม่ และตรวจสอบให้แน่ใจว่ามีหมุดล็อกในตะขอเกี่ยวสำหรับการยกคน	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3. ตรวจสอบสภาพทั่วไปของเครื่องยนต์และตรวจสอบการรั่วไหล ตรวจสอบระดับน้ำ, น้ำมันเครื่อง, น้ำมันเชื้อเพลิง, น้ำมันไฮดรอลิก, สภาพของสายไฮดรอลิก, ใบพัดลม, สายพานต่างๆ ว่ามีสภาพพร้อมใช้งานหรือไม่ บันทึกที่ระดับน้ำมันเชื้อเพลิงหลังการใช้งาน <u>90</u> % ระดับน้ำมันไฮดรอลิกหลังการใช้งาน <u>70</u> %	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4. ตรวจสอบอุปกรณ์ป้องกันการเสียหายของเครื่องยนต์ (ถ้ามี) สวิตช์ตัดแรงดันน้ำมันหล่อลื่นว่าอยู่ในสภาพพร้อมใช้งานหรือไม่ ห้ามบายพาส และตรวจสอบฟังก์ชันและการทำงานของสาร์ทและดับเครื่องยนต์ก่อนใช้งาน	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5. ตรวจสอบการรั่วไหลของน้ำมันเกียร์ของเครื่องกว้าน(winch), ตรวจสอบสภาพการเสื่อมสภาพความเสียหายของสลิง และการเรียงเก็บว่าอยู่ในสภาพดีในเครื่องกว้าน(winch) และอยู่ในร่อง sheave ทุกตำแหน่งหรือไม่	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6. ตรวจสอบคันบังคับต่างๆ ว่าสามารถคืนกลับมามีตำแหน่งปกติ (Natural Position) และมีป้ายบอกตำแหน่งการควบคุมทิศทางอยู่ครบถ้วนหรือไม่	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7. ตรวจสอบกลไกการควบคุมรวมถึงเบรกและคลัตช์เพื่อพร้อมการทำงานที่เหมาะสม	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8. ตรวจสอบสภาพและการทำงานของตัวบ่งชี้น้ำหนัก Load Indicator และ Load Chart ที่ติดอยู่ที่ถูกต้องตรงกับเครน รวมทั้งตัวบอกองศาของบูม (Boom Angle Indicator) ว่าอยู่ในสภาพพร้อมใช้งานหรือไม่	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9. ตรวจสอบการรั่วไหลหรือความเสียหายของอุปกรณ์ที่ใช้อากาศ (ระบบสาร์ท) และระบบที่ไม่ใช่กลไก, ติดเครื่องยนต์ และตรวจสอบการรั่วไหลโดยทั่วไปในขณะอุ่นเครื่อง	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10. ตรวจสอบ safety device การทำงานของ Anti -2 block และ pawl ของบูม (ทุกครั้ง) และตรวจสอบ Height Boom limit switch (ในกรณีที่ต้องยกบูมสูงเกินกว่า 75 องศา) ว่าทำงานหรือไม่, ตรวจสอบไฟสัญญาณเตือนเครื่องบิน (ถ้าติดตั้ง) ไฟบูมและดาข่ายป้องกันการตก	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11. เก็บเครนในตำแหน่งที่เหมาะสม หลังการใช้งาน ใส่ Lock หรืออุปกรณ์ ป้องกันการหมุน	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

ระบุถึงผิดปกติที่พบ:

ข้อปฏิบัติ ตรวจสอบสภาพ รายงานสิ่งผิดปกติ และกรอกแบบตรวจสอบทั้งก่อนและหลังการใช้เครน และส่งให้ Crane Mechanic เก็บไว้





# PRE-LIFT PLANNING AND CRANE PRE/POST OPERATION CHECKLIST

วันที่ 2 Nov 22 ผู้ตรวจสอบ ก่อน / หลัง Chanut N แผนก Crane  
 PTW No. .... สถานที่ตั้งของเครน 2000 Eng. Run Hour/ เวลาเริ่มใช้งาน 07:30 หลังใช้งาน 12:00  
 PRE-LIFT PLANNING ชื่อ Signal Man Arbhom P. ชื่อ Rigger Pongsathorn

	Yes	No	N/A
1. ทีมงานมีการวางแผนการยก (Lifting Plan) และมีการสื่อสารกับผู้เกี่ยวข้องทั้งหมดก่อนทำการยก			✓
2. มีการตรวจสอบอุปกรณ์การยกและการผูกมัดว่าอยู่ในสภาพที่สมบูรณ์พร้อมใช้งานทั้งขนาดและน้ำหนัก SWL ที่ใช้ในการยก เช่น ป้ายชื่อสินค้า (nameplate), รหัสสี (color code) และเครื่องหมาย (tagline)	✓		
3. ผู้จับเครนต้องมีใบอนุญาตจับเครนตามประเภท (Class) ที่กำหนด มีความคุ้นเคยและมั่นใจกับการใช้งานเครนชนิดนี้เพื่อทำการยกได้อย่างปลอดภัย ผู้ให้สัญญาณ (signal man) และผู้ยึดเกาะวัสดุ (rigger) ต้องผ่านการฝึกอบรมและมีคุณสมบัติเหมาะสมที่จะปฏิบัติงาน	✓		
4. กรณียกคน ตรวจสอบสภาพความพร้อมของกระเช้า personnel basket พื้นที่สำหรับขึ้น-ลง personnel basket มีความปลอดภัย และต้องตรวจสอบผู้โดยสารว่ามีความคุ้นเคยในการใช้ personnel basket มาก่อน และสวมใส่ work vest อย่างถูกต้อง แล้วหรือไม่	✓		

CRANE PRE/POST OPERATION CHECK: กา ✓ เมื่อตรวจพบสภาพปกติ กา ✗ เมื่อตรวจพบสภาพผิดปกติ

\*\*\*แจ้งหัวหน้างานทันทีและบันทึกสิ่งผิดปกติที่พบในพื้นที่ด้านล่าง\*\*\*

	ก่อนใช้งาน	หลังใช้งาน
1. ตรวจสอบโครงสร้างทั่วไปของเครน, โครงสร้างบูมเครน, ฐานรอยสลักบูมรวมถึง Bolt & Nut ฐานเครน (Pedestal bolts) และสลักข้อต่อบูมที่ใช้ในการต่อมีความเสียหาย, ถลอก, หลวม, สูญหาย, หมุดตัวยึดสลักกร่อน และมีรอยร้าวหรือไม่ และตรวจสอบประตูทางเข้าและออกสำหรับคนจับเครนและต้องมีความปลอดภัย	✓	✓
2. ตรวจสอบสภาพอุปกรณ์การยก เช่น สลิง, ตะขอสลิง, shackles, stringer, crane hooks ตะขอเกี่ยว, safety latch ของตะขอเกี่ยวรอก, แผ่นป้องกันสลิงหลุดว่าอยู่ในสภาพพร้อมใช้งานหรือไม่ และตรวจสอบให้แน่ใจว่ามีหมุดล็อกในตะขอเกี่ยวสำหรับการยกคน	✓	✓
3. ตรวจสอบสภาพทั่วไปของเครื่องยนต์และตรวจสอบการรั่วไหล ตรวจสอบระดับน้ำ, น้ำมันเครื่อง, น้ำมันเชื้อเพลิง, น้ำมันไฮดรอลิก, สภาพของสายไฮดรอลิก, ใบพัดลม, สายพานต่างๆ ว่ามีสภาพพร้อมใช้งานหรือไม่ บันทึกระดับน้ำมันเชื้อเพลิงหลังการใช้งาน <u>90</u> % ระดับน้ำมันไฮดรอลิกหลังการใช้งาน <u>75</u> %	✓	✓
4. ตรวจสอบอุปกรณ์ป้องกันการเสียหายของเครื่องยนต์ (ถ้ามี) สวิตช์ตัดแรงดันน้ำมันหล่อลื่นว่าอยู่ในสภาพพร้อมใช้งานหรือไม่ ห้ามบายพาส และตรวจสอบฟังก์ชันและการทำงานของสตาร์ทและดับเครื่องยนต์ก่อนใช้งาน	✓	✓
5. ตรวจสอบการรั่วไหลของน้ำมันเกียร์ของเครื่องกว้าน(winch), ตรวจสอบสภาพการเสื่อมสภาพความเสียหายของสลิง และการเรียงเก็บว่าอยู่ในสภาพดีในเครื่องกว้าน(winch) และอยู่ในร่อง sheave ทุกตำแหน่งหรือไม่	✓	✓
6. ตรวจสอบคานับถ่วงต่างๆ ว่าสามารถคืนกลับมายู่ในตำแหน่งปกติ (Natural Position) ) และมีป้ายบอกตำแหน่งการควบคุมทิศทางอยู่ครบถ้วนหรือไม่	✓	✓
7. ตรวจสอบกลไกการควบคุมรวมถึงเบรกและคลัตช์เพื่อพร้อมการทำงานที่เหมาะสม	✓	✓
8. ตรวจสอบสภาพและการทำงานของตัวบ่งชี้น้ำหนัก Load Indicator และ Load Chart ที่ติดอยู่ที่ถูกต้องตรงกับเครน รวมทั้งตัวบอกองศาของบูม (Boom Angle Indicator) ว่าอยู่ในสภาพพร้อมใช้งานหรือไม่	✓	✓
9. ตรวจสอบการรั่วไหลหรือความเสียหายของอุปกรณ์ที่ใช้อากาศ (ระบบสตาร์ท) และระบบที่ไม่ใช่กลไก, ติดเครื่องยนต์ และตรวจสอบการรั่วไหลโดยทั่วไปในขณะอุ่นเครื่อง	✓	✓
10. ตรวจสอบ safety device การทำงานของ Anti -2 block และ pawl ของบูม (ทุกครั้ง) และตรวจสอบ Height Boom limit switch (ในกรณีที่ตักยกบูมสูงเกินกว่า 75 องศา) ว่าทำงานหรือไม่, ตรวจสอบไฟสัญญาณเตือนเครื่องบิน (ถ้าติดตั้ง) ไฟบูมและตาข่ายป้องกันการตก	✓	✓
11. เก็บเครนในตำแหน่งที่เหมาะสม หลังการใช้งาน ใส่ Lock หรืออุปกรณ์ ป้องกันการหมุน	✓	✓

ระบุสิ่งผิดปกติที่พบ:

ข้อปฏิบัติ ตรวจสอบสภาพ รายงานสิ่งผิดปกติ และกรอกแบบตรวจสอบทั้งก่อนและหลังการใช้เครน และส่งให้ Crane Mechanic เก็บไว้



# PRE-LIFT PLANNING AND CRANE PRE/POST OPERATION CHECKLIST

วันที่ 06 Dec 2022 ผู้ตรวจสอบ ก่อน / หลัง Inspector แผนก Cm  
 PTW No. .... สถานที่ตั้งของเครน 170013 Eng. Run Hour/ เวลาเริ่มใช้งาน 12:00 หลังใช้งาน 13:00  
 PRE-LIFT PLANNING ชื่อ Signal Man Kitti ชื่อ Rigger Ranyat L

	Yes	No	N/A
1. ทีมงานมีการวางแผนการยก (Lifting Plan) และมีการสื่อสารกับผู้เกี่ยวข้องทั้งหมดก่อนทำการยก	<input checked="" type="checkbox"/>		
2. มีการตรวจสอบอุปกรณ์การยกและการผูกมัดว่าอยู่ในสภาพที่สมบูรณ์พร้อมใช้งานทั้งขนาดและน้ำหนัก SWL ที่ใช้ในการยก เช่น ป้ายชื่อสินค้า (nameplate), รหัสสี (color code) และเชือกถัก (tagline)	<input checked="" type="checkbox"/>		
3. ผู้ขับเครนต้องมีใบอนุญาตขับเครนตามประเภท (Class) ที่กำหนด มีความคุ้นเคยและมั่นใจกับการใช้งานเครนชนิดนี้เพื่อทำการยกได้อย่างปลอดภัย ผู้ให้สัญญาณ (signal man) และผู้ยึดเกาะวัสดุ (rigger) ต้องผ่านการฝึกอบรมและมีคุณสมบัติเหมาะสมที่จะปฏิบัติงาน	<input checked="" type="checkbox"/>		
4. กรณียกคน ตรวจสอบสภาพความพร้อมของกระเช้า personnel basket พื้นที่สำหรับขึ้น-ลง personnel basket มีความปลอดภัย และต้องตรวจสอบผู้โดยสารว่ามีความคุ้นเคยในการใช้ personnel basket มาก่อน และสวมใส่ work vest อย่างถูกต้อง แล้วหรือไม่			<input checked="" type="checkbox"/>

CRANE PRE/POST OPERATION CHECK: กา ✓ เมื่อตรวจพบสภาพปกติ กา ✗ เมื่อตรวจพบสภาพผิดปกติ

\*\*\*แจ้งหัวหน้างานทันทีและบันทึกสิ่งผิดปกติที่พบในพื้นที่ด้านล่าง\*\*\*

	ก่อนใช้งาน	หลังใช้งาน
1. ตรวจสอบโครงสร้างทั่วไปของเครน, โครงสร้างบูมเครน, ฐานรื้อสลักบูมรวมถึง Bolt & Nut ฐานเครน (Pedestal bolts) และสลักข้อต่อบูมที่ใช้ในการต่อยึดว่ามีความเสียหาย, ถดถอย, หลวม, สูญหาย, หมดอายุหรือสึกกร่อน และมีรอยร้าวหรือไม่ และตรวจสอบประตูทางเข้าและออกสำหรับคนขับเครนและต้องมีความปลอดภัย	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2. ตรวจสอบสภาพอุปกรณ์การยก เช่น สลิง, ตะขอสลิง, shackles, stringer, crane hooks ตะขอเกี่ยว, safety latch ของตะขอเกี่ยวรอก, แผ่นป้องกันสลิงหลุดว่าอยู่ในสภาพพร้อมใช้งานหรือไม่ และตรวจสอบให้แน่ใจว่ามีหมุดล็อกในตะขอเกี่ยวสำหรับการยกคน	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3. ตรวจสอบสภาพทั่วไปของเครื่องยนต์และตรวจสอบการรั่วไหล ตรวจสอบระดับน้ำ, น้ำมันเครื่อง, น้ำมันเชื้อเพลิง, น้ำมันไฮดรอลิก, สภาพของสายไฮดรอลิก, ใบพัดลม, สายพานต่างๆ ว่ามีสภาพพร้อมใช้งานหรือไม่ บันทึกที่ระดับน้ำมันเชื้อเพลิงหลังการใช้งาน <u>95</u> % ระดับน้ำมันไฮดรอลิกหลังการใช้งาน <u>25</u> %	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4. ตรวจสอบอุปกรณ์ป้องกันการเสียหายของเครื่องยนต์ (ถ้ามี) สวิตช์ตัดแรงดันน้ำมันหล่อลื่นว่าอยู่ในสภาพพร้อมใช้งานหรือไม่ ห้ามบายพาส และตรวจสอบฟังก์ชันและการทำงานของสตาร์ทและดับเครื่องยนต์ก่อนใช้งาน	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5. ตรวจสอบการรั่วไหลของน้ำมันเกียร์ของเครื่องกว้าน (winch), ตรวจสอบสภาพการเสื่อมสภาพความเสียหายของสลิง และการเรียงเก็บว่าอยู่ในสภาพดีในเครื่องกว้าน (winch) และอยู่ในร่อง sheave ทุกตำแหน่งหรือไม่	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6. ตรวจสอบคันบังคับต่างๆ ว่าสามารถคืนกลับมายู่ในตำแหน่งปกติ (Natural Position) และมีป้ายบอกตำแหน่งการควบคุมทิศทางอยู่ครบถ้วนหรือไม่	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7. ตรวจสอบกลไกการควบคุมรวมถึงเบรกและคลัตช์เพื่อพร้อมการทำงานที่เหมาะสม	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8. ตรวจสอบสภาพและการทำงานของตัวบ่งชี้น้ำหนัก Load Indicator และ Load Chart ที่ติดอยู่ที่ถูกต้องตรงกับเครน รวมทั้งตัวบอกองศาของบูม (Boom Angle Indicator) ว่าอยู่ในสภาพพร้อมใช้งานหรือไม่	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9. ตรวจสอบการรั่วไหลหรือความเสียหายของอุปกรณ์ที่ใช้อากาศ (ระบบสตาร์ท) และระบบที่ไม่ใช่กลไก, ติดเครื่องยนต์ และตรวจสอบการรั่วไหลโดยทั่วไปในขณะอุ่นเครื่อง	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10. ตรวจสอบ safety device การทำงานของ Anti -2 block และ pawl ของบูม (ทุกครั้ง) และตรวจสอบ Height Boom limit switch (ในกรณีที่ต้องยกบูมสูงเกินกว่า 75 องศา) ว่าทำงานหรือไม่, ตรวจสอบไฟสัญญาณเตือนเครื่องบิน (ถ้าติดตั้ง) ไฟบูมและตาข่ายป้องกันการตก	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11. เก็บเครนในตำแหน่งที่เหมาะสม หลังการใช้งาน ใส่ Lock หรืออุปกรณ์ ป้องกันการหมุน	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ระบุสิ่งผิดปกติที่พบ:		
ข้อปฏิบัติ ตรวจสอบสภาพ รายงานสิ่งผิดปกติ และกรอกแบบตรวจสอบทั้งก่อนและหลังการใช้เครน และส่งให้ Crane Mechanic เก็บไว้		

## MONTHLY PLATFORM INSPECTION CHECK LIST

BENCHAMAS MFP

Inspected by : Khuehng 2.

Date: 12 Dec 22

ITEMS TO BE CHECKED	CONDITION			ITEMS TO BE CHECKED	CONDITION		
	Good	No	WORK REQ.		Good	No	WORK REQ.
<b>1. HELIDECK (TOP DECK)</b>				<b>5. CELLAR DECK</b>			
a. Fire extinguishers	✓	N/A		a. Fire extinguishers	✓		
b. Flood lights working	✓	N/A		b. Emergency eye wash shower station	✓		
c. Wind sock	✓	N/A		c. Emergency eye wash drum or bottle	✓		
d. Personnel basket	✓	N/A		d. Breathing Apparatus and Escape set	✓	N/A	
e. Emergency eye wash shower station	✓			e. Mercury Spill Kit	✓	N/A	
f. Emergency eye wash drum or bottle	✓			f. Chemical PPE and Equipment Box	✓	N/A	
g. Life ring buoy&light	✓			g. Chemical skid	✓		
h. Surface clean and nonslip	✓			h. X-mas tree valves/plugs/fitting	✓		
i. ESD stations/functional	✓			i. Gauges in good condition	✓		
j. Gai-Tronic phone working	✓	N/A		j. Valve handle condition	✓		
k. Gutter drain condition/Gutter drain cap in place	✓			k. Chemical injection pump skid	✓		
<b>2. CRANE</b>				l. Check for gas/oil leaks	✓		
a. Visual check for boom/cab/ropes	✓			m. Access ladder/walking&working surface	✓		
b. Windows/wipers and control locked out	✓			n. Grating condition	✓		
c. Fire extinguishers	✓			o. Life ring buoy&Light	✓		
d. Load Chart/Hand Signal Chart available	✓			p. Blow pot condition	✓		
e. Fuel oil leakage	✓			q. Gutter drain condition/Gutter drain cap in place	✓		
f. Access ladder/Grating condition	✓			r. WHP condition (in/outside, hyd pumps are secured)	✓		
g. Crane lighting	✓			<b>6. SUB-CELLAR DECK</b>			
<b>3. MEZZANINE DECK</b>				a. Fire extinguishers	✓	N/A	
a. Fire extinguishers	✓	N/A		b. Emergency eye wash drum or bottle	✓		
b. Emergency eye wash drum or bottle	✓	N/A		c. Life jackets and Boxes	✓		
c. Life ring buoy&Light	✓	N/A		d. Life floats	✓	✓	Net damage.
d. Access ladder/Grating condition	✓			e. Life rings buoy & Light	✓		
<b>4. CONTROL ROOM</b>				f. Swing rope hanger points&Chains	✓		
a. General condition/Housekeeping	✓			g. Safety signs	✓		
b. First Aid Kit	✓			h. Gauges&Valve handle condition	✓		
c. Stretcher	✓			i. Check for gas/oil leaks	✓		
d. Fire extinguishers	✓			j. Walking&working surface	✓		
e. LOTO Equipment/Board	✓			k. Grating condition	✓		
f. Fire Blanket	✓			<b>7. BOAT LANDING</b>			
g. Telephone working	✓			a. Swing ropes	✓		
h. Catches/locked on door	✓			b. Life ring buoys&Light	✓		
i. sleep bage 2ea 034004	✓	N/A		c. Safety signs	✓	N/A	
				d. ESD stations/functional	✓		
				e. Access ladder/Grating condition	✓		

Note: \_\_\_\_\_

Production Supervisor : Kithipol T

HES Specialist : \_\_\_\_\_

Jirawatt Montreeworapatt

HSE Specialist

## MONTHLY PLATFORM INSPECTION CHECK LIST

## BENCHAMAS MFP

Date: 29 Dec 2022

ITEMS TO BE CHECKED	CONDITION			ITEMS TO BE CHECKED	CONDITION		
	Good	No	WORK REQ.		Good	No	WORK REQ.
<b>1. HELIDECK (TOP DECK)</b>				<b>5. CELLAR DECK</b>			
a. Fire extinguishers	/			a. Fire extinguishers	/		
b. Flood lights working			N/A	b. Emergency eye wash shower station	/		damage
c. Wind sock			N/A	c. Emergency eye wash drum or bottle	/		
d. Personnel basket			N/A	d. Breathing Apparatus and Escape set			N/A
e. Emergency eye wash shower station			N/A	e. Mercury Spill Kit			N/A
f. Emergency eye wash drum or bottle		/	Need to refill	f. Chemical PPE and Equipment Box			N/A
g. Life ring buoy&light	/			g. Chemical skid	/		
h. Surface clean and nonslip	/			h. X-mas tree valves/plugs/fitting	/		
i. ESD stations/functional	/			i. Gauges in good condition	/		
j. Gai-Tronic phone working			N/A	j. Valve handle condition	/		
k. Gutter drain condition/Gutter drain cap in place	/			k. Chemical injection pump skid	/		
				l. Check for gas/oil leaks	/		
<b>2. CRANE</b>				m. Access ladder/walking&working surface	/		
a. Visual check for boom/cab/ropes	/			n. Grating condition	/		
b. Windows/wipers and control locked out	/		door open hard	o. Life ring buoy&Light	/		
c. Fire extinguishers	/			p. Blow pot condition	/		
d. Load Chart/Hand Signal Chart available	/			q. Gutter drain condition/Gutter drain cap in place	/		
e. Fuel oil leakage	/			r. WHP condition (in/outside, hyd pumps are secured)	/		
f. Access ladder/Grating condition	/						
g. Crane lighting		/	Not work	<b>6. SUB-CELLAR DECK</b>			
				a. Fire extinguishers	/		
<b>3. MEZZANINE DECK</b>				b. Emergency eye wash drum or bottle	/		N/A
a. Fire extinguishers	/			c. Life jackets and Boxes	/		
b. Emergency eye wash drum or bottle	/			d. Life floats	/		
c. Life ring buoy&Light	/		N/A	e. Life rings buoy & Light	/		
d. Access ladder/Grating condition	/			f. Swing rope hanger points&Chains	/		
				g. Safety signs	/		
<b>4. CONTROL ROOM</b>				h. Gauges&Valve handle condition	/		
a. General condition/Housekeeping	/			i. Check for gas/oil leaks	/		
b. First Aid Kit	/			j. Walking&working surface	/		
c. Stretcher	/			k. Grating condition	/		
d. Fire extinguishers	/						
e. LOTO Equipment/Board	/			<b>7. BOAT LANDING</b>			
f. Fire Blanket	/			a. Swing ropes	/		
g. Telephone working	/			b. Life ring buoys&Light			N/A
h. Catches/locked on door	/			c. Safety signs	/		N/A
i. sleep bage 2ea ฝักรัด			N/A	d. ESD stations/functional	/		
				e. Access ladder/Grating condition	/		

Note:

Production Supervisor: Kittipol THES Specialist: Jirawat MontreeworapattHSE Specialist  
Chevron Thailand Exploration & Production, Ltd.



## MONTHLY PLATFORM INSPECTION CHECK LIST

## BENCHAMAS MFP

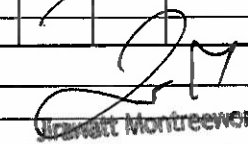
Inspected by : yut+asinDate: 9- Dec- 22

ITEMS TO BE CHECKED	CONDITION			ITEMS TO BE CHECKED	CONDITION		
	Good	No	WORK REQ.		Good	No	WORK REQ.
<b>1. HELIDECK (TOP DECK)</b>				<b>5. CELLAR DECK</b>			
a. Fire extinguishers	/			a. Fire extinguishers	/		
b. Flood lights working	N/A			b. Emergency eye wash shower station	/		
c. Wind sock	N/A			c. Emergency eye wash drum or bottle	/		
d. Personnel basket	N/A			d. Breathing Apparatus and Escape set	N/A		
e. Emergency eye wash shower station	N/A			e. Mercury Spill Kit	N/A		
f. Emergency eye wash drum or bottle	/			f. Chemical PPE and Equipment Box	N/A		
g. Life ring buoy&light	/			g. Chemical skid	/		
h. Surface clean and nonslip	/			h. X-mas tree valves/plugs/fitting	/		
i. ESD stations/functional	/			i. Gauges in good condition	/		
j. Gai-Tronic phone working	/			j. Valve handle condition	/		
k. Gutter drain condition/Gutter drain cap in place	/			k. Chemical injection pump skid	/		
				l. Check for gas/oil leaks	/		
<b>2. CRANE</b>				m. Access ladder/walking&working surface	/		
a. Visual check for boom/cab/ropes	/			n. Grating condition	/		
b. Windows/wipers and control locked out	/			o. Life ring buoy&Light	/		
c. Fire extinguishers	/			p. Blow pot condition	/		
d. Load Chart/Hand Signal Chart available	/			q. Gutter drain condition/Gutter drain cap in place	/		
e. Fuel oil leakage	/			r. WHP condition (in/outside, hyd pumps are secured)	/		
f. Access ladder/Grating condition	/						
g. Crane lighting	/			<b>6. SUB-CELLAR DECK</b>			
				a. Fire extinguishers	/		
<b>3. MEZZANINE DECK</b>				b. Emergency eye wash drum or bottle	/		
a. Fire extinguishers	/			c. Life jackets and Boxes	/		
b. Emergency eye wash drum or bottle	N/A			d. Life floats	/		
c. Life ring buoy&Light	N/A			e. Life rings buoy & Light	/		
d. Access ladder/Grating condition	/			f. Swing rope hanger points&Chains	/		
				g. Safety signs	/		
<b>4. CONTROL ROOM</b>				h. Gauges&Valve handle condition	/		
a. General condition/Housekeeping	/			i. Check for gas/oil leaks	/		
b. First Aid Kit			mark to LO	j. Walking&working surface	/		
c. Stretcher	N/A			k. Grating condition	/		
d. Fire extinguishers	/						
e. LOTO Equipment/Board	/			<b>7. BOAT LANDING</b>			
f. Fire Blanket	/			a. Swing ropes	/		
g. Telephone working	/			b. Life ring buoys&Light	/		
h. Catches/locked on door	/			c. Safety signs	/		
i. sleep bage 2ea 044004	N/A			d. ESD stations/functional	/		
				e. Access ladder/Grating condition	/		

Note:

Production Supervisor : Kittipol T

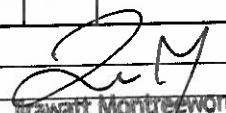
HES Specialist :

  
 Jirawat Montreeewerapatt  
 HSE Specialist  
 Chevron Thailand Exploration & Production, Ltd.

MONTHLY PLATFORM INSPECTION CHECK LIST  
BENCHAMAS MFPDate: Dec. 10, 22Inspected by: SUTTHIRAK

ITEMS TO BE CHECKED	CONDITION			ITEMS TO BE CHECKED	CONDITION		
	Good	No	WORK REQ.		Good	No	WORK REQ.
<b>1. HELIDECK (TOP DECK)</b>				<b>5. CELLAR DECK</b>			
a. Fire extinguishers	/			a. Fire extinguishers	/		
b. Flood lights working	/			b. Emergency eye wash shower station	/		
c. Wind sock	-	-	NA	c. Emergency eye wash drum or bottle	-	-	Need to replace 1 EA
d. Personnel basket	-	-	NA	d. Breathing Apparatus and Escape set	-	-	NA
e. Emergency eye wash shower station	-	-	NA	e. Mercury Spill Kit	-	-	NA
f. Emergency eye wash drum or bottle	/			f. Chemical PPE and Equipment Box	/		
g. Life ring buoy&light	/			g. Chemical skid	/		
h. Surface clean and nonslip	/			h. X-mas tree valves/plugs/fitting	/		
i. ESD stations/functional	/			i. Gauges in good condition	/		
j. Gai-Tronic phone working	/	/	No signal	j. Valve handle condition	/		
k. Gutter drain condition/Gutter drain cap in place	/			k. Chemical injection pump skid	/		
<b>2. CRANE</b>				l. Check for gas/oil leaks	/		
a. Visual check for boom/cab/ropes	/			m. Access ladder/walking&working surface	/		
b. Windows/wipers and control locked out	/			n. Grating condition	/		
c. Fire extinguishers	/			o. Life ring buoy&Light	/		
d. Load Chart/Hand Signal Chart available	/			p. Blow pot condition	/		
e. Fuel oil leakage	/			q. Gutter drain condition/Gutter drain cap in place	/		
f. Access ladder/Grating condition	/			r. WHP condition (in/outside, hyd pumps are secured)	/		
g. Crane lighting	/			<b>6. SUB-CELLAR DECK</b>			
<b>3. MEZZANINE DECK</b>				a. Fire extinguishers	-	-	NA
a. Fire extinguishers	/	-	NA	b. Emergency eye wash drum or bottle	/	-	12 EA x 2 Boxes.
b. Emergency eye wash drum or bottle	-	-	NA	c. Life jackets and Boxes	/		
c. Life ring buoy&Light	-	-	NA	d. Life floats	/	/	Not activate 2 EA
d. Access ladder/Grating condition	/			e. Life rings buoy & Light	/		
<b>4. CONTROL ROOM</b>				f. Swing rope hanger points&Chains	/		
a. General condition/Housekeeping	/			g. Safety signs	/		
b. First Aid Kit	/			h. Gauges&Valve handle condition	/		
c. Stretcher	-	-	NA	i. Check for gas/oil leaks	/		
d. Fire extinguishers	/			j. Walking&working surface	/		
e. LOTO Equipment/Board	/			k. Grating condition	/		
f. Fire Blanket	/			<b>7. BOAT LANDING</b>			
g. Telephone working	/			a. Swing ropes	/		
h. Catches/locked on door	/			b. Life ring buoys&Light	/		
i. sleep bage 2ea ๑๓๗๐๗	-	-	NA	c. Safety signs	-	-	NA
				d. ESD stations/functional	/		
				e. Access ladder/Grating condition	/		

Note:

Production Supervisor: Kittipol T
  
 Jirawatt Montreeworapatt  
 HSE Specialist

HES Specialist:

Chevron Thailand Exploration &amp; Production, Ltd.



# Inspection Report

## Work Order Details

### Inspection Type

Gen-Turbine-Mech (THA)

### Work Order #

1195466-BEMECHROV

### Description

8K SOLAR TURBINE GEN1-BLQ-ITPM

### Scheduled Date

11/26/2022

### Status

85 - Closed

### Local Code 11

C40

### Local Code 13

ITP

### Service Type

MH4400

### Work Center

BEMECHROV

### Branch Plant

3800BLQNTA

### Fields

BENCHAMAS

### Platform Tag

BENCHAMAS

### ECA Ranking

2

### PM Status

99

### PM Description

8K SOLAR TURBINE GEN1-BLQ-ITPM

### SD Category

UO

### Plan Date

10/15/2022 12:00:00 AM

## Equipment Details

### Equipment #

BELQ-ZAN-Q7801B

### Description

6M INSPECTION CO2 GEN

### Parent #

BELQ-GP

### Area

BENCHAMAS

### Equipment Class

EG - Electric Generator

## Assignment and Status

### Completed by

Kritsadakorn Chatwattana

### Completed on

10/3/2022 11:13:23 AM

### Status

Approved

### Approved by

Phoothai Patarawongsakorn

### Approved on

## Inspection Summary

Completed By :Winai B./Aphiwat S./ANIRUT R./Kritsadakorn C.

Completed date: Oct 02,2022

## Reviewer Summary

Equipment is accuracy and normal condition.

## Equipment Details

Field Name	Original Value	New Value
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## Inspection Items

### General

Item	Response	Completion
SELECT LOCATION	BENCHAMAS	LVOI@chevron.com 10/3/2022 10:50:37 AM
SELECT MAINTENANCE INTERVAL	8K	LVOI@chevron.com 10/3/2022 10:50:40 AM

## PRE-REQUISITE TASKS

Item	Response	Completion
-TOOL BOX MEETING AND HA/JSA DISCUSSION (ADDITION OR REVISE IF REQUIRE) -COORDINATE WITH PRODUCTION TO MAKE EQUIPMENT	Yes	LVOI@chevron.com 10/3/2022 10:50:45 AM

AVAILABLE FOR INSPECTION -VISUALLY  
INSPECT ALL ACCESSIBLE PARTS FOR  
LEAKS, LOOSE CONNECTIONS AND  
FITTINGS AND NON STANDARD  
CONDITIONS

#### PRE-SHUTDOWN TASK

Item	Response	Completion
REVIEW EFFICIENCY AND PERFORMANCE DATA	Yes	LVOI@chevron.com 10/3/2022 10:50:50 AM
REVIEW VIBRATION SURVEY AND RECORD TRADING FOR ENGINE AND BEARING CONDITION	Yes	LVOI@chevron.com 10/3/2022 10:50:51 AM
REVIEW BORE SCOPE RECORDS FOR ANY DISTRESS, BURNT AND CRACKS FROM PREVIOUS RECORDS	Yes	LVOI@chevron.com 10/3/2022 10:50:53 AM
BEFORE SHUTDOWN THE UNIT, A WALKAROUND INSPECTION IS RECOMMENDED TO ENSURE EQUIPMENT IS FUNCTIONING PROPERLY AND DETECT LEAKS OR OBVIOUS FAULTS	Yes	LVOI@chevron.com 10/3/2022 10:50:54 AM
TAKE READING AND RECORD ENGINE SPEED, PCD AND TEMPERATURE TO EVALUATE RESULTS AGAINST BASELINE DATA	Yes	LVOI@chevron.com 10/3/2022 10:50:56 AM
ASSIST MECH/IE TECH. TO SHUTDOWN ENGINE ON ONE OF SAFETY DEVICES	Yes	LVOI@chevron.com 10/3/2022 10:50:58 AM

#### SHUTDOWN TASK

Item	Response	Completion
LOG OUT/TAG OUT AND DEPRESSURIZE SHUT OFF GAS FUEL SUPPLY AND STARTING GAS VALVES	Yes	LVOI@chevron.com 10/3/2022 10:51:00 AM
LOCK OUT PRE/POST AND BACKUP LUBE OIL PUMPS	Yes	LVOI@chevron.com 10/3/2022 10:51:01 AM
LOCK OUT LUBE OIL COOLER AND ENCLOSURE VENT FANS	Yes	LVOI@chevron.com 10/3/2022 10:51:02 AM
LOCK OUT FIRE PROTECTION/CO2 SYSTEM	Yes	LVOI@chevron.com 10/3/2022 10:51:03 AM
VISUALLY INSPECT ALL ACCESSIBLE PARTS FOR FUEL AND OIL LEAKS, CRACK, LOOSE CONNECTIONS OF FITTINGS, EXCESSIVE VIBRATION, NOISE, AND NON STANDARD CONDITIONS	Yes	LVOI@chevron.com 10/3/2022 10:51:05 AM

#### START SYSTEMS TASK

Item	Response	Completion
INSPECT STARTER CLUTCH, IF APPLICABLE, TO ENSURE LOCK-UP IN ONE DIRECTION AND FREE ROTATION IN THE OTHER	Yes	LVOI@chevron.com 10/3/2022 10:51:08 AM
CHECK STARTER ASSEMBLY FOR UNUSUAL WEAR, LOOSENESS AND LEAKAGE	Yes	LVOI@chevron.com 10/3/2022 10:51:09 AM
VERIFY PROPER OPERATION OF VFD WHEN UNIT IS RESTARTED	Yes	LVOI@chevron.com 10/3/2022 10:51:13 AM
INSPECT LUBE OIL LEAKAGE AT STARTER MOTOR FOR LIP SEAL CONDITION	Yes	LVOI@chevron.com 10/3/2022 10:51:15 AM
RECORD VFD DATA AS VOLTAGE / CURRENT / FREQUENCY AT FULL LOAD	VOLTAGE (VOLTS): 209 CURRENT (AMPS): 100 FREQUENCY (HZ): 60	LVOI@chevron.com 10/3/2022 10:51:59 AM

#### FUEL SYSTEM TASK

Item	Response	Completion
REPLACE PILOT GAS SUPPLY FILTER AND O-RING	Yes	LVOI@chevron.com 10/3/2022 10:52:05 AM
CLEAN UP FUEL GAS INLET STRAINER	Yes	LVOI@chevron.com 10/3/2022 10:52:06 AM
REPLACE O-RING VALVE PILOT CONTROL	Yes	LVOI@chevron.com 10/3/2022 10:52:09 AM
REPLACE PRIMARY FUEL FILTER OF LIQUID BOOST PUMP	Yes	LVOI@chevron.com 10/3/2022 10:52:10 AM
REPLACE SECONDARY FUEL FILTER OF LIQUID BOOST PUMP	Yes	LVOI@chevron.com 10/3/2022 10:52:12 AM



## LUBE OIL SYSTEMS TASK

Item	Response	Completion
CHECK PRE-POST LUBE OIL PUMP/BACKUP PRE-POST LUBE OIL PUMP FOR ANY DEFECTS LEAKS, DAMAGE PIPE WORKS, LOOSE CONNECTIONS AND FITTINGS	Yes	LVOI@chevron.com 10/3/2022 10:52:17 AM
CHANGE MAIN LUBE OIL FILTER	Yes	LVOI@chevron.com 10/3/2022 10:52:19 AM
CHANGE HYDRAULIC OIL FILTER	Yes	LVOI@chevron.com 10/3/2022 10:52:20 AM
CHANGE LUBE OIL FILTER HOUSING COVER O-RING	Yes	LVOI@chevron.com 10/3/2022 10:52:21 AM
REMOVE LUBE OIL PCV (BACK PRESSUR REGULATOR) REMARK : TO INSPECT AND ADJUST TO 55 PSIG, REPLACE IF REQUIRED	Yes	LVOI@chevron.com 10/3/2022 10:52:26 AM
INSPECT LUBE OIL COOLER FAN BLADE FOR ANY DEFECTS AND CORRECT	Yes	LVOI@chevron.com 10/3/2022 10:52:28 AM
INSPECT OIL COOLER CORE, PIPE AND HOSE FOR LEAK, DAMAGE OR CORROSION	Yes	LVOI@chevron.com 10/3/2022 10:52:30 AM
CHECK LUBE OIL COOLER HOLD DOWN BOLT TIGHTNESS	Yes	LVOI@chevron.com 10/3/2022 10:52:34 AM
CHECK LUBE OIL RESERVOIR LEVEL AND TOP UP LUBE OIL SHELL TURBO T-32	Yes	LVOI@chevron.com 10/3/2022 10:52:35 AM
CHECK BACK PRESSURE OF LUBE OIL RESERVOIR TO EVALUATE BLOCKAGE OF FLAME ARRESTOR/LUBE OIL MIST ELEMENATOR FROM LOG SHEET/LOCAL CONTROL PANEL	Yes	LVOI@chevron.com 10/3/2022 10:52:38 AM

## ENCLOSURE TASK

Item	Response	Completion
REPLACE PRIMARY AIR INLET FILTERS	Yes	LVOI@chevron.com 10/3/2022 10:52:41 AM
REPLACE SECONDARY AIR INLET FILTERS	Yes	LVOI@chevron.com 10/3/2022 10:52:44 AM
INSPECT AIR INLET FILTER HOUSING FOR DAMAGE, LEAK, LOOSE OBJECT, CORROSION CLEAN UP FILTER HOUSING	Yes	LVOI@chevron.com 10/3/2022 10:52:46 AM
INSPECT WATER LEVEL OF AIR FILTER HOUSING WATER TRAP	Yes	LVOI@chevron.com 10/3/2022 10:52:47 AM
CHECK FLAME ARRESTOR BACK PRESSURE OF LUBE OIL RESERVOIR TO EVALUATE BLOCKAGE OF FLAME ARRESTOR/LUBE OIL MIST ELEMENATOR FROM LOG SHEET/LOCAL CONTROL PANEL	Yes	LVOI@chevron.com 10/3/2022 10:52:49 AM
VISALLY INSPECT AIR TRANSITION DUCT FOR CRACKS OR DISTORTION	Yes	LVOI@chevron.com 10/3/2022 10:52:50 AM

## AIR SYSTEM

Item	Response	Completion
CHECK INLET GUIDE VANE FOR PROPER POSITION ON FULLY OPEN & CLOSE	Yes	LVOI@chevron.com 10/3/2022 10:52:53 AM
CHECK ACTUATOR CYLINDER LINKAGE	Yes	LVOI@chevron.com 10/3/2022 10:52:55 AM
INSPECT ENGINE COMP. VARIABLE VANE MECHANISM FOR WEAR BUSHING, BENT ARM, LOOSE LINKAGE, ENSURE STOP SETTING IS CORRECTED	Yes	LVOI@chevron.com 10/3/2022 10:52:56 AM
INSPECT BLEED VALVE FOR SRING CONDITION, GASKET	Yes	LVOI@chevron.com 10/3/2022 10:52:58 AM
CHECK FOR LOOSE OR DAMAGE SIGNAL WIRE TO ACTUATOR IF APPLICABLE	Yes	LVOI@chevron.com 10/3/2022 10:52:59 AM
INSPECT BLEED VALVE AND RECORD FUNCTION TEST OPEN/CLOSE	OPEN: 0 PSIG CLOSE: 25 PSIG	LVOI@chevron.com 10/3/2022 10:53:45 AM
RECORD BLEED VALVE TRAVELLING TIME OPEN/CLOSE	OPEN: 0 Sec. CLOSE: 10 Sec.	LVOI@chevron.com 10/3/2022 10:54:20 AM

## TURBINE ENGINE TASK

Item	Response	Completion
DISASSEMBLE, CLEAN AND INSPECT DRAIN VALVE, CHECK CONDITION AND FUNCTION TEST	Yes	LVOI@chevron.com 10/3/2022 10:54:30 AM

PERFORM BORESCOPE INSPECTIONS FOR INTERNAL PART OF HOT SECTIONS AND TURBINE COMPRESSOR	Yes	LVOI@chevron.com 10/3/2022 10:54:31 AM
VISALLY INSPECT EXHAUST COLLECTOR/EXHAUST EXPANSION JOINT FOR CRACKS OR DISTORTION	Yes	LVOI@chevron.com 10/3/2022 10:54:33 AM
REPLACE SPARK PLUG AND ADJUSTING GAP SPARK PLUG AS SPECIFICATION	Yes	LVOI@chevron.com 10/3/2022 10:54:34 AM

#### GAS FUEL MANIFOLD TASK

Item	Response	Completion
REMOVE FUEL INJECTORS AND TORCH IGNITER. INSPECT FOR CARBON BUILDUP, DISTORTION, BURNING, CRACK AND WEAR, CLEAN AND REPLACE WITH NEW O-RINGS AND GASKETS. NOTE: MARK THE LOCATION OF EACH FUEL INJECTOR BEFORE REMOVAL. INSTALL FUEL INJECTOR DAMMY TO SUPPORT COMBUSTORS PERFORM BORE SCOPE BEFORE RE-INSTALL FUEL INJECTORS.	Yes	LVOI@chevron.com 10/3/2022 10:54:36 AM

#### GEAR UNIT TASK

Item	Response	Completion
CHECK GEARBOX HOUSING FOR ANY OIL LEAKAGE, REPAIR IF NECESSARY	Yes	LVOI@chevron.com 10/3/2022 10:54:39 AM
OPEN GEARBOX COVER AND VISUAL INSPECT GEAR TEETH CONDITON	Yes	LVOI@chevron.com 10/3/2022 10:54:39 AM
CHECK HOLD DOWN BOLTS FOR LOOSEN AND TIGHTNESS	Yes	LVOI@chevron.com 10/3/2022 10:54:40 AM

#### DRIVEN EQUIPMENT TASK

Item	Response	Completion
CHECK AND INSPECT DRIVEN COUPLING TO GENERATOR, CHECK FOR TIGHTNESS OF BOLTS AND NUTS RE-TORQUE AS SPECIFICATION	12000 LB-inch	LVOI@chevron.com 10/3/2022 10:55:30 AM
CHECK HOLD DOWN BOLTS OF GENERATOR TIGHTNESS AND TORQUE AS SPECIFICATION	5520 LB-inch	LVOI@chevron.com 10/3/2022 10:55:59 AM

#### ENGINE CRANK SOAK WASH TASK

Item	Response	Completion
AFTER ENGINE SHUTDOWN FOR AT LEAST 30 MINUTES TO ALLOW ENGINE TO COOLDOWN, PERFORM ENGINE WASH USING APPROVE FLUID	Yes	LVOI@chevron.com 10/3/2022 10:56:04 AM
REMOVE DRAIN LINES OF ENGINE PRIOR ENGINE WASH	Yes	LVOI@chevron.com 10/3/2022 10:56:05 AM
ALLOW SOAKING SETTLE FOR 15 MINUTES AND THEN CRANK ENGINE ENSURE THAT FLUID WASTE FROM ENGINE DRAINS IS CLEAN, IF NOT REPEAT ENGINE WASH AGAIN UNIT FLUID IS CLEAN	Yes	LVOI@chevron.com 10/3/2022 10:56:06 AM
APPROXIMATELY 15 TO 30 MINUTES AFTER COMPLETION OF CRANK WASH A WATER RINSE IS RECOMMENDED	Yes	LVOI@chevron.com 10/3/2022 10:56:07 AM
SPIN DRY FOR ONE TIME AFTER WASHING	Yes	LVOI@chevron.com 10/3/2022 10:56:08 AM
RE-INSTALL DRAIN LINE OF ENGINE AFTER WASHED. NOTE: TO ACCURATELY MEASURE THE PERFORMANCE OF THE COMPRESSOR CLEANING SYSTEM AND DETERMINE NECESSARY CHANGES TO CLEANING FREQUENCY AND DOSAGE, THE ENGINE OPERATING PARAMETERS SHOULD BE RECORDED PRIOR TO AND FOLLOWING EACH CLEANING.	Yes	LVOI@chevron.com 10/3/2022 10:56:09 AM

#### FINAL CHECK

Item	Response	Completion
COORDINATE WITH OPERATIONS/OTHER CRAFTS TO START ENGINE	Yes	LVOI@chevron.com 10/3/2022 10:56:14 AM
VISUALLY INSPECT ALL ACCESSIBLE PARTS FOR GAS FUEL AND LUBE OIL LEAKS, EXCESSIVE VIBRATION AND NOISE, LOOSE CONNECTIONS AND FITTINGS	Yes	LVOI@chevron.com 10/3/2022 10:56:15 AM
TAKE READINGS AND RECORD ENGINE	20047 HRS.	LVOI@chevron.com

PARAMETER: ENGINE HOURS		10/3/2022 11:03:55 AM
TAKE READINGS AND RECORD ENGINE PARAMETER: PCD	109 PSIG	LVOI@chevron.com 10/3/2022 11:04:07 AM
TAKE READINGS AND RECORD ENGINE PARAMETER: NGP (%)	100 %	LVOI@chevron.com 10/3/2022 10:56:22 AM
TAKE READINGS AND RECORD ENGINE PARAMETER: NPT (%)	0 %	LVOI@chevron.com 10/3/2022 10:56:24 AM
TAKE READINGS AND RECORD ENGINE PARAMETER: T1 AIR INLET TEMPERATURE	83 F	LVOI@chevron.com 10/3/2022 11:04:15 AM
TAKE READINGS AND RECORD ENGINE PARAMETER: T5 AVG TEMPERATURE	918 F	LVOI@chevron.com 10/3/2022 11:04:23 AM
TAKE READINGS AND RECORD LUBE OIL SYSTEM PARAMETER: LUBE OIL PRESSURE	61 PSIG	LVOI@chevron.com 10/3/2022 11:04:28 AM
TAKE READINGS AND RECORD LUBE OIL SYSTEM PARAMETER: LUBE OIL HEADER TEMPERATURE	141 F	LVOI@chevron.com 10/3/2022 11:04:36 AM
TAKE READINGS AND RECORD LUBE OIL SYSTEM PARAMETER: LUBE OIL TANK TEMPERATURE	138 F	LVOI@chevron.com 10/3/2022 11:04:45 AM
TAKE READINGS AND RECORD LUBE OIL SYSTEM PARAMETER: LUBE OIL COOLER INLET TEMPERATURE	141 F	LVOI@chevron.com 10/3/2022 11:05:45 AM
TAKE READINGS AND RECORD LUBE OIL SYSTEM PARAMETER: LUBE OIL COOLER EXIT TEMPERATURE	125 F	LVOI@chevron.com 10/3/2022 11:05:51 AM
TAKE READINGS AND RECORD VIBRATION DATA: GP (IN/S)	0.151 Inch/Sec	LVOI@chevron.com 10/3/2022 11:06:05 AM
TAKE READINGS AND RECORD VIBRATION DATA: GEARBOX FWD (M/S2)	0.9 m/Sec2	LVOI@chevron.com 10/3/2022 11:06:15 AM
CONDUCT LIQUID FUEL TRANSFER MODE DURING OPERATION. OBSERVE SPEED, TEMPERATURE, AND LOAD READINGS FOR EXCESSIVE TRANSIENTS	Yes	LVOI@chevron.com 10/3/2022 11:06:19 AM
TAKE READINGS AND RECORD VIBRATION DATA: GEARBOX AFT (M/S2).	0 m/Sec2	LVOI@chevron.com 10/3/2022 11:06:30 AM
TAKE READINGS AND RECORD ENGINE PARAMETER: AIR INLET DP	3 PSIG	LVOI@chevron.com 10/3/2022 11:06:50 AM

## JOB COMPLETION

Item	Response	Completion
-RECHECK ALL ACCESSIBLE SYSTEM FOR DAMAGE, FAULTS, LEAKS, LOOSE OR BROKEN CONNECTION -RETURN UNIT TO NORMAL OPERATION -ENSURE THE EQUIPMENT IS LEFT IN A SAFE CONDITION AND THE AREA LEFT TIDY - SIGN OFF THE WORK PERMIT AND RETURN IT TO THE AREA AUTHORITY	Yes	LVOI@chevron.com 10/3/2022 11:06:53 AM

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# Inspection Report

## Work Order Details

### Inspection Type

Gas Generator Centaur - 40 IE

### Work Order #

1195466-BEIEROV

### Description

8K SOLAR TURBINE GEN1-BLQ-ITPM

### Scheduled Date

11/26/2022

### Status

85 - Closed

### Local Code 11

C40

### Local Code 13

ITP

### Service Type

MH4400

### Work Center

BEIEROV

### Branch Plant

3800BLQNTA

### Fields

BENCHAMAS

### Platform Tag

BENCHAMAS

### ECA Ranking

2

### PM Status

99

### PM Description

8K SOLAR TURBINE GEN1-BLQ-ITPM

### SD Category

UO

### Plan Date

10/15/2022 12:00:00 AM

## Equipment Details

### Equipment #

BELQ-ZAN-Q7801B

### Description

6M INSPECTION CO2 GEN

### Parent #

BELQ-GP

### Area

BENCHAMAS

### Equipment Class

EG - Electric Generator

## Assignment and Status

### Completed by

Wanchai Maneetham

### Completed on

10/2/2022 4:04:59 PM

### Status

Approved

### Approved by

Phoothai Patarawongsakorn

### Approved on

## Inspection Summary

Complete By : Wanchai M. / Nakorn S. / Kongsak W. / Siriwat P.

Date : 2 Oct 2022

## Reviewer Summary

Equipment is accuracy and normal condition.

## Equipment Details

Field Name	Original Value	New Value
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## Inspection Items

### General

Item	Response	Completion
INTERVAL	8K	WMGN@chevron.com 10/2/2022 9:38:53 AM

### PRE-REQUISITE TASKS

Item	Response	Completion
OBTAIN WORK PERMIT, REVIEW HA/JSA ANS CARRY OUT TOOLBOX MEETING.	Yes	WMGN@chevron.com 10/2/2022 10:52:53 AM
REVIEW/ SING UP START WORK CHECK PRIOR PERFORMING TASKS.	Yes	WMGN@chevron.com 10/2/2022 10:52:54 AM
COORDINATE WITH PRODUCTION &	Yes	WMGN@chevron.com



**SHUTDOWN TASK - VISUAL INSPECTION**

Item	Response	Completion
CHECK CONNECTIONS CONDITION AND RE-TIGHTEN AS NECESSARY ON MARCHALING PANEL WHICH ARE INTERFACE WITH PACKAGE TO PROCESS CONTROL	Yes	WMGN@chevron.com 10/2/2022 10:53:10 AM
VISUALLY INSPECT ALL ACCESSIBLE ELECTRICAL SYSTEMS FOR ANY LOOSE OR BROKEN CONNECTIONS, DEFECTIVE CIRCUITRY AND NON STANDARD CONDITIONS	Yes	WMGN@chevron.com 10/2/2022 10:53:16 AM

**SHUTDOWN TASK - CHECK AND CALIBRATE PRESSURE SWITCHES**

Item	Response	Completion
PS3150 SWITCH, MAIN LUBE OIL PUMP #1 PERMISSIVE/TEST SET 6/4 PSI INC/DEC	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:53:21 AM
PS3170 SWITCH, BACKUP LUBE PUMP LOW PRESSURE TEST SET 8/6 PSI INC/DEC	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:53:25 AM
PS3200 SWITCH, BACKUP LUBE PUMP ACTIVATION SET 6/4 PSI INC/DEC	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:53:38 AM
PS3420 SWITCH, GENERATOR BEARING OIL PRESSURE LOW SHUTDOWN SET 6/4 PSI INC/DEC	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:53:32 AM
PS2106 SWITCH, LOW GAS FUEL PRESSURE ALARM (TRANSFER TO LIQUID) SET 175/150 PSI INC/DEC	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:53:56 AM
PS2121 SWITCH, GAS FUEL VENT BACK-PRESSURE HIGH ALARM SET 8/6 PSI INC/DEC	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:54:00 AM
PS2220 SWITCH, LIQUID FUEL PUMP OUTLET PRESSURE HIGH SHUTDOWN SET 960/840 PSI INC/DEC	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:53:45 AM
PDS1500 SWITCH, FLAMEOUT PROTECTION DELTA-P HIGH SHUTDOWN SET 2 PSID	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:53:50 AM

**SHUTDOWN TASK - CHECK AND CALIBRATE LEVEL SWITCH**

Item	Response	Completion
LS3101 SWITCH, LUBE OIL TANK LOW LEVEL SHUTDOWN SET 8.25 INCH FROM TOP TANK	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 10:54:36 AM

**SHUTDOWN TASK - CHECK AND CALIBRATE PRESSURE TRANSMITTER**

Item	Response	Completion
PDT3100 Lube Oil Tank Vent Range 0 -15 inH2O	ZERO: 0 INH2O SPAN: 15 INH2O	WMGN@chevron.com 10/2/2022 10:55:03 AM
PDT3240 LUBE OIL FILTER DELTA-P Range 0 - 100 PSID	ZERO: 0 PSID SPAN: 100 PSID	WMGN@chevron.com 10/2/2022 10:55:19 AM
PT3200 LUBE OIL HEADER PRESSURE Range 0 - 150 PSI	ZERO: 0 PSI SPAN: 150 PSI	WMGN@chevron.com 10/2/2022 10:57:00 AM
PT2113 MONITOR GAS FUEL PRESSURE Range 0 – 600 PSI	ZERO: 0 PSI SPAN: 600 PSI	WMGN@chevron.com 10/2/2022 10:57:35 AM
PDT2113 GAS FUEL SUPPLY FLOW Range 0 – 100 inH2O	ZERO: 0 INH2O SPAN: 100 INH2O	WMGN@chevron.com 10/2/2022 10:58:00 AM
PT2120 GAS FUEL PRESSURE Range 0 – 700 PSI	ZERO: 0 PSI SPAN: 700 PSI	WMGN@chevron.com 10/2/2022 10:58:14 AM
PT2121 GAS FUEL VALVE PRESSURE CHECK Range 0 – 700 PSI	ZERO: 0 PSI SPAN: 700 PSI	WMGN@chevron.com 10/2/2022 10:58:35 AM
PDT2131 GAS FUEL CONTROL DELTA-P Range 0 – 100 PSID	ZERO: 0 PSID SPAN: 100 PSID	WMGN@chevron.com 10/2/2022 10:58:55 AM
PT2640 GAS FUEL PURGE PRESSURE Range 0 – 700 PSI	ZERO: 0 PSI SPAN: 700 PSI	WMGN@chevron.com 10/2/2022 10:59:39 AM
PDT2201 LIQUID FUEL FILTER DIFFERENTIAL PRESSURE Range 0 – 100 PSID	ZERO: 0 PSID SPAN: 100 PSID	WMGN@chevron.com 10/2/2022 11:00:01 AM
PT2220 LIQUID FUEL PRESSURE Range : 0 – 150 PSI	ZERO: 0 PSI SPAN: 150 PSI	WMGN@chevron.com 10/2/2022 11:00:27 AM
PT2225 PUMP CHECK FUEL TRANSFER Range : 0 – 1500 PSI	ZERO: 0 PSI SPAN: 1500 PSI	WMGN@chevron.com 10/2/2022 11:00:44 AM
PT6400 MONITOR AIR SUPPLY	ZERO: 0 PSI SPAN: 700 PSI	WMGN@chevron.com 10/2/2022 11:04:50 AM

PDT1110 TURBINE AIR INLET DELTA-P Range 0 – 15 INH2O	ZERO: 0 INH2O SPAN: 15 INH2O	WMGN@chevron.com 10/2/2022 11:06:17 AM
PT1120 MONITOR PCD Range 0 – 700 PSI	ZERO: 0 PSI SPAN: 700 PSI	WMGN@chevron.com 10/2/2022 11:06:33 AM
PT1121 MONITOR PCD Range : 0 – 700 PSI	ZERO: 0 PSI SPAN: 700 PSI	WMGN@chevron.com 10/2/2022 11:06:56 AM
PDT6310 AIR INLET FILTER DELTA-P Range 0 – 10 INH2O	ZERO: 0 INH2O SPAN: 10 INH2O	WMGN@chevron.com 10/2/2022 11:08:14 AM
PDT6180 ENCLOSURE (DRIVER) PRESSURE DELTA-P Range : 0 – 3 INH2O	ZERO: 0 INH2O SPAN: 3 INH2O	WMGN@chevron.com 10/2/2022 11:09:30 AM

#### SHUTDOWN TASK - CHECK AND CALIBRATE FLOW CONTROL

Item	Response	Completion
FT2220 LIQUID FUEL FLOW TRANSMITTER	ZERO: 0 INH2O SPAN: 100 INH2O	WMGN@chevron.com 10/2/2022 2:19:43 PM
<b>Comments/Recommendations:</b> unit of FT-2220 psi		
FCE2130 ACTUATOR, GAS FUEL CONTROL VALVE	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 11:11:06 AM
FCE2225 ACTUATOR, LIQUID FUEL CONTROL VALVE	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 11:22:48 AM

#### SHUTDOWN TASK - CHECK AND INSPECT RTD SENSOR

Item	Response	Completion
TE3100 RTD, LUBE OIL TANK TEMPERATURE	94 Deg.F	WMGN@chevron.com 10/2/2022 11:15:22 AM
TE3200 RTD, LUBE OIL HEADER TEMPERATURE	94 Deg.F	WMGN@chevron.com 10/2/2022 11:23:16 AM
TE2113 RTD, GAS FUEL SUPPLY TEMPERATURE	84 Deg.F	WMGN@chevron.com 10/2/2022 11:23:41 AM
TE1110 RTD, TURBINE AIR INLET TEMPERATURE	84 Deg.F	WMGN@chevron.com 10/2/2022 11:23:32 AM
TE6110 RTD, ENCLOSURE TEMPERATURE	84 Deg.F	WMGN@chevron.com 10/2/2022 11:23:48 AM
TE4230 RTD, GENERATOR BEARING DRIVEN END	94 Deg.F	WMGN@chevron.com 10/2/2022 11:24:00 AM
TE4240 RTD, GENERATOR BEARING EXCITER END	94 Deg.F	WMGN@chevron.com 10/2/2022 11:24:07 AM
TE4210 RTD, GENERATOR WINDING PHASE A	93 Deg.F	WMGN@chevron.com 10/2/2022 11:26:08 AM
TE4213 RTD, GENERATOR WINDING PHASE B	96 Deg.F	WMGN@chevron.com 10/2/2022 11:26:17 AM
TE4216 RTD, GENERATOR WINDING PHASE C	95 Deg.F	WMGN@chevron.com 10/2/2022 11:26:26 AM

#### SHUTDOWN TASK - CHECK AND INSPECT TC SENSOR

Item	Response	Completion
TE1150 THERMOCOUPLE, T5 TEMPERATURE INPUT	91 DegF	WMGN@chevron.com 10/2/2022 11:26:33 AM
TE1151 THERMOCOUPLE, T5 TEMPERATURE INPUT	91 DegF	WMGN@chevron.com 10/2/2022 11:26:38 AM
TE1152 THERMOCOUPLE, T5 TEMPERATURE INPUT	89 DegF	WMGN@chevron.com 10/2/2022 11:27:08 AM
TE1153 THERMOCOUPLE, T5 TEMPERATURE INPUT	90 DegF	WMGN@chevron.com 10/2/2022 11:27:54 AM
TE1154 THERMOCOUPLE, T5 TEMPERATURE INPUT	91 DegF	WMGN@chevron.com 10/2/2022 11:28:07 AM
TE1155 THERMOCOUPLE, T5 TEMPERATURE INPUT	91 DegF	WMGN@chevron.com 10/2/2022 11:28:58 AM

#### SHUTDOWN TASK - CHECK AND CALIBRATE VIBRATION SYSTEM

Item	Response	Completion
VE4230 DISPLACEMENT PROBE, GENERATOR BEARING DRIVEN END (X- AXIS)	-8.5 VOLT	WMGN@chevron.com 10/2/2022 11:29:54 AM
VE4231 DISPLACEMENT PROBE, GENERATOR BEARING DRIVEN END (Y- AXIS)	-9 VOLT	WMGN@chevron.com 10/2/2022 11:30:20 AM
VE4240 DISPLACEMENT PROBE, GENERATOR BEARING EXCITER END (X- AXIS)	-8.7 VOLT	WMGN@chevron.com 10/2/2022 11:30:31 AM
VE4241 DISPLACEMENT PROBE, GENERATOR BEARING EXCITER END (Y- AXIS)	-7.2 VOLT	WMGN@chevron.com 10/2/2022 11:30:38 AM

AXIS)		
VE4765 ACCELEROMETER PROBE, GEARBOX	-7.7 VOLT	WMGN@chevron.com 10/2/2022 11:35:23 AM

#### SHUTDOWN TASK - CHECK AND INSPECTION SOLENOID VALVE

Item	Response	Completion
SV2120 PILOT, PRIMARY FUEL SHUT-OFF VALVE	101 Ohm	WMGN@chevron.com 10/2/2022 11:30:59 AM
SV2121 GAS VENT SHUT-OFF VALVE	102 Ohm	WMGN@chevron.com 10/2/2022 11:31:26 AM
SV2124 PILOT, SECONDARY FUEL SHUT-OFF VALVE	177 Ohm	WMGN@chevron.com 10/2/2022 11:32:02 AM
SV2641 GAS MANIFOLD PURGE VALVE #1	80 Ohm	WMGN@chevron.com 10/2/2022 11:35:34 AM
SV2642 GAS MANIFOLD PURGE VALVE #2	80 Ohm	WMGN@chevron.com 10/2/2022 11:35:45 AM
SV2224 SOLENOID, LIQUID FUEL BYPASS VALVE	101 Ohm	WMGN@chevron.com 10/2/2022 11:33:00 AM
SV2260 SOLENOID, LIQUID FUEL PURGE VALVE	100 Ohm	WMGN@chevron.com 10/2/2022 11:33:25 AM
SV2222 SOLENOID, SECONDARY LIQUID FUEL SHUTOFF	179	WMGN@chevron.com 10/2/2022 11:36:06 AM
SV2250 LIQUID FUEL TORCH SHUT-OFF	102 Ohm	WMGN@chevron.com 10/2/2022 11:36:21 AM
SV2220 PILOT, LIQUID FUEL SHUT-OFF	102 Ohm	WMGN@chevron.com 10/2/2022 11:36:40 AM
SV6430 AIR ASSIST SHUT-OFF	103 Ohm	WMGN@chevron.com 10/2/2022 11:36:47 AM
SV1720 ON-CRANK CLEANING SHUT-OFF	56 Ohm	WMGN@chevron.com 10/2/2022 11:32:16 AM
SV1710 PILOT, ON-LINE CLEANING SHUT-OFF VALVE	64 Ohm	WMGN@chevron.com 10/2/2022 11:32:25 AM

#### SHUTDOWN TASK - CHECK AND FUNCTION TEST SPEED SENSOR

Item	Response	Completion
CHECK AND RECORD IMPEDANCE / VOLTAGE OF SPEED MAGNETIC PICKUP	IMPEDANCE(OHM): 608 VOLTAGE(VOLT): 0.3	WMGN@chevron.com 10/2/2022 11:51:27 AM
SIMULATE FREQUENCY @ 10% SPEED SENSOR (996.7 Hz)	10 RPM	WMGN@chevron.com 10/2/2022 11:42:46 AM
SIMULATE FREQUENCY @ 105% SPEED SENSOR (10465 Hz)	105 RPM	WMGN@chevron.com 10/2/2022 11:42:38 AM
SIMULATE FREQUENCY @ 108% SPEED SENSOR (10765 Hz)	108 RPM	WMGN@chevron.com 10/2/2022 11:42:33 AM
SIMULATE FREQUENCY @ 15% BACK-UP OVERSPEED SENSOR (1308 Hz)	15 RPM	WMGN@chevron.com 10/2/2022 11:38:37 AM
SIMULATE FREQUENCY @ 110% BACK-UP OVERSPEED SENSOR (9561 Hz)	110 RPM	WMGN@chevron.com 10/2/2022 11:42:25 AM

#### SHUTDOWN TASK - CHECK AND CALIBRATE HEAT DETECTION SYSTEM

Item	Response	Completion
TS6540 SWITCH, FIRE SYSTEM THERMAL DETECTOR (Turbine) SET 325 Deg.F	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 11:43:17 AM
TS6541 SWITCH, FIRE SYSTEM THERMAL DETECTOR (Turbine) SET 325 Deg.F	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 11:43:23 AM
TS6542 SWITCH, FIRE SYSTEM THERMAL DETECTOR (DRIVE AFT) SET 325 Deg.F	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 11:43:58 AM

#### SHUTDOWN TASK - CHECK AND CALIBRATE FLAME DETECTION SYSTEM

Item	Response	Completion
CLEAN UV/IR FLAME DETECTOR SENSOR LENS	Yes	WMGN@chevron.com 10/2/2022 11:46:12 AM
DTF6510 DETECTOR, FIRE SYSTEM (LUBE OIL MODULE)	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 11:46:06 AM
DTF6511 DETECTOR, FIRE SYSTEM (FUEL RING RIGHT HAND SIDE)	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 11:50:17 AM
DTF6512 DETECTOR, FIRE SYSTEM (FUEL RING LEFT HAND SIDE)	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 11:50:06 AM

#### SHUTDOWN TASK - CHECK AND CALIBRATE GAS DETECTION SYSTEM

Item	Response	Completion
DTG6561 SENSOR, GAS DETECTION	Pass/Fail: Pass	WMGN@chevron.com

(ENCLOSURE AIR INLET)(H 10, HH 25 %LEL)	Failure Code:	10/2/2022 2:19:52 PM
DTG6571 SENSOR, GAS DETECTION (FUEL GAS AREA #1)(H 10, HH 25 %LEL)	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 2:19:54 PM
DTG6572 SENSOR, GAS DETECTION (FUEL GAS AREA #2)(H 10, HH 25 %LEL)	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 2:19:58 PM
DTG6581 SENSOR, GAS DETECTION (ENCLOSURE EXHAUST)(H 10, HH 25 %LEL)	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 2:20:00 PM
DTG6567 SENSOR, GAS DETECTION, (TURBINE AIR INLET)(H 10, HH 25 %LEL)	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 2:20:03 PM

## SHUTDOWN TASK - FIRE SUPPRESSION CO2 SYSTEM

Item	Response	Completion
PS6610 CO2 COMMON RELEASE CONFIRM SWITCH	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 2:20:10 PM
SV6611 CO2 CYLINDER SOLENOID VALVE	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 2:20:25 PM
SV6612 EXTENDED CO2 CYLINDER SOLENOID VALVE	Pass/Fail: Pass Failure Code:	WMGN@chevron.com 10/2/2022 2:20:27 PM
REMOVE TO RECHARGE WHEN FIND CO2 CYL. GROSS WEIGHT LOSTS MORE THAN 10% OF STAMPED AND RECORDS (LBS.) AND REPLACE CYL WHICH SERVICES OVER 12 YRS TO MAINTENANCE AND HYDRO TEST.	Yes	WMGN@chevron.com 10/2/2022 2:20:31 PM
MAIN CYLINDER#1 WEIGHT	138 LBS	WMGN@chevron.com 10/2/2022 2:21:35 PM
MAIN CYLINDER#2 WEIGHT	140 LBS	WMGN@chevron.com 10/2/2022 2:21:43 PM
MAIN CYLINDER#3 WEIGHT	188 LBS	WMGN@chevron.com 10/2/2022 2:21:47 PM
MAIN CYLINDER#4 WEIGHT	186 LBS	WMGN@chevron.com 10/2/2022 2:21:54 PM

## SHUTDOWN TASK - ELECTRICAL SYSTEM

Item	Response	Completion
CHECK BATTERY CHARGER FOR PROPER OPERATION.	Yes	WMGN@chevron.com 10/2/2022 9:50:17 AM
FLOAT CHARGE MODE	VOLTAGE(V): 28.9 CURRENT(A): 3.3	WMGN@chevron.com 10/2/2022 2:22:46 PM
HIGH RATE CHARGE CURRENT	VOLTAGE(V): 31 CURRENT(A): 4.5	WMGN@chevron.com 10/2/2022 2:22:58 PM
CHECK BATTERY BANK VOLTAGE	29 V	WMGN@chevron.com 10/2/2022 2:23:05 PM
MEASURE STARTER MOTOR INSULATION RESISTANCE (VFD)	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:23:28 PM
MEASURE LUBE OIL COOLER MOTOR #1 INSULATION RESISTANCE	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:23:51 PM
MEASURE LUBE OIL COOLER MOTOR #2 INSULATION RESISTANCE	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:24:03 PM
MEASURE LUBE OIL COOLER MOTOR #3 INSULATION RESISTANCE	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:24:12 PM
MEASURE ENCLOSURE VENT FAN MOTOR#1 INSULATION RESISTANCE	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:24:36 PM
MEASURE ENCLOSURE VENT FAN MOTOR#2 INSULATION RESISTANCE	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:24:56 PM
MEASURE PRE/POST LUBE OIL PUMP MOTOR (AC) INSULATION RESISTANCE	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:25:24 PM
MEASURE PRE/POST LUBE OIL PUMP MOTOR (DC) INSULATION RESISTANCE	55 M-ohm	WMGN@chevron.com 10/2/2022 2:25:38 PM
MEASURE LIQUID FUEL BOOSTER PUMP MOTOR INSULATION RESISTANCE	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:26:04 PM
MEASURE LIQUID FUEL MAIN PUMP MOTOR INSULATION RESISTANCE	T1: 550 M-ohm T2: 550 M-ohm T3: 550 M-ohm	WMGN@chevron.com 10/2/2022 2:26:19 PM
MEASURE GENERATOR INSULATION RESISTANCE	T1: 52 M-ohm T2: 52 M-ohm T3: 52 M-ohm	WMGN@chevron.com 10/2/2022 2:27:59 PM



MEASURE GENERATOR POLARIZATION INDEX TEST	T1: 52 M-ohm T2: 52 M-ohm T3: 52 M-ohm	WMGN@chevron.com 10/2/2022 2:28:16 PM
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## START AND TEST RUN UNIT

Item	Response	Completion
MEASURE STARTER MOTOR RUNNING CURRENT (VFD)	A1: 128 A A2: 128 A A3: 128 A	WMGN@chevron.com 10/2/2022 4:00:17 PM
MEASURE LUBE OIL COOLER MOTOR #1 RUNNING CURRENT	A1: 5 A A2: 5 A A3: 5 A	WMGN@chevron.com 10/2/2022 4:00:43 PM
MEASURE LUBE OIL COOLER MOTOR #2 RUNNING CURRENT	A1: 4.9 A A2: 4.9 A A3: 4.9 A	WMGN@chevron.com 10/2/2022 4:00:59 PM
MEASURE LUBE OIL COOLER MOTOR #3 RUNNING CURRENT	A1: 4.3 A A2: 4.3 A A3: 4.3 A	WMGN@chevron.com 10/2/2022 4:03:02 PM
MEASURE ENCLOSURE VENT FAN MOTOR#1 RUNNING CURRENT	A1: 21.8 A A2: 22 A A3: 21.8 A	WMGN@chevron.com 10/2/2022 4:02:02 PM
MEASURE ENCLOSURE VENT FAN MOTOR#2 RUNNING CURRENT	A1: 21 A A2: 21.2 A A3: 21 A	WMGN@chevron.com 10/2/2022 4:02:20 PM
MEASURE PRE/POST LUBE OIL PUMP MOTOR (AC) RUNNING CURRENT	A1: 2.1 A A2: 2.1 A A3: 2 A	WMGN@chevron.com 10/2/2022 4:02:37 PM
MEASURE PRE/POST LUBE OIL PUMP MOTOR (DC) RUNNING CURRENT	43 A	WMGN@chevron.com 10/2/2022 2:30:43 PM
MEASURE LIQUID FUEL BOOSTER PUMP MOTOR RUNNING CURRENT	A1: 1.2 A A2: 1.2 A A3: 1.2 A	WMGN@chevron.com 10/2/2022 2:32:10 PM
MEASURE LIQUID FUEL MAIN PUMP MOTOR RUNNING CURRENT	A1: 4.9 A A2: 4.8 A A3: 4.8 A	WMGN@chevron.com 10/2/2022 2:33:59 PM

## FINAL CHECK

Item	Response	Completion
RECHECK ALL ACCESSIBLE INSTRUMENT SYSTEMS FOR SIGN OF BURNT OR LOOSE CONNECTION	Yes	WMGN@chevron.com 10/2/2022 2:29:29 PM
RE-INSTALL DISCHARGE SOLENOIDS ONTO CO2 CYLINDER HEADS, REMOVE FORCE AND SIGN OFF ISOLATION LOG AND RETURN TO NORMAL OPERATION	Yes	WMGN@chevron.com 10/2/2022 2:29:30 PM
SIGN OFF WORK PERMIT AND CLOSE PM WORK ORDER	Yes	WMGN@chevron.com 10/2/2022 2:29:30 PM

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## Maintenance activities Daily Report

Work Order Number: 1144456... Equipment Number: SRWA - CR8000

Work Center: Crane mech

Actual Crew: 3 Actual Hour from PM Job card: 27 Actual Hour from CM:

Actual Start Date / Time: 31/3/22 / 08:00 Actual Finish Date / Time: 31/3/22 / 15:30

1/4/22 / 10:00

1/4/22 / 16:00

2/4/22 / 09:30

2/4/22 / 15:30

5/4/22 / 09:00

5/4/22 / 15:30

## Parts

☒ JDE inventory ☐ Surplus ☐ No part issued

## Category Code

	PM (Preventive Maintenance)					CM (Corrective Maintenance)				
Work order classification	PMC	PMS				FND	FSD	PRC	PRO	REP
Primary Discipline	I	E	M	O	Q	I	E	M	O	Q
Secondary discipline (Local Code 3)						W	T			
Local Code 4	IIT	EEL	MME	OOP	AIM	IIT	EEL	MTT	MME	PRS
	MMC					CSS	OOP	AGM	AIM	
Work Identification						BIW	NBI			
						ORD	PMI	HAZ	RCA	RTF

## Related Links: \*\* CM Only \*\*

Component Code: ☐ Filter ☐ Hose/Tubing ☐ Regulator ☐ Fitting ☐ Isolator/Insulator  
☐ Bearing ☐ Gasket/Seal ☐ Belt ☐ Coupling ☐ Cooler/Exchanger  
☐ Gauge ☐ Oil/Lubricant ☐ Actuator ☐ Mech. Seal ☐ Bolt/Fastener  
☐ Pump ☐ Radiator ☐ Valve ☐ Other: \_\_\_\_\_

Failure Action: ☐ Charged ☐ Cleaned ☐ Flushed ☐ Installed ☐ Lubricated  
☐ Adjusted ☐ Replaced ☐ Removed ☐ Repaired ☐ Overhauled  
☐ Removed ☐ Refurbished ☐ Tightened ☐ Restart ☐ Reset  
☐ PM/PDM Corrective Action ☐ PM/PDM No Corrective Action  
☐ No Action Require ☐ Other: \_\_\_\_\_

## Daily Report (i-plan) Code

Task Code	AS PLAN	CANCEL	DELAY/EARLY	BIW	NBI
Task Code Reason/Remark for Cancel Job	[Delay] Plan too short	[Delay] Issue during execution		[Delay] Interrupt by other jobs (BIW/Early/Delay)	
	[Early] Previous Jobs finish early	Man-Hr not enough due to BIW	Man-HR not enough due to delay job	Man-Hr not enough due to not plan for resource	
Task Code Reason/Remark for BIW	P1/P2 WORK ORDER	Repair/Restart Machin S/D	Urgent request from unplanned jobs		Other

## Attachment

Problem Descriptions: PM Generate

As Found: 1 X PM

Action Taken: Follow job task

Action by: Apichart W., Jaet M., Padol J.

Possible root cause: Recommendation: N/A

As left: Normal operation

Job Completed Date: 5 Apr 22

Entry by/ Date: Padol J. / 9 Apr 22

Specialist/Supervisor review and sign &lt;For accurate data&gt;: Chulernchok P. (For CR-MECH Supv.)

11 Apr. 2020



31 Mar - 2 Apr 22

W/O: 1144456

Sheet: 180B1HD-80 (MS)PH(39)(41)(42)

CRANE MAKE: Nautilus  
MODEL: 180B1HD-80 (MS)  
SERIAL NUMBER: Crane Specific

LOCATION  
C2, Remote Platform

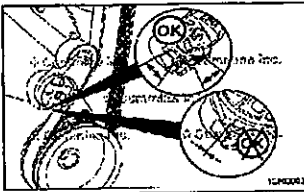
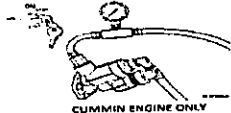
DATA BASE - PM JOB TASK CARD

SRWA 1 Y PM

Crew Size:  
Estimated Hours:

SYSTEM	TASK	Specification	Record/Handing	PH
Safety	Perform Job Safety Analysis (JSA)	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Obtain "COMPANY" PERMIT TO WORK	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Perform Tool Box Talk	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	BEFORE/AFTER JOB EXECUTION: Ensure to comply with isolation procedure (LOCK OUT/TAG OUT, WARNING SIGNS and BARRIERS).	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
Required Tools	Insure proper tools are available at the job site	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Tool bag	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Tool box	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Tool Container	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	MPI equipment and operator	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Check safety harness Software and Hardware should be good condition before use	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Check Rescue Equipment ready to use onsite	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Portable Scaffolding and Crew if require	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
Lubricants	Insure proper lubricants and consumables are available at the job site.	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Hydraulic System - Hydraulic Oil	Rando HD-68	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Slew Gearbox - Gear Oil	Meropa 220	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Auxiliary Hoist - Gear Oil	Meropa 220	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Main Hoist - Gear Oil	Meropa 220	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Grease Points - Lithium Based **IT MUST NOT INCLUDE MOLYBDENUM DISULPHIDE**	MULTIFAK EP#2	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Open Gear Teeth - Open Gear Lube highly water resistant and of an adhesive nature.	OMEGA 73	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Pneumatic Lubricator	SAE Grade 10	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Wire rope Lubricant Company preferred grade	Birlube 70	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Engine Oil - SAE Grade 15W-40 (Delo Gold)	15W-40	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Safe Load Indicator fluid	W-15	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Engine Radiator - Should have radiator preservatives additives	Cat® SCA	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
Consumables	Spray Cold Galvanize	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Denso Tape	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	WD-40	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
History Review	Before starting work, tasks preparation at least 1 day prior to starting work: 1. Review history PM/ CM from Roving Team, 2. Review last PM/ CM/ PMI from Crane Mech, 3. List out all punch list and prepare parts. 4. Review last Certificate task performed	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Require to update part history from Crane Mech on following main components to ensure the right parts are prepared: - Aux/ Main/ Boom Cylinder, Engine, Swing Gearbox, etc. Reference: Crane OEM information of each part need to be recorded - Manufacturer & Contact info - Model & serial number - Installation date	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Review history data from Certificates and incorporate into current PM: - Pull Test Certificates (ongoing update, 4 yr. history). - Load Test Certificates (ongoing update, 4 yr. history). - Wire Rope Certifications (running rope and standing rope) (life of rope). - Hoist Certifications for hoist classified as "personnel handling" hoist.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Review Last Preventative Maintenance Records (Inspection Reports) - Pre-use (Pre-Post Inspection) - 6 Monthly (API RP 2D Not Defined, Company Standard) - 1 Yearly (API RP 2D Defined Annual Inspection)	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Visually inspect (Sling, sling hooks and shackles) include Websling / Chain	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
Lifting Gear Preparation	Check color code / Tag & date inspection	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Determine if access route to/from crane is clean, safe, unobstructed and adequately protected against falls, tripping and slipping	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Check drain lines and drip pans for deterioration	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Remove any sediment collected in the bottom of drip pans	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Check for general crane and components for loss of protective coating and corrosion	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Check for missing or loose corrosion, deformation pins, pin keepers, bolts, nuts, fasteners of all ladders, cages and working platform	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Apply grease to exposed grease parts (control valve spools, ball-ring gear, parking brake valve, etc.)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Engine CUMMINS	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
Prime Mover	CUMMINS CB.3	S/N.: ARR.No.:	OEM Manual	13451626
	Check/Clean crankcase breather	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Check/Clean air cleaner	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Check radiator & Cap and record condition	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Check for any signs of leaks on or around the engine ie: Crankshaft seal (front /rear), Fuel Injection Pump	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Check for engine exhaust system for leaks, corrosion, insulation and general condition	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Check all engine hoses for wear and deterioration	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Drain water and sediment for diesel tank	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Lubricate fan bearing/shaft	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Change radiator Coolant	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Change corrosion resistor (water filter)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Test radiator Coolant PH, Top up if required and Record Value	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	COOLANT PARAMETERS (PH):	6 or higher	OEM Manual	PH = 8
	Determine if engine hour meter is working and giving accurate measurements and record:	OEM Manual		
	HOUR METER PARAMETERS:	LAST READING	HRS	265 HRS
	Check condition of engine hold down bolts	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Change cooling fan drive belts	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Check condition fan blade	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	

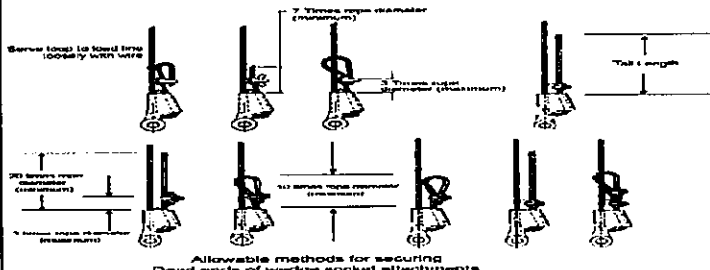


SYSTEM	TASK	Specification	Record/Reading
	Check that neither the top nor bottom tensioner arm stop is touching the cast boss on the tensioner body for CUMMINS engine as picture.	 OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check engine HYD starter drive gear bendix and fly wheel gear teeth condition and record. **Replace if required*	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO Bendix Gear : <u>90</u> % Fly wheel Gear teeth : <u>95</u> %
	Check leak and worn at Pulley Water Pump as found. If replace	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition Ratchet Bendix HYD Starter	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricate engine throttle linkage, if applicable	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if the tachometer operates properly: Record Value of Idle & Max Speed (RPMs) Note: Too low Idle (RPMs) will cause excessive worn at winch brake	OEM Manual	
	<b>**ENGINE RPM SPECIFIC CUMMINS**</b>	IDLE SPEED 900-1000 RPM MAX SPEED 2200-2300 RPM	<u>850</u> RPM <u>2200</u> RPM
	Confirm engine oil pressure as per Parameters below and Record Value:		<u>62</u> PSI
	<b>**ENGINE OIL PRESSURE CUMMINS**</b>	Minimum >10 PSI Maximum 75 PSI	<u>75</u> PSI
	Confirm engine fuel pressure Parameters are correct and Record Value:		
	<b>ENGINE FUEL PRESSURE SPECIFIC**</b>  Cummins C8.3 High Idle >18 PSI	OEM Manual	<u>25</u> PSI
	Clean Up Strainer Transfer Pump	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Confirm engine temperature Parameters and Record Value:		<u>180</u> F
	<b>**ENGINE WATER TEMP SPECIFIC**</b> Cummins C8.3 NORMAL 158 - 195 degree F	OEM Manual	
	Test engine SAFETY DEVICE- ensure engine kill cable shuts off FUEL supply	API RP 2D	<input checked="" type="checkbox"/> Function ( ) False
	Test engine SAFETY DEVICE- ensure EMERGENCY KILL CABLE - shuts off AIR supply	API RP 2D	<input checked="" type="checkbox"/> Function ( ) False
	Test engine SAFETY DEVICE- ensure ENGINE low lube oil - releases OIL PRESSURE to activate Alarm Air System ***Note*** Engine oil pressure low alarm at 20 PSI	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False
	Test engine SAFETY DEVICE- ensure HIGH TEMP - releases OIL PRESSURE to activate Alarm Air System	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False
	Check / Clean primary fuel/water separator *Replace if required*	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition of turbocharger, and for any oil or hot air leaks	OEM Manual	( ) Leak <input checked="" type="checkbox"/> Not Leak
	Change engine lube oil and oil filter	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change fuel filter	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change air filter, if required	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check governor for any leak and noise	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check/Adjust engine lash valve, inspect valve rotators valve clearance	Cummins C8.3 IN 0.012 Inch. EX 0.022 Inch.	<input checked="" type="checkbox"/> YES ( ) NO
	Check timing point (timing mark & injection pump - CUMMINS Engine C8.3) Re-torque hold down bolts (122 FT-LBS)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change gasket valve cover	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check and inspect condition wear of pump drive spline and record **Note; Remaining 70% of Original Spline Surface must be replace.	Company Spec/Standard	<u>90</u> % Remaining
	Check and inspect condition wear of adaptor Coupling spline shaft and record **Note; Remaining 70% of Original adaptor Coupling spline shaft Surface must be replace.	Company Spec/Standard	<u>90</u> % Remaining
	Check and inspect condition wear and crack of Coupling Drive Plate	Company Spec/Standard	<u>90</u> % Remaining
	Retorque bolts of Coupling Drive Plate	OEM Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Evaluate engine performance, tune up if required	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
Hydraulic Start System (Apply for C2-Remote P/F Only)	Check pressure system at the pressure gauge which should reach 3,000 PSI as standard when the system is FULLY charged. Record Value. (As the system cools down, the pressure should drop slightly and finally stabilised.) Visually inspect all hydraulic connections and hoses for leaks and retighten if necessary. (Caution: This should NOT be done if the system is under pressure.) 1. Slowly release system pressure by loosening the bleed screw on top of the hand pump. 2. Ensure no pressure remains, retighten the suspected leak fitting or replace the damaged hose or component. 3. Retighten the bleed screw on the hand pump. 4. Pump the system up to 2200 - 2500 PSI 5. Inspect that the leak was eliminated.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Function check Accumulator Pre-charge. (Caution: This should NOT be done if the system is under pressure.) 1. Shut the engine off, release system pressure via the bleed screw on top of the hand pump 2. Retighten bleed screw and actuate the hand pump. The pressure will rapidly increase and then stabilised. This pressure is related to accumulator gas pre-charge pressure. 4. If the pressure rapidly increase to 3000 PSI, it indicates that the accumulator has lost its gas charge. 5. Troubleshoot as necessary	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO

SYSTEM	Task	Compliance	Record/Reading		
	Check the unloading valve integrity with the engine running. 1. Slowly release system pressure by loosening the bleed screw on top of the hand pump. 2. Tighten bleed screw on top of hand pump and notice pressure in system will increase. 3. This pressure should read between 2200 - 2600 PSI depending on the recharge ratio 80% std. (90% optional). Record Pressure Value.	OEM Manual	2600 PSI		
	Check Nitrogen pressure in Accumulator (spec @ 1,500 psi)	OEM Manual	✓ YES ( ) NO		
	Check Function and Condition of Hydraulic Recharging Pump/ Drive Belt (if applicable)	OEM Manual	✓ Function ( ) False		
Pneumatic System	check Air Compressor external oil supply and return lines, if applicable, for kinks, bends, or restrictionsto flow	Company Spec/Standard	✓ YES ( ) NO		
	inspect the compressor discharge port, inlet cavity and discharge line for evidence of restrictions and carboning. (if excessive buildup is noted)	Company Spec/Standard	✓ YES ( ) NO		
	Check all hose connections are sound and all mounting and pivoting connections are secure.	Industry Standard	✓ YES ( ) NO		
	Check condition / Clean and lubricate unloading valve	Industry Standard	✓ YES ( ) NO		
	Check proper air pressure is available for the system. Record Value.	OEM Manual			
	AIR SYSTEM PARAMETERS: MAX 60 PSI	OEM Manual	60 PSI		
	Visually inspection condition of air receiver for signs of corrosion or loose of structural integrity.	Industry Standard	✓ YES ( ) NO		
	Check the hose, piping and tubing for mechanical damage, corrosion, splits, blisters, cracking or excessive abrasion on the outer surface	Industry Standard	✓ YES ( ) NO		
	Drain off air filter and reciever to remove condensed water. If water is present, drain until water is removed.	Industry Standard	✓ YES ( ) NO		
	Check proper operation of pop off valve, by manually functioning valve.	Industry Standard	✓ YES ( ) NO		
	Check proper operation of manual latch valve, by manually functioning latch.	Industry Standard	✓ YES ( ) NO		
	Check proper operation of small engine alarm horn.	Industry Standard	✓ YES ( ) NO		
Hoist / Brakes	Visually check a hoist exhibits erratic operation and/or unusual noise, the hoist must be taken out of service until it is inspected and serviced by a qualified technician. Continued operation of a hoist with a defect in a critical component may lead to loss of load control, property damage, serious injury or death.	OEM Manual	✓ YES ( ) NO		
	Visual exteriors of hoist, frames, drums and flanges for damage, leaks, cracks and wear and repair/replace as required to maintain the structural integrity of the hoist.	OEM Manual	✓ YES ( ) NO		
	Check all hoist mounting pins, bolts or other fasteners and replace or tighten as necessary.	OEM Manual	✓ YES ( ) NO		
	Lubricant level must be maintained between the minimum and maximum levels; midway up sight glass or at bottom of level plug port as equipped and check/clean plug vent. Use only the recommended type of lubricant.	OEM Manual	✓ YES ( ) NO		
	Inspect Brake Valve Opening Pressure test V/V 1-1/4" PD Series : no lower than 550 PSI V/V 1-1/2" CH Series : no lower than 575 PSI	Main Aux	Braden Bulletin 527-Dec,1996	700 PSI 700 PSI	
	Inspect Brake cylinder opening pressure test. CH/PD Series : 400-450 PSI.	Main Aux	Industry Standard	500 PSI 500 PSI	
	Measure differancian of static and dynamic brake. CH/PD Series : 150-250 PSI.	Main Aux	Industry Standard	200 PSI 200 PSI	
	Check for external oil leaks and repair as necessary. This is extremely important due to the accelerated wear that will result from insufficient lubricating oil in the hoist.	OEM Manual	✓ YES ( ) NO		
	RECORD BOOM CYLINDER INFORMATION :	Boom cylinder Diameter:	OEM Manual	DIA: 12 Inch	
		CY Number:	OEM Manual	L= 8108-22 R= 8108-35	
		Serial Number:	OEM Manual	L= 8143 R= 8148	
	RECORD MAIN HOIST INFORMATION :	Manufacturer:	OEM Manual	Braden	
		Model:	OEM Manual	CH115A-23090-02-1	
		Serial Number:	OEM Manual	0502990	
	Check MAIN HOIST for proper operation and good condition	API RP 2D	✓ YES ( ) NO		
	Brake test & record pressure of MAIN HOIST	OEM Manual	✓ YES ( ) NO		
	Check MAIN HOIST gear oil level/condition, top up if required. ** Refer to Onsite Gear Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference **	OEM Manual	✓ YES ( ) NO		
	RECORD AUXILIARY HOIST INFORMATION :	Manufacturer:	OEM Manual	Braden	
		Model:	OEM Manual	PD12C-29064-04-1	
		Serial Number:	OEM Manual	0569808	
	Check AUXILIARY HOIST for proper operation and good condition	API RP 2D	✓ YES ( ) NO		
	Brake test & record pressure of AUXILIARY HOIST	API RP 2D	✓ YES ( ) NO		
	Check AUXILIARY HOIST gear oil level/condition, top up if required. ** Refer to Onsite Gear Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference **	OEM Manual	✓ SEND SKL LAB NOT SEND SKL LAB		
	Check Relief Valve: Determine hoistes' relief valve pressure gauge is working and giving accurate measurement by notice whether pressure gauge is vibrating or not. If not, set relief valve pressure in accordance with the schematic and parameters below. Record all readings.	OEM Manual	✓ YES ( ) NO		
	BOOM RELIEF VALVE TEST	Relief Specific:	3,000 PSI	OEM Manual	3000 PSI
	MAIN HOIST RELIEF VALVE TEST	Relief Specific:	3,250 PSI	OEM Manual	3250 PSI
	AUX HOIST RELIEF VALVE TEST	Relief Specific:	2,950 PSI	OEM Manual	2950 PSI
	SWING RELIEF VALVE TEST	Relief Specific:	1,500 PSI	OEM Manual	1500 PSI
Measure Pressure of hoist motor case drains and Record Value Reference Bulletin: BRADEN Inspection, Testing, Preventive Maintenance and Special Operating Instructions For Planetary Hoists PB-308 latest edition for further details.	OEM Manual				
MAIN HOIST CASE DRAIN for Gear Motor (Down Mode).	PRESSURE	< 100 psi	Company Spec/Standard	10/16 PSI	
AUX. HOIST CASE DRAIN for Gear Motor (Down Mode).	PRESSURE	< 100 psi	Company Spec/Standard	0/8 PSI	

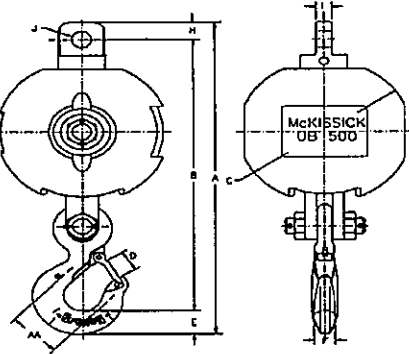
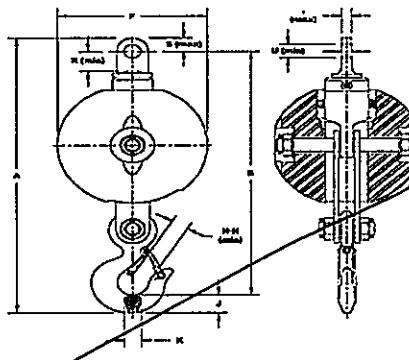
SYSTEM	TASK	Specification	Record/Reading		
Hydraulic System	Check hydraulic tank oil level. Oil should be visible in the sight glass. Top up as required (3/4 Tank Minimum)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
	Check hydraulic oil condition. (Check if running hours are more than 100 hours from last oil change or during Annual inspection) ** Refer to Onsite Hydraulic Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference **	Rando HD-68 Company Spec/Standard	<input checked="" type="checkbox"/> SEND SKL LAB <input checked="" type="checkbox"/> NOT SEND SKL LAB		
	Drain off 1 liter of oil to remove condensed water. If water is present, drain until water is removed and top up with clean oil	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Check for any hydraulic leaks	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Check the hydraulic hose, piping and tubing for mechanical damage, corrosion, splits, blisters, cracking or excessive abrasion on the outer surface	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO		
	Check that all hydraulic hose connections are sound and that all mounting and pivoting connections are secure.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Lubricate hydraulic swivel in pedestal and insure tie down restrains are in place and preventing the swivel from rotating with the crane structure.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
	Ensure the filler breather on tank is not covered or clogged	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Visually inspect for missing or loose pins, pin keepers, bolts, nuts, fasteners on all pumps, motors and valves	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO		
	Check the filter bypass indicator, while engine is running	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
	With engine running (after all other items pass inspection), check the system for leaks around fittings, hoses, valves and reservoirs	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	With engine running, check the source of any unusual noise or vibration that may cause or indicate equipment damage or wear	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Ensure all hoses are properly rated for the system, see "Parameters" for each system for details.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Record hydraulic oil operating temperature. Note: Hydraulic fluid overheating temperature is over 180 F degrees or 82 C, degrees (reservoir temperature)	Industry Standard	120 Degree F		
	Determine if hydraulic return pressure gauge is working and giving accurate measurements. Record readings				
	RECORD HYDRAULIC RETURN PRESSURE PARAMETERS: 75 psi "maximum"	OEM Manual	8-23 PSI		
	Change hydraulic return filters and seals	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
	Test all hydraulic relief valves and record pressures with engine at : #REF!	API RP 2D			
	BOOM FUNCTION TEST (Need Crane Mech to verify each platform)		OEM Manual		
	Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual
Full Speed Pressure			RECORD	OEM Manual	800 PSI
DOWN		Cracking pressure	RECORD	OEM Manual	800 PSI
		Full Speed Pressure	RECORD	OEM Manual	1300 PSI
MAIN HOIST FUNCTION TEST (Need Crane Mech to verify each platform)		OEM Manual			
Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual	100 PSI
		Full Speed Pressure	RECORD	OEM Manual	600 PSI
	DOWN	Cracking pressure	RECORD	OEM Manual	700 PSI
		Full Speed Pressure	RECORD	OEM Manual	1400 PSI
AUX HOIST FUNCTION TEST (Need Crane Mech to verify each platform)		OEM Manual			
Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual	200 PSI
		Full Speed Pressure	RECORD	OEM Manual	600 PSI
	DOWN	Cracking pressure	RECORD	OEM Manual	600 PSI
		Full Speed Pressure	RECORD	OEM Manual	1600 PSI
SWING FUNCTION TEST (Need Crane Mech to verify each platform)		OEM Manual			
Boom Angle : 60 Degree (Recommend or as applicable)	LEFT	Cracking pressure	RECORD	OEM Manual	200 PSI
		Full Speed Pressure	RECORD	OEM Manual	400 PSI
	RIGHT	Cracking pressure	RECORD	OEM Manual	200 PSI
		Full Speed Pressure	RECORD	OEM Manual	400 PSI
Remove for inspection by exercise cut-off PILOT OPERATED VALVE (A2B)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO			
Hydraulic system	Function check for properly cut-off PILOT OPERATED VALVE (Joy Stick Only) e.g. - Anti-two block (Main/ Aux)	OEM Manual	<input checked="" type="checkbox"/> Function ( ) False		
Hydraulic system	Replace PILOT OPERATED VALVE (Joy Stick Only)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
Electrical system and Crane Boom Lighting	Check the electrical junction boxes, wires and connections for deterioration, desiccant bags, (replace as required)	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Check the condition of the grounding and lighting protection system.	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Visually inspect boom floodlight and light guards for loose, missing, corroded	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Check condition pipe support, u-bolt, nuts of boom floodlight and Electric slinging for loose, missing, corroded	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Check Electric slinging/swivel for 360° continuous rotation	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
	Check Water ingress, condensation in electric slinging and boom floodlight	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
	Check freely movement and lubricate of boom floodlight	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
	With generator in operation, Intergize all lights to ensure proper function.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO		
	Check condition of crane boom lighting and safety net is secured with strong point. * **Safety net should be replace 24 months after installation (2 year)***	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Check function of crane sound signal	Company Spec/Standard	( ) YES <input checked="" type="checkbox"/> N/A ( ) NO		

SYSTEM	TASK	Reference	Pass/Fail/NA
	Check function of crane boom lighting at boom upper section	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO
	Check function of crane boom lighting at boom lower section	Company Spec/Standard	( ) YES <input checked="" type="checkbox"/> N/A ( ) NO
	Check function of crane boom lighting at winch skid	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO
	Check function of crane boom lighting at crane cabin	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO
	Check function beacon light at boom tip	Company Spec/Standard	( ) YES <input checked="" type="checkbox"/> N/A ( ) NO
	Inspection wire rope guide & Roller assembly	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
Operator Control Station	Check general condition of control panel, bolts, paint security, etc.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if there is a serviceable fire extinguisher in the vicinity of the crane	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if correct load chart is in use and easily visible for operator	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if charts, indicators and hand signal chart are in the cabling and firmly attached	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if angle/radius indicator plate is easily visible to operator and is moving freely.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition of control levers and determine if they "dead-man" back to the neutral position.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition of pressure gauges.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check proper control labels are firmly installed, completely legible and properly labeled	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check controls for freedom-of-movement	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition, Leak, freely movement of Swing Lock Selector	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition, Leak, freely movement of Dynamic swing break system ** Note: If HYD Oil loose in CYD reservoir must be refill	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition, Leak, freely movement of Accelerate System ** Note: If HYD Oil loose in CYD reservoir must be refill	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check all safety glass and rubber seal for proper condition	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Function Test Horn	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition and function Main/ Aux selector valve	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
Load Indicator System	Check condition and function of boom/ main/ aux/ swing joy stick	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Visual check on fittings and connections for leaks. Fix leak if any.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Should any leaks exist, stop leak and recharge system, refer to maintenance manual	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Recharge or Change Load cell oil, refer to condition	OEM Manual	<input checked="" type="checkbox"/> Change ( ) Recharge
	Check general condition of tubing, hoses, pins bolts, paint, etc.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Insure load cell is free of obstructions	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition of gauge(s) face and clean glass as required.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check weight indicator function (Main)	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check weight indicator function (Aux)	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check weight indicator fluid, top up if required	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Insure Safe Working Load, matches ratings on the Crane Load Chart	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Insure Boom Length, matches the Crane Load Chart	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Insure Boom Angle measurements and readings match the boom angle indicator.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Insure Boom Radius measurements indicate the distance from center line of the crane to the hook	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check Main load cell gap 1/4 (0.250) inch	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
Pedestal & Structure	Check Aux load cell gap 3/8(0.380) inch (Compression Load Cell Type)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check weight indicator accuracy "maximum variance +/- 2%	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Visually check Pedestal for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks weld, etc.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check water rain drain at pedestal must be not obstruct	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check pin and cotter pin of pedestal missing, corrosion, wear, damage and exercise pin.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
Box Boom & Luffing CYD	Visually check Base - Plate connection and Base hoist Structure for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks weld, etc.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check A fixed such as Handrail, Walkway, Grating, stationary structure without significant movement in response to waves and currents in normal operating conditions.	API RP 2C	<input checked="" type="checkbox"/> YES ( ) NO
	Check and Verify entire box boom and Boom CYD for loss of protective coating and corrosion	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check and Verify entire box boom and Boom CYD for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks, etc.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check and Verify boom end connections, for bends, dents, corroded areas, cracked welds, and signs of mechanical damage, wear, etc. **any deviation should be reported**	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check and Verify boom rest and wooden support to ensure it's in good condition	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Inspect pin and pin holes of Upper tank and Lower tank for excessive clearance	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	BOOM CYLINDER PIN MAXIMUM TOLERANCE 1/8" (3mm)	Industry Standard	
	Check BOOM CYLINDERS for proper operation and good condition	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check Boom cylinder barrels and rods for leaks, mechanical damage and corrosion	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check and measurement boom foot pin and connection pins for clearance	Industry Standard	
	BOOM FOOT PINS & BOOM BOX CONNECTER PIN TOLERANCE 1/8" (3mm)	Industry Standard	
	Boom Foot Pin Tolerance	Industry Standard	0.018 inch
	Boom Box Connector Pin Tolerance	Industry Standard	0.012 inch
	Check connecting bolts of box boom loose, corrosion, wear, damage	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricate boom foot pins and bushings	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricate boom cylinder pins, bearings and bushings	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Boom function test angle/radius to correction **Note: The cylinder(s) mechanism shall be capable of elevating the boom from a minimum of zero degrees to the maximum recommended boom angle.	API RP 2C	<input checked="" type="checkbox"/> YES ( ) NO
Wire Rope	Operation functional test and verify Boom Creeping down **Note: Test at angle 60°	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if parts-of-line match parts of line on the load chart in the crane cabin.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if visible portion of wire rope adequately lubricated. If not lubricate wire rope	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	For each layer of wire rope on drum, check that all rope is parallel and each crossover point at hoist flanges is correct	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	The top layer of rope must not be lower to the flange tips 2.5 in for Smooth drum, 2 in for groove drum or 2.5 times of wire rope diameter	API RP 2C	<input checked="" type="checkbox"/> YES ( ) NO

SYSTEM	TASK	Specification	Record/Reading																				
	Inspect wire rope for, kinking, crushing, broken wires, necking down of rope diameter, worn outside wires, corroded or broken wires at end connection, cutting or unstranding.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																				
	<b>**Note**</b> Running Ropes of rotation-resistant construction used in the main or auxiliary hoist: - Four (4) Randomly distributed broken wires within 3D rope diameter - Two (2) broken wires in one stand within 6 rope diameter One valley break can indicate internal rope damage requiring close inspection of this section of the rope. When one or more valley breaks are found in one lay length the rope should be retired.	API RP2D Edition 7	None																				
	Reductions for the rope diameter, from initial wire rope dimensional measurements, in a nonworking area (an area away from the sheaves) compared to the lowest diameter of rope measured in three working areas (areas where the rope regularly goes over a sheave) of more than the following is observed: - 3/64 in. (0.047 in.) (1.2 mm) for diameters up to and including 3/4 in. (19.1 mm); - 1/16 in. (0.062 in.) (1.6 mm) for diameters of 7/8 in. to 1-1/8 in. (22.2 mm to 28.6 mm); - 3/32 in. (0.093 in.) (0.8 mm) for diameter of 1-1/4 in. to 1-1/2 in. (31.8 mm to 38.1 mm); - For rope diameters greater than 1-1/2 in., $\pm 5\%$ diameter loss from baseline measurement. - Wear of one-third the original diameter of the outside individual wires	API RP2D Edition 7	None																				
	Increase in the length of an individual rope lay is observed. This increase in lay length and accompanying reduction in diameter can be caused by failure of the core. This can occur more readily in ropes or rotation-resistant construction.	API RP2D Edition 7	<input checked="" type="checkbox"/> YES ( ) NO																				
	- Inspection and Verify running and standing rope from heat effect <b>**Note:</b> Not more than 250°C - There is evidence of heat damage from any source (i.e. engine exhaust, flare towers, stress corrosion cracking, etc.). Heat can be generated by passing a rope over a frozen or non-turning sheave, contact with structural members of the crane, improperly grounded welding leads or lightning strikes	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO																				
	With the boom at the highest possible angle and the main load block or overhaul ball at the water level, ensure there is a minimum of 5 wraps of wire-rope remaining on the drums. Note: (Thai law, requires minimum of 2 wraps)	API SPEC 2C / Thai Law	<input checked="" type="checkbox"/> YES ( ) NO																				
	Reference: - Running rope safety factor not less than 6 for wire rope that are running wire, (Thai law; Wire rope nominal breaking strength x number parts of line / Design factor 6) - Standing rope safety factor not less than 3.5 for wire rope that are stay cables, (Thai law)	Thai Law	<input checked="" type="checkbox"/> YES ( ) NO																				
	Measure and record nominal diameter of "running ropes" main and auxiliary (particularly on drum, equalizer sheave and at sockets, clips and dead end points) *****Nominal = several measurements added together divided by Number of measurements*****	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																				
	Inspect wire rope and record size below:	API RP 2D																					
	<table border="1"> <tr> <td rowspan="3">MAIN WIRE ROPE OD:</td><td>FULL DRUM</td><td>OEM Manual</td><td>0.660 inch</td></tr> <tr> <td>HALF DRUM</td><td>OEM Manual</td><td>0.653 inch</td></tr> <tr> <td>WATER LEVEL</td><td>OEM Manual</td><td>0.655 inch</td></tr> <tr> <td rowspan="3">AUX WIRE ROPE OD:</td><td>FULL DRUM</td><td>OEM Manual</td><td>0.659 inch</td></tr> <tr> <td>HALF DRUM</td><td>OEM Manual</td><td>0.652 inch</td></tr> <tr> <td>WATER LEVEL</td><td>OEM Manual</td><td>0.655 inch</td></tr> </table>	MAIN WIRE ROPE OD:	FULL DRUM	OEM Manual	0.660 inch	HALF DRUM	OEM Manual	0.653 inch	WATER LEVEL	OEM Manual	0.655 inch	AUX WIRE ROPE OD:	FULL DRUM	OEM Manual	0.659 inch	HALF DRUM	OEM Manual	0.652 inch	WATER LEVEL	OEM Manual	0.655 inch		
MAIN WIRE ROPE OD:	FULL DRUM		OEM Manual	0.660 inch																			
	HALF DRUM		OEM Manual	0.653 inch																			
	WATER LEVEL	OEM Manual	0.655 inch																				
AUX WIRE ROPE OD:	FULL DRUM	OEM Manual	0.659 inch																				
	HALF DRUM	OEM Manual	0.652 inch																				
	WATER LEVEL	OEM Manual	0.655 inch																				
	Slip-Cut 1 meter of all ropes at the wedge socket and re-wedge to prevent rust inside of wedge socket (at outward end of rope, not on hoist drum) Dead end tail length is never less than 6 inches, or: - Standard 6 to 8 Strand wire rope is not less than 7 times the rope diameter - Rotation Resistant Wire Rope is not less than 20 times the rope diameter	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO																				
	U-bolt and Fist Grip Clips: Extreme care should be exercised to assure proper orientation of U-bolt clips. The U-bolt segment shall be in contact with the wire rope dead-end. The orientation, spacing, torquing, and number of all clips shall be in accordance with the crane manufacturer's specifications.	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO																				
	 <p>Allowable methods for securing Dead ends of wedge socket attachments</p>	API SPEC 2C	OK																				
	Verify that the wedge socket and wedge are the correct size for the rope in use and record the size	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO																				
Sheaves & Bearings	Lubricate all sheave bearings	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																				
	Visually Inspect all sheaves and bushings for cracks, wear and deterioration	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																				
	Visually inspect wire rope track of sheave for rope imprints, wear and deterioration. If damage exist sheave should be resurfaced or replaced.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																				
	Pins retained by snap rings, bolt lock shafts, plates lock should be checked for missing or loose for all	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																				
	Check wire rope guards and keepers for proper location and condition.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																				
	Determine if wire rope is jumping the sheaves, by looking for signs of damage on the sheave brim	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO																				
	Sheave Rope Profile for optimum Rope life the sheave groove profile should be correctly matched to the rope diameter	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO																				
	Check rope sheave should be machine grooved to depth of not less than 1.5 times the nominal diameter of the rope	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO																				
	Ensure the sheaves are aligned and the fleet angle is correct <b>**Remark:</b> Wire rope User's Manual allows 2 degree on grooved winch drum, Smooth Drum should be not more than 1-1/2 degree	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																				
	Determine if wire rope size and sheave sizes/grooves are compatible and record size. Sheave pitch diameter (D) to nominal wire rope diameter (d) ratio (D/d) shall not be less than 18:1	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO																				



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SYSTEM	TASK	Specification	Record/Reading	
Auxiliary Ball	Verify to ensure nut firmly at which trunion rotate. Identify to set-screw in nut/ swivel/ counter pin and thread condition.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Last NDE inspection record	Industry Standard	Last inspect date <u>Nov 2020</u>	
	RECORD AUX BALL INFORMATION:			
	Manufacturer:	OEM Manual	<u>McKISSICK</u>	
	Model:	OEM Manual	<u>MB07T200E</u>	
	Serial Number:	OEM Manual	<u>41312503</u>	
	Record Auxiliary Ball measurements and details for future comparison with historical data: For Model MB07T200E ONLY	Industry Standard		
		AA Dimensions 3.0 Inch	Industry Standard	<u>3</u> mm/ inch
		A Dimensions 24.89 Inch	Industry Standard	<u>24.7</u> mm/ inch
		B Dimensions 21.71 Inch	Industry Standard	<u>21.7</u> mm/ inch
		C Dimensions 12.50 Inch	Industry Standard	<u>12.5</u> mm/ inch
		D Dimensions 1.61 Inch	Industry Standard	<u>1.6</u> mm/ inch
		E Dimensions 1.81 Inch	Industry Standard	<u>1.8</u> mm/ inch
		F Dimensions 1.38 Inch	Industry Standard	<u>1.5</u> mm/ inch
		H Dimensions 1.38 Inch	Industry Standard	<u>1.31</u> mm/ inch
		I Dimensions 0.88 Inch	Industry Standard	<u>7</u> mm/ inch
		J Dimensions 1.31 Inch	Industry Standard	<u>1.1</u> mm/ inch
	Record Auxiliary Ball measurements and details for future comparison with historical data: For Model OB 7EE 200-4	Industry Standard		
		A Dimensions 27.25 Inch	Industry Standard	_____ mm/ inch
		B Dimensions 24.10 Inch	Industry Standard	_____ mm/ inch
F Dimensions 12.00 Inch		Industry Standard	_____ mm/ inch	
H-H Dimensions 1.38 Inch		Industry Standard	_____ mm/ inch	
J Dimensions 1.81 Inch		Industry Standard	_____ mm/ inch	
K Dimensions 1.46 Inch		Industry Standard	_____ mm/ inch	
R Dimensions 1.55 Inch		Industry Standard	_____ mm/ inch	
S Dimensions 1.34 Inch		Industry Standard	_____ mm/ inch	
T Dimensions 1.03 Inch		Industry Standard	_____ mm/ inch	
U Dimensions 1.31 Inch		Industry Standard	_____ mm/ inch	
Safety system	Check Condition anti - two block , hanging chain , eye bolts , fix bolts , shackle for missing , corrosion , erosion , deformation	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Check anti - two block kick out plate for freely movement	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Check anti-2-block device proper function of Main winch	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False	
	Check anti-2-block device proper function of Aux. winch	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False	
	Check relation of boom radius and boom angle (lowest, middle, highest) with reference to load chart. Recharge fluid W-15 to load indicator, if required.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Functional test of emergency lowering system (See procedure in Emergency Load Lowering Box). <b>Note:</b> Keep for 1 Yr PM to sustain crane mechanic competency. <b>Caution:</b> Function test must be performed on top deck with max 2-foot height.	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False	
	Visually check emergency load lowering kit. Ensure EMERGENCY LOWERING PROCEDURE and MATERIAL LIST are in the box. - Ensure ALL items shown on the list are in the box and in good condition - SECURE THE BOX WITH A TIE WRAP.	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
Slew Mechanism	Visually check for damage and excessive wear on gear teeth	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Visually check slew gear box in the area of oil seal for any leaks	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	RECORD SLEW GEAR BOX INFORMATION:			
	Manufacturer:	OEM Manual	<u>BSK</u>	
	Model:	OEM Manual	<u>250A</u>	
	Serial Number:	OEM Manual		
	CHECK and RE-TORQUE swing drive gearbox mounting bolts at following brands: - ESKRIDGE, Model: 250 = 150 FT-LBS	API RP 2D	<u>150</u> FT-LBS	
	Check swing gearbox oil level/condition, top up if required	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Monitor slew gearbox oil condition by visually examine for burnt smell, metal particles, and/or other contaminants, record and change if found.	Meropa 220	<input checked="" type="checkbox"/> CHANGE OIL <input checked="" type="checkbox"/> NOT CHANGE OIL	
	Change slew gear box oil	OEM Manual	( ) CHANGE OIL <input checked="" type="checkbox"/> NOT CHANGE OIL	
Grease all pivot points of slew ring (bearing)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
Grease open gears (pinion)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO		
Check condition of slew ring bolts e.g. Bolt grade and washers. <b>Caution:</b> Use only hardened flat washers under head of bolt. Do not use lock washers, or regular flat washers.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO		

SYSTEM	TASK	Completion	Board/Member
Recommended urgency timeframe for corrective action:		Completed Date:	Completed By:

System:	Risk Level:	Component:	In Accordance with:
Location:	Date Originated:		
HYD. hose # 8x110" line main A2B (return) of boom Tip was deteriorate.			
Recommended urgency timeframe for corrective action:			
Replace		Completed Date:	Completed By:
		1 Apr 22	Apichart Jaet, Padol

System:	Risk Level:	Component:	In Accordance with:
Location:	Date Originated:		
Boom pressure gauge was fail.			
Recommended urgency timeframe for corrective action:			
Replace		Completed Date:	Completed By:
		1 Apr 22	Apichart Jaet, Padol

System:	Risk Level:	Component:	In Accordance with:
Location:	Date Originated:		
HYD. hose # 4x90" from Aux C/V to drum valve was deteriorate.			
Recommended urgency timeframe for corrective action:			
Replace		Completed Date:	Completed By:
		5 Apr 22	Jaet, Padol Kriangsak.

System:	Risk Level:	Component:	In Accordance with:
Location:	Date Originated:		
HYD. hose # 4x130" from Main C/V to drum valve was deteriorate			
Recommended urgency timeframe for corrective action:			
Replace		Completed Date:	Completed By:
		5 Apr 22	Jaet, Padol Kriangsak

System:	Risk Level:	Component:	In Accordance with:
Location:	Date Originated:		
HYD. hose # 4x125" from Aux C/V to Aux pressure gauge.			
Recommended urgency timeframe for corrective action:			
Replace		Completed Date:	Completed By:
		5 Apr 22	Jaet, Padol Kriangsak.

System:	Risk Level:	Component:	In Accordance with:
Location:	Date Originated:		
Recommended urgency timeframe for corrective action:			
		Completed Date:	Completed By:

System:	Risk Level:	Component:	In Accordance with:
Location:	Date Originated:		
Recommended urgency timeframe for corrective action:			
		Completed Date:	Completed By:



SYSTEM	TASK	Specification	Record/Reading								
	Monitor ball-ring grease sample. If found wear and tear particles, take sample and send to lab. **Wear assessment by grease sample analysis—wear may be monitored by periodic grease sample analysis as describe in this section. Grease samples should be collected every twelve months as a minimum and the results of the analysis recorded; this period should be shortened if obvious metal or contaminants are present.	API PR 2D	( ) SEND TO LAB ✓ NOT SEND TO LAB								
	Rotate crane 360 degree and check smoothness of operation	OEM Manual	✓ YES ( ) NO								
	Check swing drive static parking brake for proper operation Caution: DO NOT stop the swing of the crane with this static brake (parking brake)	OEM Manual	✓ YES ( ) NO								
	Check swing lock mechanism and Cylinder condition; leak, corrosion, dent, loss all part, worn and wear	OEM Manual	✓ YES ( ) NO								
	Check swing lock mechanism freely lock and unlock for function	OEM Manual	✓ YES ( ) NO								
Verify crane condition and load test as separate procedure.											
<b>Table 1—Static/Onboard Test Load and Radius</b> <table border="1"> <thead> <tr> <th>Static/Onboard Rated Load at a Specific Radius lb (kg)</th> <th>Test Loads In Excess of Static/Onboard Rated Load at a Specific Radius</th> </tr> </thead> <tbody> <tr> <td>≤ 40,000 (18,144)</td> <td>25 %</td> </tr> <tr> <td>&gt; 40,000 ≤ 100,000 (&gt; 18,144 ≤ 45,356)</td> <td>10,000 lb (4536 kg)</td> </tr> <tr> <td>&gt; 100,000 (45,356)</td> <td>10 %</td> </tr> </tbody> </table>		Static/Onboard Rated Load at a Specific Radius lb (kg)	Test Loads In Excess of Static/Onboard Rated Load at a Specific Radius	≤ 40,000 (18,144)	25 %	> 40,000 ≤ 100,000 (> 18,144 ≤ 45,356)	10,000 lb (4536 kg)	> 100,000 (45,356)	10 %	API 2C	✓ YES ( ) NO
Static/Onboard Rated Load at a Specific Radius lb (kg)	Test Loads In Excess of Static/Onboard Rated Load at a Specific Radius										
≤ 40,000 (18,144)	25 %										
> 40,000 ≤ 100,000 (> 18,144 ≤ 45,356)	10,000 lb (4536 kg)										
> 100,000 (45,356)	10 %										
Verify crane condition and load test as separate procedure.		U2.1	✓ YES ( ) NO								

Risk Level Definitions: The following 3 levels indicate the impact the noted deficiency poses to the operation or structural integrity of the equipment:

Level #1 = Minor Deficiency	Level #2 = Restricted Operation	Level #3 = Crane Removal
Minor deficiency that is recommended to be promptly addressed, but poses no safety and/or environmental risk. The crane can still be operated at full duty.	Deficiency identified that has the potential to limit, de-rate or damage the crane, its surroundings and/or the environment. The duty and locked/ tagged out until the crane's duty and operation should be de-rated or service restricted.	The crane should be removed from duty and locked/ tagged out until the deficiency is rectified.

System:	Risk Level:	Component:	Location:	In Accordance with:	Date Originated:
Description: HYD. hose # 16x165" line boom down (L) was deteriorate.					
Recommended urgency timeframe for corrective action:			Replace	Completed Date: 31 Mar 22	Completed By: Apichart Jaet Padol
Description: HYD. hose # 16x150" line boom up (L) was deteriorate					
Recommended urgency timeframe for corrective action:			Replace	Completed Date: 31 Mar 22	Completed By: Apichart Jaet Padol
Description: HYD. hose # 12x220" from flow divider to swing control valve was deteriorate.					
Recommended urgency timeframe for corrective action:			Replace	Completed Date: 1 Mar 22	Completed By: Apichart Padol, Jaet
Description: HYD. hose # 16x50" from flow divider to flow divider priority was deteriorate.					
Recommended urgency timeframe for corrective action:			Replace	Completed Date: 1 Mar 22	Completed By: Apichart Jaet Padol
Description: HYD. hose # 8x40" line loading valve was deteriorate					
Recommended urgency timeframe for corrective action:			Replace	Completed Date: 1 Mar 22	Completed By: Apichart Jaet Padol



SYSTEM	TASK	Specification	Record/Reading
HYD.	hose *4x70", *4x150" line case drain Apr, Main was deteriorate 2FA.		
Recommended urgency timeframe for corrective action:			
Replace		Completed Date: 1 Apr 22	Completed By: Apichart Jaet, Padoi

Done by Apichart W. 5 Apr 22

Jaet M.

Padoi J.

## THE PEDESTAL CRANE CONDITION VERIFICATION

Date: <b>5 Apr 22</b>			
Crane Owner: CTEP/COIL		Field: <b>Benchamas</b>	Platform/ Vessel: <b>SRWA</b>
Crane Owner's representative: (Mech Supv./ M'Dent) <b>Samsak U.</b>			
Qualified inspector: (Qualified Crane Mechanic) <b>Padol J.</b>			
Inspector's company/ agency: (Third Party or Outsource to witness if applicable) <b>Chevron</b>			
Manufacture: <b>Nautilus</b>	Fabrication by: <b>oil stated</b>	Year of Fabrication: <b>March 2014</b>	Country: <b>USA</b>
Model / Serial: <b>22343C</b>	Standard API Edition: <b>Seventh Edition 2012</b>		Remark
Safe Working Load (SWL) → OEM	<b>15.46</b> Metric Tonnes		
Safe Working Load (SWL) → Existing via MOC, if applicable	Metric Tonnes		
Boom length, Main	<b>80</b> Ft		
Boom length, Auxiliary if applicable	<b>13</b> Ft		
Part of line main hoist	<b>4</b> Part line		
Part of line auxiliary hoist	<b>1</b> Part line		
Safe Working Load at longest boom radius	<b>80</b> ft	<b>3.76</b> Metric Tonnes/ Lbs	
Safe Working Load at shortest boom radius	<b>13</b> ft	<b>15.46</b> Metric Tonnes/ Lbs	
The document of crane specification for Testing, Maintenance and Inspection are provided by:	<b>OEM</b>	MOC / Crane Engineer	
Has the crane ever been modified by MOC?  (To verify if this crane is modified with MOC → Allow to test the crane. If this crane is modified without MOC → Not allow to test the crane)	YES	<b>NO</b>	(Employers are not allowed to modify or adjust any part of cranes or derricks or consent to other persons to do these things, that might reduce the safety of the employees who work with the cranes or derricks).
Does the rotating part have proper guard in place?	<b>YES</b>	NO	(Need mitigation plan)
Is the ladder and hand rail in place?	<b>YES</b>	NO	(Need mitigation plan)
Is the maintenance platform in place?	<b>YES</b>	NO	(Need mitigation plan)
Is the SWL tag labelled on crane pedestal, main block or aux ball?	<b>YES</b>	NO	(Need mitigation plan)
Verify if the crane major component damaged or not	YES (Need to repair or mitigate unsafe condition with MOC before testing)	<b>NO</b>	(Employers shall not allow employees work with damaged/ unsafe cranes or derricks)
Inspect boom end connections, for bends, dents, corroded areas, cracked welds, and signs of mechanical damage, wear, etc. **any deviation should be reported**  <b>Level 1</b> = Incidental: Minor deficiency that is recommended to be promptly addressed, but poses no safety and/or environmental risk. The crane can still be operated at full duty. → Allow to test  <b>Level #2</b> = Restricted Operation: Deficiency identified that has the potential to limit, de-rate or damage the crane, its surroundings and/or the environment. The duty and locked/ tagged out until the crane's duty and operation should be de-rated or service restricted. → To be derated  <b>Level #3</b> = Out of Service; The crane should be removed from duty and locked/ tagged out until the deficiency is rectified. → Not Use	YES (To be verified)	<b>NO</b>	
<b>Function Load Testing</b>			
1. Verify Crane SWL (Existing)	<b>3.0</b> Metric Tonnes		
2. Verify routine maximum actual load.	<b>2.4</b> Metric Tonnes		
3. Select the specimen load to be more than actual routine load 1.25 times but not more than SWL.  <b>Example # 1</b> : Crane's SWL is 18 Metric Tonnes. The routine maximum actual load is 2.4 Metric Tonnes. Therefore, the load testing shall be 2.4 x 1.25 = 3 Metric Tonnes.  <b>Example # 2</b> : Crane's SWL is 18 Metric Tonnes. The routine maximum actual load is 16 Metric Tonnes. By calculation, the load testing is 16 x 1.25 = 20 Metric Tonnes more than SWL (18 MTon). Therefore, the load testing shall be 18 Metric Tonnes equal to SWL.	<b>3.0</b> Metric Tonnes		
4. Use Auxiliary Winch if specimen load less than or equal 3 Metric Tonne	<b>YES</b>	NO	
5. Use Main Winch if specimen load more than 3 Metric Tonne	<b>YES</b>	NO	
6. The record of load testing: Fill in "Function Test Record" sheet attached.			

## RECORDED FUNCTION TEST PROCEDURE

1. CHECK AND RECORD READING RADIUS AND BOOM INDICATOR AT FOUR (4) VALUES INCLUDING MAXIMUM AND MINIMUM.

( ALL REDJUS MEASUREMENT ARE TO BE TEKEN FROM THE CENTERLINE OF CRANE ROTATION)

ACTUAL	INDICATED RADIUS (FT)
A) 15' (MINIMUM)	15
B) 20'	20
C) 25'	25
O) 30' ( INTERMEDIATE)	30
E) 40'	40
F) 50' (INTERMEDIATE)	50
G) 60'	60
H) 75' (MAXIMUM)	75

2. CHECK AND RECORD READING ON BOOM ANGLE / DEGREES.

SPECIFICATION	INDICATED BOOM ANGLE (DEGREES)
1). MAXIMUM. 81 DEGREES	81
2). INTERMEDIATE. 60 DEGREES	60
3). INTERMEDIATE. 40 DEGREES	40
4). MINIMUM. 0 DEGREES	0

3. READING ON LOAD INDICATOR WITHOUT SLINGS OR LOAD / LBS. (LOAD BLOCK + WIRE ROPE)

ACTUAL	INDICATOR READ FREE LOAD, (LBS)
1). MAXIMUM RADIUS 640 LBS.	700
2). MINIMUM RADIUS 640 LBS.	850

4. CHECK AND RECORD ENGINE HIGH IDLE SPEED / RPM.

SPECIFICATION	INDICATED OF FUNCTIONAL (RPM)
1). IDLE SPEED 900 RPM	900
2). LOW SPEED 900 RPM	900
3). HIGH SPEED 2200 RPM	2200

5. FUNTIONALLY TEST THE FOLLOWING.

ACTUAL	INDICATED OF FUNCTIONAL (TESTED)
A) MAIN HOIST ANTI -TWO BLOCK.	Function
B) AUXILIARY HOIST ANTI -TWO BLOCK.	Function
C) HIGH BOOM ANGLE KICK OUT.	Box boom
D) LOW BOOM ANGLE KICK OUT.	Box boom
E) PRIME MOVER SHUTDOWN.	Function
F) EMERGENCY SHUTDOWN.	Function
G) ROTATE CRANE 360 LEFT.	Smooth
H) ROTATE CRANE 360 RIGHT.	Smooth

6. RECORD HYDRAULIC RELIEF VALVE PRESSURE SETTING ON FOLLOWING HYDRAULIC FUNCTION:

SPECIFICATION	INDICATED PRESSURE (PSI)
A) MAIN HOIST 3250 PSI.	3256
B) AUXILIARY HOIST 2950 PSI.	2950
C) BOOM HOIST 3000 PSI.	3000

TEST CONDUCTED BY: Padol J. POSITION: CR. Mech  
 CRANE OPERATOR: Apichart W. POSITION: CR. Mech  
 COMMENTS: DATE: 5 Apr 22

## ▪ DETERMINING CRANE CAPACITY WITH LOAD CHART

1. Loads with weight marked:

A. Add weight of hook block to load weight.

B. Add weight of rigging to load weight (unless pre-rigged) (if pre-rigged, weight of slings is included in load weight)

C. Verify boom angle/radius needed to make lift - both hoisting and lowering if different. Indicator is approximate - if possible, measure radius for capacity lifts.

D. Find capacity of crane in proper column on load chart.

- Do not interpolate if angle, radius or load weight falls between chart values, go to safer case.
- Use static rating (at static radius to be used) for lifts off or onto a fixed platform.
- Use dynamic ratings (at dynamic radius to be used) for lifts off or onto a boat.

2. Do **Not exceed** the lowest rated capacity for the lift. Example: To move a load from the platform to the boat, there will be a rated static capacity

(capacity to lift the load from the platform at the radius used), and a rated dynamic capacity (capacity to get down on the boat at a possibly different radius).

Do Not exceed the least of the two capacities on this lift.

3. Do **Not boom down** to a lower angle (longer radius) than shown on the load chart for the weight while moving the load, Keep this minimum angle in mind at all times.

## ▪ LIFTING UNKNOWN LOADS TO DETERMINE WEIGHT

1. Verify angle or radius to be used.

2. Find capacity of crane on chart.

3. Subtract weight of hook block or ball from capacity - check/adjust zero setting on weight indicator.

4. Hoist load carefully, be aware of capacity limit on weight indicator (if available).

5. If capacity is reached on load indicator before load rises, lift cannot be made at the radius used.

6. Do Not show the weight of slings as part of the load unless pre-rigged (slings stay with load).





## Maintenance activities Daily Report

Work Order Number: 1176452 Equipment Number: BEWB-2BE-B9970  
 Work Center: CR-Mech  
 Actual Crew: 4 Actual Hour from PM Job card: 24 Actual Hour from CM: \_\_\_\_\_  
 Actual Start Date / Time: 12-14 Mar 22 / 09:00 Actual Finish Date/ Time: 12-14 Mar 22 / 16:00

## Parts

☒ JDE inventory ☐ Surplus ☐ No part issued

## Category Code

	PM (Preventive Maintenance)					CM (Corrective Maintenance)				
Work order classification	PMC	PMS				FND	FSD	PRC	PRO	REP
Primary Discipline	I	E	M	O	Q	I	E	M	O	Q
Secondary discipline (Local Code 3)						W	T			
	IIT	EEL	MME	OOP	AIM	IIT	EEL	MTT	MME	PRS
Local Code 4	MMC					CSS	OOP	AGM	AIM	
Work Identification						BIW	NBI			
						ORD	PMI	HAZ	RCA	RTF

## Related Links: \*\* CM Only \*\*

Component Code: ☐ Filter ☐ Hose/Tubing ☐ Regulator ☐ Fitting ☐ Isolator/Insulator  
☐ Bearing ☐ Gasket/Seal ☐ Belt ☐ Coupling ☐ Cooler/Exchanger  
☐ Gauge ☐ Oil/Lubricant ☐ Actuator ☐ Mech. Seal ☐ Bolt/Fastener  
☐ Pump ☐ Radiator ☐ Valve ☐ Other: \_\_\_\_\_

Failure Action: ☐ Charged ☐ Cleaned ☐ Flushed ☐ Installed ☐ Lubricated  
☐ Adjusted ☐ Replaced ☐ Removed ☐ Repaired ☐ Overhauled  
☐ Removed ☐ Refurbished ☐ Tightened ☐ Restart ☐ Reset  
☐ PM/PDM Corrective Action ☒ PM/PDM No Corrective Action  
☐ No Action Require ☐ Other: \_\_\_\_\_

## Daily Report (i-plan) Code

Task Code	AS PLAN	CANCEL	DELAY/EARLY	BIW	NBI	
Task Code Reason/Remark for Cancel Job	[Delay] Plan too short	[Delay] Issue during execution		[Delay] Interrupt by other jobs (BIW/Early/Delay)		
	[Early] Previous Jobs finish early	Man-Hr not enough due to BIW	Man-HR not enough due to delay job	Man-Hr not enough due to not plan for resource		
Task Code Reason/Remark for BIW	P1/P2 WORK ORDER	Repair/Restart Machine S/D	Urgent request from unplanned jobs		Other	

## Attachment.

Problem Descriptions: 14 Crane PM.  
 As Found: PM Generated  
 Action Taken: Follow to PM Job card

Action by: Surasak T. / Kingkarn W. / Udom T.

Possible root cause: Recommendation: N/A

As left: Normal operation

Job Completed Date: 14/3/22

Entry by/ Date: Surasak T. / 15 Mar 22

Specialist/Supervisor review and sign <For accurate data>: Surasak T. 12 May 22





BEWB

Sheet: 180B1-80

Run 4156 hr.

WO/1176452

CRANE MAKE: Nautilus  
MODEL: 180B1-80  
SERIAL NUMBER: Crane Specific

LOCATION

DATA BASE - PM JOB TASK CARD

C2 Remote Platform

Crew Size:  
Estimated Hours:

SYSTEM	TASK		Specification	Record/Reading	
Safety	Perform Job Safety Analysis (JSA)		Company Spec/Standard	YES	( ) NO
	Obtain "COMPANY" PERMIT TO WORK		Company Spec/Standard	YES	( ) NO
	Perform Tool Box Talk		Company Spec/Standard	YES	( ) NO
	BEFORE/AFTER JOB EXECUTION: Ensure to comply with isolation procedure (LOCK OUT/TAG OUT, WARNING SIGNS and BARRIERS).		Company Spec/Standard	YES	( ) NO
Required Tools	Insure proper tools are available at the job site		Company Spec/Standard	YES	( ) NO
	Tool bag		Company Spec/Standard	YES	( ) NO
	Tool box		Company Spec/Standard	YES	( ) NO
	Tool Container		Company Spec/Standard	YES	( ) NO
	MPI equipment		Company Spec/Standard	YES	( ) NO
	Check safety harness Software and Hardware should be good condition before use		Company Spec/Standard	YES	( ) NO
	Check Rescue Equipment ready to use onsite		Company Spec/Standard	YES	( ) NO
Lubricants	Portable Scaffolding and Crew if require		Company Spec/Standard	YES	( ) NO
	Insure proper lubricants and consumables are available at the job site.		Company Spec/Standard	YES	( ) NO
	Hydraulic System - Hydraulic Oil	Rando HD-68	OEM Manual	YES	( ) NO
	Slew Gearbox - Gear Oil	Meropa 220	OEM Manual	YES	( ) NO
	Auxiliary Hoist - Gear Oil	Meropa 220	OEM Manual	YES	( ) NO
	Main Hoist - Gear Oil	Meropa 220	OEM Manual	YES	( ) NO
	Grease Points - Lithium Based **IT MUST NOT INCLUDE MOLYBDENUM DISULPHIDE**	MULTIFAK EP#2	OEM Manual	YES	( ) NO
	Open Gear Teeth - Open Gear Lube highly water resistant and of an adhesive nature.	OMEGA 73	OEM Manual	YES	( ) NO
	Pneumatic Lubricator	SAE Grade 10	OEM Manual	YES	( ) NO
	Wire rope Lubricant Company preferred grade	Birlube 70	OEM Manual	YES	( ) NO
	Engine Oil - SAE Grade 15W-40 (Delo Gold)	15W-40	OEM Manual	YES	( ) NO
	Safe Load Indicator fluid	W-15	OEM Manual	YES	( ) NO
	Engine Radiator - Should have radiator preservatives additives	Cat® SCA	OEM Manual	YES	( ) NO
Consumables	Spray Cold Galvanize		Company Spec/Standard	YES	( ) NO
	Denso Tape		Company Spec/Standard	YES	( ) NO
	WD-40		Company Spec/Standard	YES	( ) NO
History Review	Before starting work, tasks preparation at least 1 day prior to starting work: 1. Review history winch gear inspection and boom replacement 2. Review last PM/ CM/ PMI from Crane Mech, 3. List out all punch list and prepare parts. 4. Review last Certificate task performed		API RP 2D	YES	( ) NO
	Require to update part history from Crane Mech on following main compenents to ensure the right parts are prepared: - Aux/ Main/ Boom Cylinder, Engine, Swing Gearbox, etc. Reference: Crane OEM information of each part need to be recorded - Manufacturer & Contact info - Model & serial number - Installation date		Company Spec/Standard	YES	( ) NO
	Review history data from Certificates and incorporate into current PM: - Pull Test Certificates (ongoing update, 4 yr. history). - Load Test Certificates (ongoing update, 4 yr. history). - Wire Rope Certifications (running rope and standing rope) (life of rope). - Hoist Certifications for hoist classified as "personnel handling" hoist.		API RP 2D	YES	( ) NO
	Review Last Preventative Maintenance Records (Inspection Reports) - Pre-use (Pre-Post Inspection) - 6 Monthly (API RP 2D Not Defined, Company Standard) - 1 Yearly (API RP 2D Defined Annual Inspection)		API RP 2D	YES	( ) NO
Lifting Gear	Visually Inspect (Sling, sling hooks and shackles) include Websling / Chain		Company Spec/Standard	YES	( ) NO
Preparation	Check color code / Tag & date inspection		Company Spec/Standard	YES	( ) NO
General	Determine if access route to/from crane is clean, safe, unobstructed and adequately protected against falls, tripping and slipping		Company Spec/Standard	YES	( ) NO
	Check drain lines and drip pans for deterioration		API RP 2D	YES	( ) NO
	Remove any sediment collected in the bottom of drip pans		Industry Standard	YES	( ) NO
	Check for general crane and components for loss of protective coating and corrosion		Industry Standard	YES	( ) NO
	Check for missing or loose, corrosion, deformation pins, pin keepers, bolts, nuts, fasteners of all ladders, cages and working platform		API RP 2D	YES	( ) NO
	Apply grease to exposed grease parts (control valve spools, ball-ring gear, parking brake valve, etc.)		OEM Manual	YES	( ) NO
Prime Mover	Engine CATERPILLAR		OEM Manual		
	CATERPILLAR MODEL □ 3304DI	S/N.:	OEM Manual	332162A	
		ARR.No.:	OEM Manual		
	Check lube oil level and condition, top up / replace if required		OEM Manual	YES	( ) NO
	Check diesel tank level, top up if required.		OEM Manual	YES	( ) NO
	Check/Clean crankcase breather cap		OEM Manual	YES	( ) NO
	Check/Clean air cleaner		OEM Manual	YES	( ) NO
	Check Condition of radiator / clean radiator cap		OEM Manual	YES	( ) NO
	Check for any signs of leaks on or around the engine ie; Crankshaft seal (front/rear)		OEM Manual	YES	( ) NO
	Check for engine exhaust system for leaks, corrosion, insulation and general condition		OEM Manual	YES	( ) NO
	Check all engine hoses for wear and deterioration		OEM Manual	YES	( ) NO
	Drain water and sediment form diesel tank		OEM Manual	YES	( ) NO
	Lubricate fan bearing/shaft		OEM Manual	YES	( ) NO



SYSTEM	TASK	Specification	Record/Reading
	Change Radiator Coolant	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Test radiator Coolant PH, Top up if required and Record Value	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	COOLANT PARAMETERS (PH): 6 or higher	OEM Manual	PH = <u>7</u>
	Determine if engine hour meter is working and giving accurate measurements and record:	OEM Manual	
	HOUR METER PARAMETERS: LAST READING <u>1186</u> HRS	OEM Manual	<u>1193</u> HRS
	Check condition of engine hold down bolts	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change cooling fan drive belts	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition fan blade	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change drive belt of recharging pump. If required	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check belts for wear and looseness. If necessary, replace or adjust. To check belt Tension, apply 110 N (25 lbs) of force midway between the pulleys. Correctly adjusted belts with deflect 13 to 19 mm (1/2 to 3/4 inch).	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check engine starter drive gear bendix and fly wheel gear teeth condition and record. **Replace if required"	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO Bendix Gear : <u>80</u> % Fly wheel Gear teeth : <u>80</u> %
	Check condition Ratchet of Bendix HYD Starter	OEM Manual	Ratchet: <u>80</u> %
	Lubricate and exercise engine throttle linkage, if applicable	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if the tachometer operates properly: Record Value of Idle & Max Speed (RPMs) Note: Too low Idle (RPMs) will cause excessive worn at winch break	OEM Manual	
	ENGINE RPM SPECIFIC** IDLE SPEED 850-950 RPM	OEM Manual	<u>850</u> RPM
	MAX SPEED 2200 RPM	OEM Manual	<u>2200</u> RPM
	Confirm engine oil pressure as per Parameters below and Record Value:	OEM Manual	
	ENGINE OIL PRESSURE SPECIFIC** Minimum 30 PSI	OEM Manual	<u>30</u> PSI
	Maximum 70 PSI	OEM Manual	<u>85</u> PSI
	Confirm engine fuel pressure Parameters are correct and Record Value:	OEM Manual	
	ENGINE 3304 DI FUEL PRESSURE SPECIFIC** Normal Green Range/ 15 PSI **Note; Fuel pressure at high idle is lower than 105 kPa (15 psi) PARAMETERS	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Confirm engine temperature Parameters and Record Value:	OEM Manual	
	ENGINE CAT 3304 DI WATER TEMP PARAMETERS NORMAL 120 - 180 degrees F	OEM Manual	<u>170</u> F
	Test engine SAFETY DEVICE- ensure engine kill cable shuts off FUEL supply	API RP 2D	<input checked="" type="checkbox"/> Function ( ) False
	Test engine SAFETY DEVICE- ensure LOW LUBE OIL PRESSURE - releases OIL PRESSURE to trip the Fuel Supply and shutting down engine. (CAT 3304DI only)	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False
	Test engine SAFETY DEVICE- ensure HIGH TEMP - releases OIL PRESSURE to Trip Lube Oil Shut Down Engine. (CAT 3304DI only)	Company Spec/Standard	<input type="checkbox"/> Function ( ) False
	Check / Clean primary fuel *Replace if required*	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition of turbocharger, and for any oil or hot air leaks	OEM Manual	( ) Leak <input checked="" type="checkbox"/> Not Leak
	Change engine lube oil and oil filter	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change fuel filter	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change air filter, if required	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check fuel injection pump/governor for any leak and noise	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check/Adjust engine lash valve, inspect valve rotators valve clearance (IN = 0.015", EXT = 0.025")	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check timing point (timing mark & injection pump ( CAT Engine 3304 DI only) Re-torque hold down bolts (for DI only 200+/-20 FT-LBS)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change gasket valve cover	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check and Inspect condition wear of pump drive spline and record **Note; Remaining 70% of Original Spline Surface must be replace.	Company Spec/Standard	<u>75</u> % Remaining
	Check and Inspect condition wear of Coupling spline and record **Note; Remaining 70% of Original Spline Surface must be replace.	Company Spec/Standard	<u>75</u> % Remaining
	Check and Inspect condition wear and crack of Coupling Drive Plate	Company Spec/Standard	<u>85</u> % Remaining
	Retorque bolts of Coupling Drive Plate ( tread size 5/16 inch=18±4.5/ tread size 3/8 inch =35±7 FT-lb)	OEM Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Evaluate engine performance, tune up if required	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
Hydraulic Start System (Apply for C2-Remote P/F Only)	Check pressure system at the pressure gauge which should reach 3,000 PSI as standard when the system is FULLY charged. Record Value. (As the system cools down, the pressure should drop slightly and finally stabilised.)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Visually inspect all hydraulic connections and hoses for leaks and retighten if necessary. (Caution: This should NOT be done if the system is under pressure.) 1. Slowly release system pressure by loosening the bleed screw on top of the hand pump. 2. Ensure no pressure remains, retighten the suspected leak fitting or replace the damaged hose or component. 3. Retighten the bleed screw on the hand pump. 4. Pump the system up to 2200 - 2600 PSI 5. Inspect that the leak was eliminated.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO



SYSTEM	TASK	Specification	Record/Reading
	<b>Function check Accumulator Pre-charge.</b> (Caution: This should NOT be done if the system is under pressure.) 1. Shut the engine off, release system pressure via the bleed screw on top of the hand pump 2. Retighten bleed screw and actuate the hand pump. The pressure will rapidly increase and then stabilised. This pressure is related to accumulator gas pre-charge pressure. 4. If the pressure rapidly increase to 3000 PSI, it indicates that the accumulator has lost its gas charge. 5. Troubleshoot as necessary	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	<b>Check the unloading valve integrity with the engine running.</b> 1. Slowly release system pressure by loosening the bleed screw on top of the hand pump. 2. Tighten bleed screw on top of hand pump and notice pressure in system will increase. 3. This pressure should read between 2200 - 2600 PSI depending on the recharge ratio 80% std. (90% optional). Record Pressure Value.	OEM Manual	<u>2500</u> PSI
	Check Nitrogen pressure in Accumulator ***Note**spec @ 1,500 psi as follow schematic and if found pressure loss below 1400 PSI then prepare recharge nitrogen in system	OEM Manual	<u>1500</u> PSI
Pneumatic System	Check for noisy Air compressor operation, which could indicate a worn drive gear coupling, a loose pulley or excessive internal wear	Company Spec/Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check Air Compressor external oil supply and return lines, if applicable, for kinks, bends, or restriction to flow	Company Spec/Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Inspect the Air compressor discharge port, inlet cavity and discharge line for evidence of restrictions and carboning. (If excessive buildup is noted)	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check all hose connections are sound and all mounting and pivoting connections are secure.	Industry Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check condition / Clean and lubricate unloading valve	Industry Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check proper air pressure is available for the system. Record Value.	OEM Manual	
	AIR SYSTEM PARAMETERS: MAX 60 PSI	OEM Manual	
	Visually inspection condition of air receiver for signs of corrosion or loose of structural integrity.	Industry Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check the hose, piping and tubing for mechanical damage, corrosion, splits, blisters, cracking or excessive abrasion on the outer surface	Industry Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Drain off air filter and receiver to remove condensed water. If water is present, drain until water is removed.	Industry Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check proper operation of pop off valve, by manually functioning valve.	Industry Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check proper operation of manual latch valve, by manually functioning latch.	Industry Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Hoist / Brakes	Check proper operation of small engine alarm horn.	Industry Standard	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Visually check a hoist exhibits erratic operation and/or unusual noise, the hoist must be taken out of service until it is inspected and serviced by a qualified technician. Continued operation of a hoist with a defect in a critical component may lead to loss of load control, property damage, serious injury or death.	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Visual exteriors of hoist, frames, drums and flanges for damage, leaks, cracks and wear and repair/replace as required to maintain the structural integrity of the hoist.	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check all hoist mounting pins, bolts or other fasteners and replace or tighten as necessary.	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Lubricant level must be maintained between the minimum and maximum levels; midway up sight glass or at bottom of level plug port as equipped and check/clean plug vent. Use only the recommended type of lubricant.	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Inspect Brake Valve Opening Pressure test V/V 1-1/4" PD Series: no lower than 550 PSI	Main Braden Bulletin 527-Dec,1996	<u>600</u> PSI
	Inspect Brake cylinder opening pressure test. CH/PD Series: 400-450 PSI	Main Industry Standard	<u>450</u> PSI
	Measure differancian of static and dynamic brake. CH/PD Series: 150-250 PSI	Main Industry Standard	<u>150</u> PSI
	Check for external oil leaks and repair as necessary. This is extremely important due to the accelerated wear that will result from insufficient lubricating oil in the hoist.	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	RECORD BOOM CYLINDER INFORMATION :	Boom cylinder Diameter:	OEM Manual DIA: <u>12</u> Inch
		CY Number:	OEM Manual L- <u>54618</u> -R= <u>5468</u>
		Serial Number:	OEM Manual L- <u>54618-3</u> -R= <u>5467</u>
	RECORD MAIN HOIST INFORMATION :	Manufacturer:	OEM Manual Braden
		Model:	OEM Manual <u>CH185A36120-02-7</u>
		Serial Number:	OEM Manual <u>9706017</u>
	Check MAIN HOIST for proper operation and good condition	API RP 2D	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Brake test & record pressure of MAIN HOIST	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check MAIN HOIST gear oil level/condition, top up if required. ** Refer to Onsite Gear Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference**	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Change main hoist gear oil	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	RECORD AUXILIARY HOIST INFORMATION :	Manufacturer:	OEM Manual Braden
		Model:	OEM Manual <u>PD 15B-61064-04-1</u>
		Serial Number:	Inspector's Assessment <u>9805605</u>
	Check AUXILIARY HOIST for proper operation and good condition	API RP 2D	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Brake test & record pressure of AUXILIARY HOIST	API RP 2D	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Check AUXILIARY HOIST gear oil level/condition, top up if required. ** Refer to Onsite Gear Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference**	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	Change auxiliary hoist gear oil	OEM Manual	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO



SYSTEM	TASK				Specification	Record/Reading
	<b>Check Relief Valve:</b> Determine hoistes' relief valve pressure gauge is working and giving accurate measurement by notice whether pressure gauge is vibrating or not. If not, set relief valve pressure in accordance with the schematic and parameters below. Record all readings.				OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	BOOM RELIEF VALVE TEST	Relief Specific:	2,700 PSI	OEM Manual	2700 PSI	
	MAIN HOIST RELIEF VALVE TEST	Relief Specific:	2,700 PSI	OEM Manual	2700 PSI	
	AUX HOIST RELIEF VALVE TEST	Relief Specific:	2,700 PSI	OEM Manual	2700 PSI	
	SWING RELIEF VALVE TEST	Relief Specific:	1,200 PSI	OEM Manual	1200 PSI	
	<b>Measure Pressure of hoist motor case drains and Record Value</b> <b>Reference Bulletin:</b> BRADEN Inspection, Testing, Preventive Maintenance and Special Operating Instructions For Planetary Hoists PB-308 latest edition for further details.				OEM Manual	
	MAIN HOIST CASE DRAIN for Gear Motor (Down Mode).	PRESSURE	< 100 psi	Company Spec/Standard	0 PSI	
	AUX. HOIST CASE DRAIN for Gear Motor (Down Mode).	PRESSURE	< 100 psi	Company Spec/Standard	17 PSI	
Hydraulic System	Check hydraulic tank oil level. Oil should be visible in the sight glass. Top up as required (3/4 Tank Minimum)				OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check hydraulic oil condition. (Check if running hours are more than 100 hours from last oil change or during Annual inspection) ** Refer to Onsite Hydraulic Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference **		Rando HD-68	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Drain off 1 liter of oil to remove condensed water. If water is present, drain until water is removed and top up with clean oil				Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check for any hydraulic leaks				Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check the hydraulic hose, piping and tubing for mechanical damage, corrosion, splits, blisters, cracking or excessive abrasion on the outer surface				API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check that all hydraulic hose connections are sound and that all mounting and pivoting connections are secure.				Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricate hydraulic swivel in pedestal and insure tie down restrains are in place and preventing the swivel from rotating with the crane structure.				OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Ensure the filler breather on tank is not covered or clogged				Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Visually inspect for missing or loose pins, pin keepers, bolts, nuts, fasteners on all pumps, motors and valves				API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check the filter bypass indicator, while engine is running				OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	With engine running (after all other items pass inspection), check the system for leaks around fittings, hoses, valves and reservoirs				Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	With engine running, check the source of any unusual noise or vibration that may cause or indicate equipment damage or wear				Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Ensure all hoses are properly rated for the system, see "Parameters" for each system for details.				Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Record hydraulic oil operating temperture. Note: Hydraulic fluid overheating temperature is over 180 F degrees or 82 C, degrees (reservoir temperature)				Industry Standard	120 Degree F
	Determine if hydraulic return pressure gauge is working and giving accurate measurements. Record readings					
	<b>RECORD HYDRAULIC RETURN PRESSURE PARAMETERS:</b>		60 PSI "maximum"	OEM Manual	7-10 PSI	
	Change hydraulic return filters and seals				OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Test all hydraulic relief valves and record pressures with engine at :		2200 RPM	API RP 2D		
	<b>BOOM FUNCTION TEST</b> (Need Crane Mech to verify each platform)				OEM Manual	
	Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual	200 PSI
			Full Speed Pressure	RECORD	OEM Manual	800 PSI
		DOWN	Cracking pressure	RECORD	OEM Manual	800 PSI
			Full Speed Pressure	RECORD	OEM Manual	1200 PSI
	<b>MAIN HOIST FUNCTION TEST</b> (Need Crane Mech to verify each platform)				OEM Manual	
	Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual	200 PSI
			Full Speed Pressure	RECORD	OEM Manual	500 PSI
		DOWN	Cracking pressure	RECORD	OEM Manual	500 PSI
			Full Speed Pressure	RECORD	OEM Manual	1200 PSI
	<b>AUX HOIST FUNCTION TEST</b> (Need Crane Mech to verify each platform)				OEM Manual	
	Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual	500 PSI
			Full Speed Pressure	RECORD	OEM Manual	500 PSI
		DOWN	Cracking pressure	RECORD	OEM Manual	500 PSI

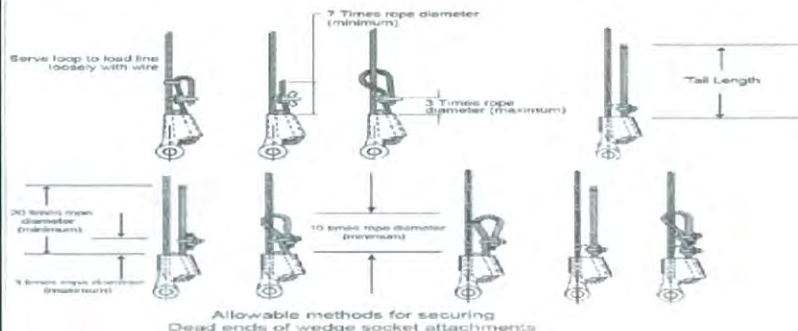
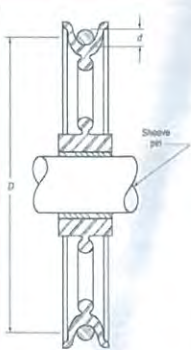


SYSTEM	TASK				Specification	Record/Reading	
		DOWN	Full Speed Pressure	RECORD	OEM Manual	1300 PSI	
	SWING FUNCTION TEST (Need Crane Mech to verify each platform)				OEM Manual		
	Via cross over relief valve, from Boom Control valve Boom Angle : 60 Degree (Recommend or as applicable)	LEFT	Cracking pressure	RECORD	OEM Manual	300 PSI	
			Full Speed Pressure	RECORD	OEM Manual	500 PSI	
		RIGHT	Cracking pressure	RECORD	OEM Manual	300 PSI	
			Full Speed Pressure	RECORD	OEM Manual	500 PSI	
Electrical system and Crane Boom Lighting	Check the electrical junction boxes, wires and connections for deterioration, desiccant bags, (replace as required)				Industry Standard	YES ( ) NO	
	Check the condition of the grounding and lighting protection system.				Company Spec/Standard	YES ( ) NO	
	Visually inspect boom floodlight and light guards for loose, missing, corroded				Company Spec/Standard	YES ( ) NO	
	Check condition pipe support , U-bolt ,nuts of boom floodlight and Electric sliring for loose , missing , corroded				Company Spec/Standard	YES ( ) NO	
	Check Electric sliring/swivel for 360° continuous rotation				OEM Munnal	YES ( ) NO	
	Check Water ingress, condensation in electric sliring and boom floodlight				OEM Munnal	YES ( ) NO	
	Check feely movement and lubricate of boom floodlight				OEM Munnal	YES ( ) NO	
	With generator in operation, intergize all lights to unsure proper function.				API RP 2D	YES ( ) NO	
	Check condition of crane boom lighting and safety net is secured with strong point. * **Safety net should be replace 24 months after installation (2 year)***	Last installation date			Company Spec/Standard	YES ( ) NO	
	Check function of crane sound signal				Company Spec/Standard	YES ( ) N/A ( ) NO	
	Check function of crane boom lighting at boom upper section				Company Spec/Standard	YES ( ) N/A ( ) NO	
	Check function of crane boom lighting at boom lower section				Company Spec/Standard	YES ( ) N/A ( ) NO	
	Check function of crane boom lighting at winch skid				Company Spec/Standard	YES ( ) N/A ( ) NO	
	Check function of crane boom lighting at crane cabin				Company Spec/Standard	YES ( ) N/A ( ) NO	
	Check function beacon light at boom tip				Company Spec/Standard	YES ( ) N/A ( ) NO	
	Inspection wire rope guide & Roller assembly				Company Spec/Standard	YES ( ) NO	
	Hyd Driven Generator	Visually inspect crane boom light and boom light guard, insure that is secure and not damaged.				Company Spec/Standard	( ) YES ( ) NO
		Check condition of intake and exhaust air screens of generator to insure they are clean				OEM Manual	( ) YES ( ) NO
		Inspect generator for any buildup of contamination (dirt, oil, etc.) on the windings.				OEM Manual	( ) YES ( ) NO
With engine running @ 2,000 rpm minimum intergize genearator check voltage & Hz				OEM Manual	( ) YES ( ) NO		
With generator running check for any unusual noise or vibration from generator bearings				OEM Manual	( ) YES ( ) NO		
With lights on monitor generator RPMs for hunting, reference Hz and Voltage at panel.				OEM Manual	( ) YES ( ) NO		
Operator Control Station	Check general condition of control panel, bolts, paint security, etc.				API RP 2D	YES ( ) NO	
Operator Control Station	Determine if there is a serviceable fire extinguisher in the vicinity of the crane				Company Spec/Standard	YES ( ) NO	
	Determine if correct load chart is in use and easily visible for operator				API RP 2D	YES ( ) NO	
	Determine if charts, indicators and hand signal chart are in the cabling and firmly attached				API RP 2D	YES ( ) NO	
	Determine if angle/radius indicator plate is easily visible to operator and is moving freely.				API RP 2D	YES ( ) NO	
	Check condition of control levers and determine if they "dead-man" back to the neutral position.				API RP 2D	YES ( ) NO	
	Check condition of pressure gauges.				API RP 2D	YES ( ) NO	
	Check proper control labels are firmly installed, completely legible and properly labeled				API RP 2D	YES ( ) NO	
	Check controls for freedom-of-movement				API RP 2D	YES ( ) NO	
	Check all safety glass and rubber seal for proper condition				API RP 2D	YES ( ) NO	
Load Indicator System	Function Test Horn				Industry Standard	YES ( ) NO	
	Visual check on fittings and connections for leaks. Fix leak if any.				OEM Manual	YES ( ) NO	
	Should any leaks exist, stop leak and recharge system, refer to maintenance manual				OEM Manual	YES ( ) NO	
	Change Load cell fluid				OEM Manual	YES ( ) NO	
	Check general condition of tubing, hoses, pins bolts, paint, etc.				Industry Standard	YES ( ) NO	
	Insure load cell is free of obstructions				OEM Manual	YES ( ) NO	
	Check condition of gauge(s) face and clean glass as required.				OEM Manual	YES ( ) NO	
	Check weight indicator function (Main)				Company Spec/Standard	YES ( ) NO	
	Check weight indicator function (Aux)				Company Spec/Standard	YES ( ) NO	
	Check weight indicator fluid, top up if required				Industry Standard	YES ( ) NO	
	Insure Safe Working Load, matches ratings on the Crane Load Chart				OEM Manual	YES ( ) NO	
	Insure Boom Length, matches the Crane Load Chart				OEM Manual	YES ( ) NO	
	Insure Boom Angle measurements and readings match the boom angle indicator.				OEM Manual	YES ( ) NO	
	Insure Boom Radius measurements indicate the distance from center line of the crane to the hook				OEM Manual	( ) YES ( ) NO	
	Check Main load cell gap 1/4 (0.250) inch				OEM Manual	YES ( ) NO	
	Check Aux load cell gap 3/8(0.380) inch (Compression Load Cell Type)				OEM Manual	YES ( ) NO	
	Check weight indicator accuracy "maximum variance +/- 2%				Industry Standard	YES ( ) NO	

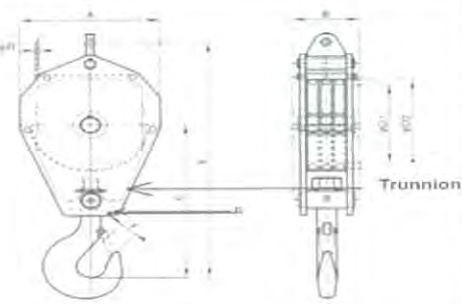


SYSTEM	TASK	Specification	Record/Reading
Pedestal & Structure	Visually check Pedestal for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks weld, etc.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check water rain drain at pedestal must be not obstruct	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check pin and cotter pin of pedestal missing, corrosion, wear, damage and exercise pin.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Visually check Base - Plate connection and Base hoist Structure for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks weld, etc.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check A fixed such as Handrail, Walkway, Grating, stationary structure without significant movement in response to waves and currents in normal operating conditions.	API RP 2C	<input checked="" type="checkbox"/> YES ( ) NO
Box Boom & Luffing CYD	Check and Verify entire box boom and Boom CYD for loss of protective coating and corrosion	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check and Verify entire box boom and Boom CYD for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks, etc.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check and Verify boom end connections, for bends, dents, corroded areas, cracked welds, and signs of mechanical damage, wear, etc. <b>**any deviation should be reported**</b>	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check and Verify boom rest and wooden support to ensure it's in good condition	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Inspect pin and pin holes of Upper tank and Lower tank for excessive clearance	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	BOOM CYLINDER PIN MAXIMUM TOLERANCE	1/8" (3mm) Industry Standard	0.010 inch
	Check BOOM CYLINDERS for proper operation and good condition	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check Boom cylinder barrels and rods for leaks, mechanical damage and corrosion	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check and measurement boom foot pin and connection pins for clearance	Industry Standard	
	BOOM FOOT PINS & BOOM BOX CONNECTER PIN TOLERANCE	1/8" (3mm) Industry Standard	
	Boom Foot Pin Tolerance	Industry Standard	0.019 inch
	Boom Box Connector Pin Tolerance	Industry Standard	0.020 inch
	Check connecting bolts of box boom loose, corrosion, wear, damage	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricate boom foot pins and bushings	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricate boom cylinder pins, bearings and bushings	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Boom function test angle/radius to correction <b>**Note:</b> The cylinder(s) mechanism shall be capable of elevating the boom from a minimum of zero degrees to the maximum recommended boom angle.	API RP 2C	<input checked="" type="checkbox"/> YES ( ) NO
	Operation functional test and verify Boom Creeping down <b>**Note:</b> Test at angle 60 °	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
Wire Rope	Determine if parts-of-line match parts of line on the load chart in the crane cabin.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if visible portion of wire rope adequately lubricated. If not lubricate wire rope	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	For each layer of wire rope on drum, check that all rope is parallel and each crossover point at hoist flanges is correct	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	The top layer of rope must not be lower to the flange tips 2.5 in for Smooth drum, 2 in for groove drum or 2.5 times of wire rope diameter	API RP 2C	<input checked="" type="checkbox"/> YES ( ) NO
	Inspect wire rope for, kinking, crushing, broken wires, necking down of rope diameter, worn outside wires, corroded or broken wires at end connection, cutting or unstringing.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	<b>**Note**Running Ropes of rotation-resistant construction used in the main or auxiliary Hoist:</b> - Four (4) Randomly distributed broken wires within 30 rope diameter - Two (2) broken wires in one stand within 6 rope diameter	API RP2D Edition 7	None
	One valley break can indicate internal rope damage requiring close inspection of this section of the rope. When one or more valley breaks are found in one lay length the rope should be retired.	API RP2D Edition 7	None
	Reductions for the rope diameter, from initial wire rope dimensional measurements, in a nonworking area (an area away from the sheaves) compared to the lowest diameter of rope measured in three working areas (areas where the rope regularly goes over a sheave) of more than the following is observed: — 3/64 in. (0.047 in.) (1.2 mm) for diameters up to and including 3/4 in. (19.1 mm); — 1/16 in. (0.062 in.) (1.6 mm) for diameters of 7/8 in. to 1-1/8 in. (22.2 mm to 28.6 mm); — 3/32 in. (0.093 in.) (0.8 mm) for diameter of 1-1/4 in. to 1-1/2 in. (31.8 mm to 38.1 mm); — For rope diameters greater than 1-1/2 in., a 5 % diameter loss from baseline measurement. — Wear of one-third the original diameter of the outside individual wires	API RP2D Edition 7	None
	Increase in the length of an individual rope lay is observed. This increase in lay length and accompanying reduction in diameter can be caused by failure of the core. This can occur more readily in ropes or rotation-resistant construction.	API RP2D Edition 7	<input checked="" type="checkbox"/> YES ( ) NO
	-Inspection and Verify running and standing rope from heat effect <b>**Note:</b> Not more than 250°C -There is evidence of heat damage from any source (i.e. engine exhaust, flare towers, stress corrosion cracking, etc.). Heat can be generated by passing a rope over a frozen or non-turning sheave, contact with structural members of the crane, improperly grounded welding leads or lightning strikes	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	With the boom at the highest possible angle and the main load block or overhaul ball at the water level, ensure there is a minimum of 5 wraps of wire-rope remaining on the drums. Note: (Thai law, requires minimum of 2 wraps)	API SPEC 2C / Thai Law	<input checked="" type="checkbox"/> YES ( ) NO
	<b>Reference:</b> · Running rope safety factor not less than 6 for wire rope that are running wire, (Thai law; Wire rope nominal breaking strength x number parts of line / Design factor 6) · Standing rope safety factor not less than 3.5 for wire rope that are stay cables, (Thai law)	Thai Law	<input checked="" type="checkbox"/> YES ( ) NO

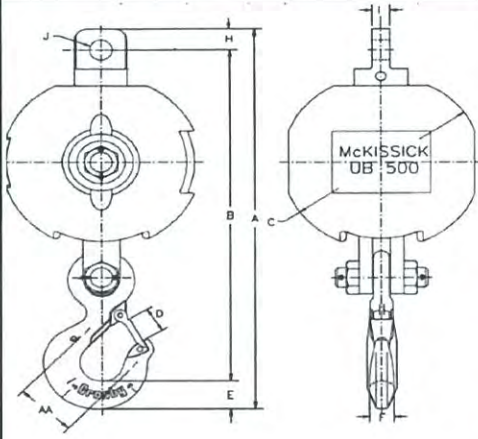
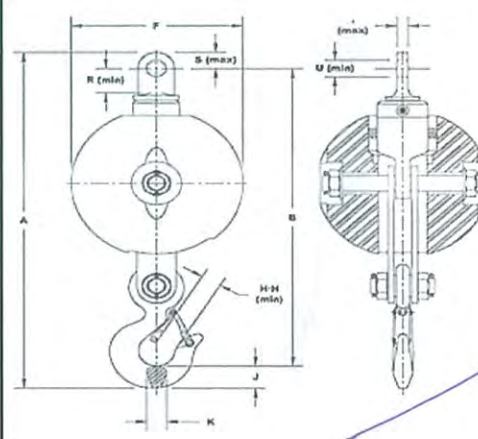


SYSTEM	TASK	Specification	Record/Reading																
	Measure and record nominal diameter of "running ropes" main and auxiliary (particularly on drum, equalizer sheave and at sockets, clips and dead end points) *****Nominal = several measurements added together divided by Number of measurements*****	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																
	Inspect wire rope and record size below:	API RP 2D																	
	<table border="1"> <thead> <tr> <th>MAIN WIRE ROPE OD:</th><th></th><th></th><th></th></tr> </thead> <tbody> <tr> <td></td><td>FULL DRUM</td><td>OEM Manual</td><td>0.971 inch</td></tr> <tr> <td></td><td>HALF DRUM</td><td>OEM Manual</td><td>0.972 inch</td></tr> <tr> <td></td><td>WATER LEVEL</td><td>OEM Manual</td><td>0.977 inch</td></tr> </tbody> </table>	MAIN WIRE ROPE OD:					FULL DRUM	OEM Manual	0.971 inch		HALF DRUM	OEM Manual	0.972 inch		WATER LEVEL	OEM Manual	0.977 inch		
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AUX WIRE ROPE OD:																			
	FULL DRUM	OEM Manual	0.685 inch																
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	WATER LEVEL	OEM Manual	0.684 inch																
	Slip-Cut 1 meter of all ropes at the wedge socket and re-wedge to prevent rust inside of wedge socket (at outward end of rope, not on hoist drum) Dead end tail length is never less than 6 inches, or: - Standard 6 to 8 Strand wire rope is not less than 7 times the rope diameter - Rotation Resistant Wire Rope is not less than 20 times the rope diameter	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO																
	U-bolt and Fist Grip Clips: Extreme care should be exercised to assure proper orientation of U-bolt clips. The U-bolt segment shall be in contact with the wire rope dead-end. The orientation, spacing, torquing, and number of all clips shall be in accordance with the crane manufacture's specifications.	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO																
		API SPEC 2C																	
	Verify that the wedge socket and wedge are the correct size for the rope in use and record the size	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO																
Sheaves & Bearings	Lubricate all sheave bearings	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																
	Visually inspect all sheaves and bushings for cracks, wear and deterioration	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																
	Visually inspect wire rope track of sheave for rope imprints, wear and deterioration. If damage exist sheave should be resurfaced or replaced.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																
	Pins retained by snap rings, bolt lock shafts, plates lock should be checked for missing or loose for all	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																
	Check wirerope guards and keepers for proper location and condition.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																
	Determine if wire rope is jumping the sheaves, by looking for signs of damage on the sheave brim	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO																
	Sheave Rope Profile for optimum Rope life the sheave groove profile should be correctly matched to the rope diameter	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO																
	Check rope sheave should be machine grooved to adepth of not less than 1.5 times the normal diameter of the rope	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO																
	Ensure the sheaves are aligned and the fleet angle is correct **Remark ; Wire rope User's Manual allows 2 degree on grooved winch drum, Smooth Drum should be not more than 1-1/2 degree	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO																
	Determine if wire rope size and sheave sizes/grooves are compatible and record size. Sheave pitch diameter (D) to nominal wire rope diameter (d) ratio (D/d) shall not be less than 18:1	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO																
	 <table border="1"> <thead> <tr> <th>MAIN POINT SHEAVES:</th><th>SHEAVE D / WIRE ROPE d = &gt;18</th><th>API SPEC 2C</th><th>           20 inch (D)            0.750 inch (d)            26.6 (Ratio D/d)         </th></tr> </thead> <tbody> <tr> <td>AUX SHEAVES:</td><td>SHEAVE D / WIRE ROPE d = &gt;18</td><td>API SPEC 2C</td><td>           20 inch (D)            0.685 inch (d)            32 (Ratio D/d)         </td></tr> <tr> <td>IDLER SHEAVES:</td><td>SHEAVE D / WIRE ROPE d = &gt; 18 (If applicable)</td><td>API SPEC 2C</td><td>           16 inch (D)            0.950 inch (d)            21.3 (Ratio D/d)         </td></tr> <tr> <td>MAIN BLOCK SHEAVES:</td><td>SHEAVE D / WIRE ROPE d = &gt; 16</td><td>API SPEC 2C</td><td>           16 inch (D)            0.750 inch (d)            21.3 (Ratio D/d)         </td></tr> </tbody> </table>	MAIN POINT SHEAVES:	SHEAVE D / WIRE ROPE d = >18	API SPEC 2C	20 inch (D) 0.750 inch (d) 26.6 (Ratio D/d)	AUX SHEAVES:	SHEAVE D / WIRE ROPE d = >18	API SPEC 2C	20 inch (D) 0.685 inch (d) 32 (Ratio D/d)	IDLER SHEAVES:	SHEAVE D / WIRE ROPE d = > 18 (If applicable)	API SPEC 2C	16 inch (D) 0.950 inch (d) 21.3 (Ratio D/d)	MAIN BLOCK SHEAVES:	SHEAVE D / WIRE ROPE d = > 16	API SPEC 2C	16 inch (D) 0.750 inch (d) 21.3 (Ratio D/d)		
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MAIN BLOCK SHEAVES:	SHEAVE D / WIRE ROPE d = > 16	API SPEC 2C	16 inch (D) 0.750 inch (d) 21.3 (Ratio D/d)																
Load Block	Load Block: Check the load block for cleanliness, binding sheaves, damaged or worn sheaves, worn or distorted sheave pins, broken bolts, and worn cheek weights.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO																



SYSTEM	TASK	Specification	Record/Reading
	<b>Hook:</b> Check the hook damage, excessive wear to the hook safety latch, hook swivel trunnions, thrust collar, securing, damage or missing lubrication fittings, proper lubrication, cracks and gouges, and if visibly bent or twisted or has been exposed to welding or arching.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Hook: Tip has been bent more than 10 degree out of plane from the hook body	Industry Standard/API RP2D7	<input checked="" type="checkbox"/> YES ( ) NO
	Pins for bronze bushing and straight roller bearing should have a running clearance of .031 inch/ sheave of end play and should be adjusted accordingly	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Hook or shackle to swivel case clearance is set at .031 to .062 inch, Clearance exceeding .12 to .18 (ONLY CROSBY BRAND)	OEM Crosby	<input checked="" type="checkbox"/> YES ( ) NO
	<b>OEM STANDARD RECOMMEND that Crane block removal from service untill replaced and repair following below</b>	OEM STANDARD	
	- Elongated center pin and hook trunnion holes exceeding 5% of Original diameter	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO
	-Material loss due to wear exceeding 10% of original section	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO
	-Sheave wire rop groove diameter smaller than 2.5%	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO
	Loosened tie bolts nuts, center pin round nuts, check weight cap screws and hook nut cap screws. Tie bolt nuts to be torqued to 35-40 ft.Lbs and restaked, all other fasteners wrench tight	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO
	Throat opening - any distortion causing an increase in throat opening of 5% not ot exceed 1/4 in. (6 mm.)(or as recommended by the manufacturer)	ASME B30.10	<input checked="" type="checkbox"/> YES ( ) NO
	Inspect rope track worn in sheave groove, sheave must be resurface or replace	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Ensure the load block is not using "Cast Iron" cheek weights they can not be used as per API	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if all hooks are equipped with properly operating safety latches and check for proper functioning	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricate sheave bearings and swivels	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Re-tighten nut firmly to point at which trunion will just rotate, the Re-tighten set-screw in nut and thread condition as in the picture below,	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Last NDE inspection record	Industry Standard	Last inspect date _____
	<b>RECORD LOAD BLOCK INFORMATION :</b>		Manufacturer: OEM Manual Model: OEM Manual Serial Number: OEM Manual
	Record Load block measurements and details for future comparison with historical data	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
		A - Block OD	Industry Standard
		B - Block length	Industry Standard
		C - Center of Pin to hook Saddle	Industry Standard
		D1 - Sheave Diameter	Industry Standard
		E - Block Width	Industry Standard
		F - Throat Opening	Industry Standard
		G - Trunnion	Industry Standard
			20 mm/ inch
			13 mm/ inch
			31 mm/ inch
			16 mm/ inch
			37 mm/ inch
			7 mm/ inch
			0.018 mm/ inch
Aux. Ball	<b>Inspect Auxiliary ball</b> for cleanliness, binding swivel, work pad-eye hole. Inspect the hook damage, excessive wear to the hook safety latch, Bent connector plates, Severe corrosion pitting, hook swivel trunnions, thrust collar, securing, damage or missing lubrication fittings, Loose, missing or damaged retaining nuts, cotter pins or swivel set screws, Missing or illegible rating and warning tags, proper lubrication, cracks and gouges, and if visibly bent or twisted or has been exposed to welding or arching.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Hook: Tip has been bent more than 10 degree out of plane from the hook body	Industry Standard/API RP2D7	<input checked="" type="checkbox"/> YES ( ) NO
	<b>OEM STANDARD recommend that Crane overhaul ball removal from service untill replaced and repair following below</b>	OEM STANDARD	
	- Elongated ball pin holes, hook latch pin holes and swivel eye exceeding 5% of original diameter,	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO
	-Swivel end play gap exceeding .08". Excessive end play indicates damaged internal set screw	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO
	-Material loss due to wear exceeding 10% of original section	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO
	Throat opening - any distortion causing an increase in throat opening of 5% not ot exceed 1/4 in. (6 mm.)(or as recommended by the manufacturer)	ASME B30.10	<input checked="" type="checkbox"/> YES ( ) NO
	All hooks that lift personnel are to have a positive locking safety latch to be used while lifting personnel**	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	*** Temperature Effected : When hooks are to be used at temperature above 400° F. (204°C) or below -40°F (-40°C), the hook manufacturer or a qualified person should be consulted		
	*** Chemically Active Environment : The strength of hooks can be affected by chemically active environments, such as caustic or acid substances or fumes. The hook manufacturer or qualified person should be consulted before hooks are used in chemically active environment	ASME B30.10	
	Verify to ensure nut firmly at which trunion rotate. Identify to set-screw in nut/ swivel/ counter pin and thread condition.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Last NDE inspection record	Industry Standard	Last inspect date _____



SYSTEM	TASK	Specification	Record/Reading
	RECORD AUX BALL INFORMATION :	Manufacturer: OEM Manual	Mc 013/12
		Model: OEM Manual	MB07T200E
		Serial Number: OEM Manual	981318
	Record Auxiliary Ball measurements and details for future comparison with historical data: For Model MB07T200E ONLY	Industry Standard	
		AA Dimensions 3.0 Inch	Industry Standard 3.0 mm/ inch
		A Dimensions 24.89 Inch	Industry Standard 25 mm/ inch
		B Dimensions 21.71 Inch	Industry Standard 22 mm/ inch
		C Dimensions 12.50 Inch	Industry Standard 12 mm/ inch
		D Dimensions 1.61 Inch	Industry Standard 1.6 mm/ inch
		E Dimensions 1.81 Inch	Industry Standard 1.85 mm/ inch
		F Dimensions 1.38 Inch	Industry Standard 1.62 mm/ inch
		H Dimensions 1.38 Inch	Industry Standard 1.35 mm/ inch
		I Dimensions 0.88 Inch	Industry Standard 0.85 mm/ inch
		J Dimensions 1.31 Inch	Industry Standard 1.24 mm/ inch
		Record Auxiliary Ball measurements and details for future comparison with historical data: For Model OB 7EE 200-4	Industry Standard
		A Dimensions 27.25 Inch	Industry Standard
		B Dimensions 24.10 Inch	Industry Standard
		F Dimensions 12.00 Inch	Industry Standard
		H-H Dimensions 1.38 Inch	Industry Standard
		J Dimensions 1.81 Inch	Industry Standard
		K Dimensions 1.46 Inch	Industry Standard
Safety system	Check Condition anti - two block , hanging chain , eye bolts , fix bolts , shackle for missing , corrosion , erosion , deformation	API RP 2D	YES ( ) NO
	Check anti - two block kick out plate for freely movement	Company Spec/Standard	YES ( ) NO
	Check anti-2-block device proper function of Main winch		Function ( ) False
	Check anti-2-block device proper function of Aux. winch		Function ( ) False
	Visually check emergency load lowering kit. Ensure EMERGENCY LOWERING PROCEDURE and MATERIAL LIST are in the box. - Ensure ALL items shown on the list are in the box and in good condition - SECURE THE BOX WITH A TIE WRAP.	Company Spec/Standard	YES ( ) NO
Slew Mechanism	Visually check for damage and excessive wear on gear teeth	OEM Manual	YES ( ) NO
	Visually check slew gear box in the area of oil seal for any leaks	API RP 2D	YES ( ) NO
	CHECK and RE-TORQUE swing drive gearbox mounting bolts at following brands: - ESKRIDGE, Model: 250 = 150 FT-LBS	API RP 2D	150 FT-LBS
	RECORD SLEW GEAR BOX INFORMATION :	Manufacturer: OEM Manual	ESKIDGE
		Model: OEM Manual	250A
		Serial Number: OEM Manual	
	Check swing gearbox oil level/condition, top up if required	OEM Manual	YES ( ) NO
	Monitor slew gearbox oil condition by visually examine for burnt smell, metal particles, and/or other contaminants, record and change if found.	Meropa 220	CHANGE OIL ( ) NOT CHANGE OIL
	Change slew gear box oil	OEM Manual	CHANGE OIL ( ) NOT CHANGE OIL
	Grease all pivot points of slew ring (bearing)	OEM Manual	YES ( ) NO
	Grease open gears (pinion)	OEM Manual	YES ( ) NO
	Check condition of slew ring bolts e.g. Bolt grade and washers.		
	Caution: Use only hardened flat washers under head of bolt. Do not use lock washers, or regular flat washers.	Industry Standard	YES ( ) NO



SYSTEM	TASK	Specification	Record/Reading								
	<b>Monitor ball-ring grease sample.</b> If found wear and tear particles, take sample and send to lab. **Wear assessment by grease sample analysis—wear may be monitored by periodic grease sample analysis as describe in this section. Grease samples should be collected every twelve months as a minimum and the results of the analysis recorded; this period should be shortened if obvious metal or contaminants are present.	API PR 2D	<div>( ) SEND TO LAB</div> <div><del>( )</del> NOT SEND TO LAB</div>								
	Rotate crane 360 degree and check smoothness of operation	OEM Manual	<div><del>( )</del> YES</div> <div>( ) NO</div>								
	Check swing drive static parking brake for proper operation Caution: <b>DO NOT stop the swing of the crane with this static brake (parking brake)</b>	OEM Manual	<div><del>( )</del> YES</div> <div>( ) NO</div>								
	Check swing lock mechanism condition, corrosion ,dent , loos all part,worn and wear	OEM Manual	<div><del>( )</del> YES</div> <div>( ) NO</div>								
	Check swing lock mechanism freely lock and unlock for function	OEM Manual	<div><del>( )</del> YES</div> <div>( ) NO</div>								
	Verify crane condition and load test as separate procedure.  <b>Table 1—Static/Onboard Test Load and Radius</b> <table><tr><th>Static/Onboard Rated Load at a Specific Radius lb (kg)</th><th>Test Loads in Excess of Static/Onboard Rated Load at a Specific Radius</th></tr><tr><td>≤ 40,000 (18,144)</td><td>25 %</td></tr><tr><td>&gt; 40,000 ≤ 100,000 (&gt;18,144 ≤ 45,356)</td><td>10,000 lb (4536 kg)</td></tr><tr><td>&gt; 100,000 (45,356)</td><td>10 %</td></tr></table>	Static/Onboard Rated Load at a Specific Radius lb (kg)	Test Loads in Excess of Static/Onboard Rated Load at a Specific Radius	≤ 40,000 (18,144)	25 %	> 40,000 ≤ 100,000 (>18,144 ≤ 45,356)	10,000 lb (4536 kg)	> 100,000 (45,356)	10 %	API 2C	<div><del>( )</del> YES</div> <div>( ) NO</div>
Static/Onboard Rated Load at a Specific Radius lb (kg)	Test Loads in Excess of Static/Onboard Rated Load at a Specific Radius										
≤ 40,000 (18,144)	25 %										
> 40,000 ≤ 100,000 (>18,144 ≤ 45,356)	10,000 lb (4536 kg)										
> 100,000 (45,356)	10 %										
	Verify crane condition and load test as separate procedure.	17.1	<div><del>( )</del> YES</div> <div>( ) NO</div>								

Risk Level Definitions: The following 3 levels indicate the impact the noted deficiency poses to the operation or structural integrity of the equipment:

Level 1 = Incidental	Level #2 = Restricted Operation	Level #3 = Out of Service
Minor deficiency that is recommended to be promptly addressed, but poses no safety and/or environmental risk. The crane can still be operated at full duty.	Deficiency identified that has the potential to limit, de-rate or damage the crane, its surroundings and/or the environment. The duty and locked/ tagged out until the crane's duty and operation should be de-rated or service restricted.	The crane should be removed from duty and locked/ tagged out until the deficiency is rectified.

System:	Risk Level:	Component:	Replace		In Accordance with:
		Location:			Date Originated:
Description:	Replace regulator new P/N 11-8010 temp 125 F				
Recommended					
Recommended urgency timeframe for corrective action:			Completed Date:	Completed By:	

System:	Risk Level:	Component:			In Accordance with:
		Location:			Date Originated:
Description:	Need to repair flexible exhaust pipe and Accobrace to normal				
Recommended					
Recommended urgency timeframe for corrective action:			Completed Date:	Completed By:	

System:	Risk Level:	Component:			In Accordance with:
		Location:			Date Originated:
Description:					
Recommended					
Recommended urgency timeframe for corrective action:			Completed Date:	Completed By:	

System:	Risk Level:	Component:			In Accordance with:
		Location:			Date Originated:
Description:					
Recommended					

SYSTEM	TASK		Specification	Record/Reading
Recommended urgency timeframe for corrective action:		Completed Date:	Completed By:	
System:	Risk Level:	Component:	In Accordance with:	
	Location:		Date Originated:	
Description:				
Recommended				
Recommended urgency timeframe for corrective action:		Completed Date:	Completed By:	
System:	Risk Level:	Component:	In Accordance with:	
	Location:		Date Originated:	
Description:				
Recommended				
Recommended urgency timeframe for corrective action:		Completed Date:	Completed By:	
System:	Risk Level:	Component:	In Accordance with:	
	Location:		Date Originated:	
Description:				
Recommended				
Recommended urgency timeframe for corrective action:		Completed Date:	Completed By:	

Completed Date 4/3/22

Kingshank W.

Sarasak T.

Udorn T.





## THE PEDESTAL CRANE CONDITION VERIFICATION

Date: <u>14/3/22</u>			
Crane Owner: CTEP/COTL		Field: <u>Berchamas</u> Platform/Vessel: <u>BEWB</u>	
Crane Owner's representative: (Mech Supv./M'Dent) <u>Panupan C</u>			
Qualified inspector: (Qualified Crane Mechanic) <u>Surasak T.</u>			
Inspector's company/agency: (Third Party or Outsourcing to witness if applicable) <u>Kingmanha</u>			
Manufacture: <u>Nactiles</u>		Fabrication by: <u>oil states</u> Year of Fabrication: <u>1998</u> Country: <u>USA</u>	
Model / Serial: <u>180 B1-80 S/N 109709-C</u>		Standard API Edition: <u>Fifth Edition 1995</u>	
Safe Working Load (SWL) ---> OEM		<u>18.46</u> Metric Tonnes	
Safe Working Load (SWL) ---> Existing via MOC, if applicable		<u>18.46</u> Metric Tonnes	
Boom length, Main		<u>80</u> Ft	
Boom length, Auxiliary if applicable		<u>4</u> Ft	
Part of line main hoist		<u>4</u> Part line	
Part of line auxiliary hoist		<u>1</u> Part line	
Safe Working Load at longest boom radius		<u>83</u> ft <u>7.666</u> Metric Tonnes/ Lbs	
Safe Working Load at shortest boom radius		<u>13</u> ft <u>40,703</u> Metric Tonnes/ Lbs	
The document of crane specification for Testing, Maintenance and Inspection are provided by:		OEM MOC / Crane Engineer	
Has the crane ever been modified by MOC? (To verify if this crane is modified with MOC --> Allow to test the crane. If this crane is modified without MOC --> Not allow to test the crane)		YES NO <u>NO</u>	
Does the rotating part have proper guard in place?		<u>YES</u> NO (Need mitigation plan)	
Is the ladder and hand rail in place?		<u>YES</u> NO (Need mitigation plan)	
Is the maintenance platform in place?		<u>YES</u> NO (Need mitigation plan)	
Is the SWL tag labelled on crane pedestal, main block or aux ball?		<u>YES</u> NO (Need mitigation plan)	
Verify if the crane major component damaged or not		YES (Need to repair or mitigate unsafe condition with MOC before testing) NO <u>NO</u> (Employers shall not allow employees work with damaged/ unsafe cranes or derricks)	
Inspect boom end connections, for bends, dents, corroded areas, cracked welds, and signs of mechanical damage, wear, etc. **any deviation should be reported**  Level #1 = Incidental: Minor deficiency that is recommended to be promptly addressed, but poses no safety and/or environmental risk. The crane can still be operated at full duty. --> <u>Allow to test</u>  Level #2 = Restricted Operation: Deficiency identified that has the potential to limit, de-rate or damage the crane, its surroundings and/or the environment. The duty and locked/ tagged out until the crane's duty and operation should be de-rated or service restricted. --> <u>To be derated</u>  Level #3 = Out of Service: The crane should be removed from duty and locked/ tagged out until the deficiency is rectified. --> <u>Not Use</u>		YES (To be verified) NO <u>NO</u>	
<b>Function Load Testing</b>			
1. Verify Crane SWL (Existing)		<u>18.46</u> Metric Tonnes	
2. Verify routine maximum actual load.		<u>3.0</u> Metric Tonnes	
3. Select the specimen load to be more than actual routine load 1.25 times but not more than SWL.  Example #1: Crane's SWL is 18 Metric Tonnes. The routine maximum actual load is 2.4 Metric Tonnes. Therefore, the load testing shall be 2.4 x 1.25 = 3 Metric Tonnes.  Example #2: Crane's SWL is 18 Metric Tonnes. The routine maximum actual load is 16 Metric Tonnes. By calculation, the load testing is 16 x 1.25 = 20 Metric Tonnes more than SWL (18 MTon). Therefore, the load testing shall be 18 Metric Tonnes equal to SWL.		<u>3.75</u> Metric Tonnes	
4. Use Auxiliary Winch if specimen load less than or equal 3 Metric Tonne		<u>YES</u> NO	
5. Use Main Winch if specimen load more than 3 Metric Tonne		<u>YES</u> NO	
6. The record of load testing: Fill in "Function Test Record" sheet attached.			

## RECORDED FUNCTION TEST PROCEDURE

1. CHECK AND RECORD READING RADIUS AND BOOM INDICATOR AT FOUR (4) VALUES INCLUDING MAXIMUM AND MINIMUM.

( ALL REDIUS MEASUREMENT ARE TO BE TEKEN FROM THE CENTERLINE OF CRANE ROTATION)

ACTUAL	INDICATED RADIUS (FT)
A) 15' (MINIMUM)	80
B) 20'	76
C) 25'	73
D) 30' ( INTERMEDIATE)	69
E) 40'	61
F) 50' (INTERMEDIATE)	54
G) 60'	47
H) 75' (MAXIMUM)	21

2. CHECK AND RECORD READING ON BOOM ANGLE / DEGREES.

SPECIFICATION	INDICATED BOOM ANGLE (DEGREES)
1). MAXIMUM. .... 87 DEGREES	13
2). INTERMEDIATE. .... 69 DEGREES	30
3). INTERMEDIATE. .... 59 DEGREES	50
4). MINIMUM. .... 0 DEGREES	30

3. READING ON LOAD INDICATOR WITHOUT SLINGS OR LOAD / LBS. (LOAD BLOCK + WIRE ROPE)

ACTUAL	INDICATOR READ FREE LOAD, (LBS)
1). MAXIMUM RADIUS 750 LBS.	500
2). MINIMUM RADIUS 750 LBS.	150

4. CHECK AND RECORD ENGINE HIGH IDLE SPEED / RPM.

SPECIFICATION	INDICATED OF FUNCTIONAL (RPM)
1). IDLE SPEED 850 RPM	850
2). LOW SPEED - RPM	-
3). HIGH SPEED 2800 RPM	2800

5. FUNTIONALLY TEST THE FOLLOWING.

ACTUAL	INDICATED OF FUNCTIONAL (TESTED)
A) MAIN HOIST ANTI - TWO BLOCK.	function
B) AUXILIARY HOIST ANTI - TWO BLOCK.	function
C) HIGH BOOM ANGLE KICK OUT.	N/A
D) LOW BOOM ANGLE KICK OUT.	N/A
E) PRIME MOVER SHUTDOWN.	function
F) EMERGENCY SHUTDOWN.	function
G) ROTATE CRANE 360 LEFT.	Good
H) ROTATE CRANE 360 RIGHT.	Good

6. RECORD HYDRAULIC RELIEF VALVE PRESSURE SETTING ON FOLLOWING HYDRAULIC FUNCTION:

SPECIFICATION	INDICATED PRESSURE (PSI)
A) MAIN HOIST 2700 PSI.	2700
B) AUXILIARY HOIST 2700 PSI.	2700
C) BOOM HOIST 2700 PSI.	2700

TEST CONDUCTED BY: Sorabau T  
 CRANE OPERATOR: Kinliamba  
 COMMENTS :

POSITION: CD-Mech.  
 POSITION: CD-Mech.  
 DATE: 14/3/22



## ▪ DETERMINING CRANE CAPACITY WITH LOAD CHART

1. Loads with weight marked:
  - A. Add weight of hook block to load weight.
  - B. Add weight of rigging to load weight (unless pre-rigged) (if pre-rigged, weight of slings is included in load weight)
  - C. Verify boom angle/radius needed to make lift - both hoisting and lowering if different. Indicator is approximate - if possible, measure radius for capacity lifts.
  - D. Find capacity of crane in proper column on load chart.
    - Do not interpolate if angle, radius or load weight falls between chart values, go to safer case.
    - Use static rating (at static radius to be used) for lifts off or onto a fixed platform.
    - Use dynamic ratings (at dynamic radius to be used) for lifts off or onto a boat.
2. Do **Not exceed** the lowest rated capacity for the lift. Example: To move a load from the platform to the boat, there will be a rated static capacity  
(capacity to lift the load from the platform at the radius used), and a rated dynamic capacity (capacity to get down on the boat at a possibly different radius).  
Do Not exceed the least of the two capacities on this lift.
3. Do **Not boom down** to a lower angle (longer radius) than shown on the load chart for the weight while moving the load, Keep this minimum angle in mind at all times.

## ▪ LIFTING UNKNOWN LOADS TO DETERMINE WEIGHT

1. Verify angle or radius to be used.
2. Find capacity of crane on chart.
3. Subtract weight of hook block or ball from capacity - check/adjust zero setting on weight indicator.
4. Hoist load carefully, be aware of capacity limit on weight indicator (if available).
5. If capacity is reached on load indicator before load rises, lift cannot be made at the radius used.
6. Do Not show the weight of slings as part of the load unless pre-rigged (slings stay with load).



## Maintenance activities Daily Report

Work Order Number: 1198468 Equipment Number: LAW-3BE-E 620  
 Work Center: CO. medh  
 Actual Crew: 4 Actual Hour from PM Job card: 21 Actual Hour from CM: -  
 Actual Start Date / Time: 19/11/2022 Actual Finish Date / Time: 21/11/2022

## Parts

☒ JDE inventory ☐ Surplus ☐ No part issued

Category Code										
	PM (Preventive Maintenance)					CM (Corrective Maintenance)				
Work order classification	PMC	PMS	MA	O	Q	FND	FSD	PRC	PRO	REP
Primary Discipline	I	E	MA	O	Q	I	E	M	O	Q
Secondary discipline (Local Code 3)	IIT	EEL	MMZ	OOP	AIM	IIT	EEL	MTT	MME	PRS
	MMC					CSS	OOP	AGM	AIM	
Local Code 4						BIW	NBI			
Work Identification						ORD	PMI	HAZ	RCA	RTF

## Related Links: \*\* CM Only \*\*

Component Code: ☐ Filter ☐ Hose/Tubing ☐ Regulator ☐ Fitting ☐ Isolator/Insulator  
☐ Bearing ☐ Gasket/Seal ☐ Belt ☐ Coupling ☐ Cooler/Exchanger  
☐ Gauge ☐ Oil/Lubricant ☐ Actuator ☐ Mech. Seal ☐ Bolt/Fastener  
☐ Pump ☐ Radiator ☐ Valve ☐ Other: \_\_\_\_\_

Failure Action: ☐ Charged ☐ Cleaned ☐ Flushed ☐ Installed ☐ Lubricated  
☐ Adjusted ☐ Replaced ☐ Removed ☐ Repaired ☐ Overhauled  
☐ Removed ☐ Refurbished ☐ Tightened ☐ Restart ☐ Reset  
☐ PM/PDM Corrective Action ☐ PM/PDM No Corrective Action  
☐ No Action Require ☐ Other: \_\_\_\_\_

## Daily Report (i-plan) Code

Task Code	AS PLAN	CANCEL	DELAY/EARLY	BIW	NBI	
Task Code Reason/Remark for Cancel Job	[Delay] Plan too short	[Delay] Issue during execution		[Delay] Interrupt by other jobs (BIW/Early/Delay)		
	[Early] Previous Jobs finish early	Man-Hr not enough due to BIW	Man-HR not enough due to delay job	Man-Hr not enough due to not plan for resource		
Task Code Reason/Remark for BIW	P1/P2 WORK ORDER	Repair/Restart Machine S/D	Urgent request from unplanned jobs		Other	

## Attachment.

Problem Descriptions: 1 year p.m

As Found: P.M Generated.

Action Taken: Follow job Task.

Action by: Aspirah. C. / udon T. / Saranyu C. / noppadol T.

Possible root cause: Recommendation: -

As left: normal operation

Job Completed Date: 21/11/2022

Entry by/ Date: Aspirah. C. 21/11/2022.

Specialist/Supervisor review and sign <For accurate data>: Jack M. 23 Nov 2022.



LAW. 14. PM. WO: 1198A68

Sheet: 180B1-80 (MS)CH4

Hours 1231 hrs.  
w/o 1198468CRANE MAKE: Nautilus  
MODEL: 180B1-80 (MS)  
SERIAL NUMBER: Crane SpecificLOCATION  
C2, Remote Platform

DATA BASE - PM JOB TASK CARD

Crew Size: 4  
Estimated Hours: 1231

Category	Item	Company Spec/Standard	YES	NO	
Safety	Perform Job Safety Analysis (JSA)	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Obtain "COMPANY" PERMIT TO WORK	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Perform Tool Box Talk	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	BEFORE/AFTER JOB EXECUTION: Ensure to comply with Isolation procedure (LOCK OUT/TAG OUT, WARNING SIGNS and BARRIERS).	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Required Tools	Insure proper tools are available at the job site	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Tool bag	Company Spec/Standard	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Tool box	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Tool Container	Company Spec/Standard	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	MPI equipment and operator	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check safety harness Software and Hardware should be good condition before use	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check Rescue Equipment ready to use onsite	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Portable Scaffolding and Crew if require	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Lubricants	Insure proper lubricants and consumables are available at the job site.	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Hydraulic System - Hydraulic Oil	Rando HD-68	OEM Manual	<input checked="" type="checkbox"/>	
	Slew Gearbox - Gear Oil	Meropa 220	OEM Manual	<input checked="" type="checkbox"/>	
	Auxiliary Hoist - Gear Oil	Meropa 220	OEM Manual	<input checked="" type="checkbox"/>	
	Main Hoist - Gear Oil	Meropa 220	OEM Manual	<input checked="" type="checkbox"/>	
	Grease Points - Lithium Based **IT MUST NOT INCLUDE MOLYBDENUM DISULPHIDE**	MULTIFAK EPW2	OEM Manual	<input checked="" type="checkbox"/>	
	Open Gear Teeth - Open Gear Lube highly water resistant and of an adhesive nature.	OMEGA 73	OEM Manual	<input checked="" type="checkbox"/>	
	Pneumatic Lubricator	SAE Grade 10	OEM Manual	<input checked="" type="checkbox"/>	
	Wire rope Lubricant Company preferred grade	Bilube 70	OEM Manual	<input checked="" type="checkbox"/>	
	Engine Oil - SAE Grade 15W-40 (Delo Gold)	15W-40	OEM Manual	<input checked="" type="checkbox"/>	
	Safe Load Indicator fluid	W-15	OEM Manual	<input checked="" type="checkbox"/>	
	Engine Radiator - Should have radiator preservatives additives	Cat* SCA	OEM Manual	<input checked="" type="checkbox"/>	
	Consumables	Spray Cold Galvanize	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Denso Tape	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>
WD-40		Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
History Review	Before starting work, tasks preparation at least 1 day prior to starting work: 1. Review history PM/ CM from Roving Team, 2. Review last PM/ CM/ PMI from Crane Mech, 3. List out all punch list and prepare parts. 4. Review last Certificate task performed	API RP 2D	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Require to update part history from Crane Mech on following main compenents to ensure the right parts are prepared: - Aux/ Main/ Boom Cylinder, Engine, Swing Gearbox, etc. Reference: Crane OEM information of each part need to be recorded - Manufacturer & Contact info - Model & serial number - Installation date	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Review history data from Certificates and incorporate into current PM: - Pull Test Certificates (ongoing update, 4 yr. history). - Load Test Certificates (ongoing update, 4 yr. history). - Wire Rope Certifications (running rope and standing rope) (life of rope). - Hoist Certifications for hoist classified as "personnel handling" hoist.	API RP 2D	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Review Last Preventative Maintenance Records (Inspection Reports) - Pre-use (Pre-Post Inspection) - 6 Monthly (API RP 2D Not Defined, Company Standard) - 1 Yearly (API RP 2D Defined Annual Inspection)	API RP 2D	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Visually Inspect (Sling, sling hooks and shackles) Include Websling / Chain	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Lifting Gear Preparation	Check color code / Tag & date inspection	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Determine if access route to/from crane is clean, safe, unobstructed and adequately protected against falls, tripping and slipping	Company Spec/Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
General	Check drain lines and drip pans for deterioration	API RP 2D	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Remove any sediment collected in the bottom of drip pans	Industry Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Prime Mover	Check for general crane and components for loss of protective coating and corrosion	Industry Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check for missing or loose, corrosion, deformation pins, pin keepers, bolts, nuts, fasteners of all ladders, cages and working platform	API RP 2D	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Apply grease to exposed grease parts (control valve spools, ball-ring gear, parking brake valve, etc.)	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Engine Caterpillar	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	CATERPILLAR MODEL 3216	S/N.: ARR.No.:	OEM Manual	4212-03499 151-4383	
	Check lube oil level and condition, top up / replace if required	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check diesel tank level, top up if required.	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check/Clean crankcase breather	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check/Clean air cleaner	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check Condition of radiator / clean radiator cap	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check for any signs of leaks on or around the engine le; Crankshaft seal (front /rear)	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check for engine exhaust system for leaks, corrosion, insulation and general condition	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Check all engine hoses for wear and deterioration	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Drain water and sediment form diesel tank	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Clean Diesel tank level sightglass	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Lubricate fan bearing/shaft	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Change Radiator Coolant	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Test radiator Coolant PH, Top up if required and Record Value	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	COOLANT PARAMETERS (PH):	6 or higher	PH =	7	
	HOUR METER PARAMETERS:	LAST READING	1230 HRS	1231 HRS	
Check condition of engine hold down bolts	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
	Check condition fan blade	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Change cooling fan drive belts	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Inspect CAT 3216 engine belts for wear and looseness. If necessary, replace or adjust. To check belt Tension, after has engine run more than 30 minutes apply 400 N (90 lbs) of force midway between the pulleys. Correctly adjusted belts with deflect 13 to 19 mm (1/2 to 3/4 inch).	OEM Manual	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

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SYSTEM	TASK	Specification	Record/Reading
	Check engine HYD starter drive gear bendix and fly wheel gear teeth condition and record. **Replace if required*	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO Bendix Gear: <u>80</u> % Fly wheel Gear teeth: <u>90</u> %
	Check condition Ratchet Bendix HYD Starter	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricate and check engine throttle system.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Determine if the tachometer operates properly: Record Value of Idle & Max Speed (RPMs) Note: Too low Idle (RPMs) will cause excessive worn at winch brake	OEM Manual	
	**ENGINE RPM SPECIFIC**	IDLE SPEED 850-950 RPM MAX SPEED 2200 RPM	OEM Manual <u>850</u> RPM OEM Manual <u>2200</u> RPM
	Confirm engine oil pressure as per Parameters below and Record Value:	OEM Manual	
	**ENGINE OIL PRESSURE SPECIFIC**	Minimum 30 PSI Maximum 70 PSI	OEM Manual <u>30</u> PSI OEM Manual <u>70</u> PSI
	Confirm engine fuel pressure Parameters are correct and Record Value:	OEM Manual	
	ENGINE FUEL PRESSURE SPECIFIC** **Note: Fuel pressure at high idle is lower than 105 kPa (15 psi) PARAMETERS	Normal Green Range/ 15 PSI	OEM Manual <input checked="" type="checkbox"/> YES ( ) NO
	Confirm engine temperature Parameters and Record Value:	OEM Manual	
	**ENGINE WATER TEMP SPECIFIC**	NORMAL 120 - 180 degrees F	OEM Manual <u>170</u> F
	Test engine SAFETY DEVICE- ensure engine kill cable shuts off FUEL supply	API RP 2D	<input checked="" type="checkbox"/> Function ( ) False
	Test engine SAFETY DEVICE- ensure EMERGENCY KILL CABLE - shuts off AIR supply	API RP 2D	<input checked="" type="checkbox"/> Function ( ) False
	Test engine SAFETY DEVICE- ensure ENGINE low lube oil - releases OIL PRESSURE to activate Alarm Air System ***Note*** Engine oil pressure low alarm at 20 PSI	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False
	Test engine SAFETY DEVICE- ensure HIGH TEMP - releases OIL PRESSURE to activate Alarm Air System	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False
	Check / Clean primary fuel/water separator *Replace if required*	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition of turbocharger, and for any oil or hot air leaks	OEM Manual	( ) Leak <input checked="" type="checkbox"/> Not Leak
	Change engine lube oil and oil filter	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change fuel filter	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change air filter, if required	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check fuel injection pump, governor for any leak and noise	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check/Adjust engine lash valve, inspect valve rotators valve clearance (IN = 0.015", EXT = 0.025")	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check Fuel Timing of Unit Injector (CAT 3126) Reference: Fuel timing Injection length, use the following references to obtain information: - Engine Information Plate (located at valve cover) - TMI (Technical Marketing Information - located at Manual Book) - Fuel setting and related Information Fiche	Company Spec/Standard	<u>65.13</u> mm/ inch (After Adjustment)
	Check Damper of Crank Shaft Pulley (CAT Engine 3126)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change gasket valve cover	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Test/Exchange fuel Injection nozzle, if required. Require inspection record for tracking.	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False
	Rebuild or replace Starter motor, if required. Require inspection record for tracking.	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Rebuild or replace Water pump, if required. Require inspection record for tracking.	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Rebuild or replace Turbo charger, if required. Require inspection record for tracking.	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check and inspect condition wear of pump drive spline and record **Note: Remaining 70% of Original Spline Surface must be replace.	Company Spec/Standard	<u>90</u> % Remaining
	Check and inspect condition wear of adaptor Coupling spline shaft and record **Note: Remaining 70% of Original adaptor Coupling spline shaft Surface must be replace.	Company Spec/Standard	<u>85</u> % Remaining
	Check and inspect condition wear and crack of Coupling Drive Plate	Company Spec/Standard	<u>90</u> % Remaining
	Retorque bolts of Coupling Drive Plate	OEM Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Evaluate engine performance, tune up if required	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
Hydraulic Start System (Apply for C2-Remote P/F Only)	Check pressure system at the pressure gauge which should reach 3,000 PSI as standard when the system is FULLY charged. Record Value. (As the system cools down, the pressure should drop slightly and finally stabilised.) Visually inspect all hydraulic connections and hoses for leaks and retighten if necessary. (Caution: This should NOT be done if the system is under pressure.) 1. Slowly release system pressure by loosening the bleed screw on top of the hand pump. 2. Ensure no pressure remains, retighten the suspected leak fitting or replace the damaged hose or component. 3. Retighten the bleed screw on the hand pump. 4. Pump the system up to 2200 - 2600 PSI 5. Inspect that the leak was eliminated.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Function check Accumulator Pre-charge. (Caution: This should NOT be done if the system is under pressure.) 1. Shut the engine off, release system pressure via the bleed screw on top of the hand pump 2. Retighten bleed screw and actuate the hand pump. The pressure will rapidly increase and then stabilised. This pressure is related to accumulator gas pre-charge pressure. 4. If the pressure rapidly increase to 3000 PSI, it indicates that the accumulator has lost its gas charge. 5. Troubleshoot as necessary	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check function recharging system by function boom down while the engine running. 1. The crane engine is running at 1,000-1500 RPM. 2. Slowly control lever boom function down for charging pressure to accumulator. 3. This pressure should read on pressure gauge between 2200 - 2600 PSI depending on the recharge ratio 80% std. (90% optional). Record Pressure Value.	OEM Manual	<u>2500</u> PSI
	Check Nitrogen pressure in Accumulator ***Note***spec @ 1,500 psi as follow schematic and if found pressure loss below 1400 PSI then prepare recharge nitrogen in system	OEM Manual	<u>1500</u> PSI
	check for noisy compressor operation, which could indicate a worn drive gear coupling, a loose pulley or excessive internal wear	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
Pneumatic System			

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	Check Air Compressor external oil supply and return lines, if applicable, for kinks, bends, or restriction to flow	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Inspect the Air compressor discharge port, inlet cavity and discharge line for evidence of restrictions and carboning. (If excessive buildup is noted)	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check all hose connections are sound and all mounting and pivoting connections are secure.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check condition / Clean and lubricate unloading valve	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check proper air pressure is available for the system. Record Value.	OEM Manual	
	AIR SYSTEM PARAMETERS: MAX 60 PSI	OEM Manual	60 PSI
	Visually inspection condition of air receiver for signs of corrosion or loose of structural integrity.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check the hose, piping and tubing for mechanical damage, corrosion, splits, blisters, cracking or excessive abrasion on the outer surface	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Drain off air filter and receiver to remove condensed water. If water is present, drain until water is removed.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check proper operation of pop off valve, by manually functioning valve.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check proper operation of manual latch valve, by manually functioning latch.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check proper operation of small engine alarm horn.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
Hoist / Brakes	Visually check a hoist exhibits erratic operation and/or unusual noise, the hoist must be taken out of service until it is inspected and serviced by a qualified technician. Continued operation of a hoist with a defect in a critical component may lead to loss of load control, property damage, serious injury or death.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Visual exteriors of hoist, frames, drums and flanges for damage, leaks, cracks and wear and repair/replace as required to maintain the structural integrity of the hoist.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check all hoist mounting pins, bolts or other fasteners and replace or tighten as necessary.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Lubricant level must be maintained between the minimum and maximum levels; midway up sight glass or at bottom of level plug port as equipped and check/clean plug vent. Use only the recommended type of lubricant.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Inspect Brake Valve Opening Pressure test V/V 1-1/4" PD Series: no lower than 550 PSI	Aux	550 PSI
	Inspect Brake cylinder opening pressure test. CH/PD Series: 400-450 PSI	Aux	400 PSI
	Measure differential of static and dynamic brake. CH/PD Series: 150-250 PSI	Aux	150 PSI
	Check for external oil leaks and repair as necessary. This is extremely important due to the accelerated wear that will result from insufficient lubricating oil in the hoist.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	RECORD BOOM CYLINDER INFORMATION :	Boom cylinder Diameter:	OEM Manual
		CY Number:	OEM Manual
		Serial Number:	OEM Manual
	RECORD MAIN HOIST INFORMATION :	Manufacturer:	OEM Manual
		Model:	OEM Manual
		Serial Number:	OEM Manual
	Check MAIN HOIST for proper operation and good condition	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Brake test & record pressure of MAIN HOIST	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check MAIN HOIST gear oil level/condition, top up if required. ** Refer to Onsite Gear Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference **	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Change main hoist gear oil	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	RECORD AUXILIARY HOIST INFORMATION :	Manufacturer:	OEM Manual
		Model:	OEM Manual
		Serial Number:	OEM Manual
Hydraulic System	Check AUXILIARY HOIST for proper operation and good condition	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Brake test & record pressure of AUXILIARY HOIST	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO
	Check AUXILIARY HOIST gear oil level/condition, top up if required. ** Refer to Onsite Gear Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference **	OEM Manual	<input checked="" type="checkbox"/> SEND SKL LAB ( ) NOT SEND SKL LAB
	Change auxiliary hoist gear oil	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check Relief Valve: Determine hoists' relief valve pressure gauge is working and giving accurate measurement by notice whether pressure gauge is vibrating or not. If not, set relief valve pressure in accordance with the schematic and parameters below. Record all readings.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	BOOM RELIEF VALVE TEST	Relief Specific: 3,000 PSI	OEM Manual
	MAIN HOIST RELIEF VALVE TEST	Relief Specific: 3,065 PSI	OEM Manual
	AUX HOIST RELIEF VALVE TEST	Relief Specific: 2,800 PSI	OEM Manual
	SWING RELIEF VALVE TEST	Relief Specific: 1,300 PSI	OEM Manual
	Measure Pressure of hoist motor case drains and Record Value Reference Bulletin: BRADEN Inspection, Testing, Preventive Maintenance and Special Operating Instructions For Planetary Hoists PB-308 latest edition for further details.	OEM Manual	
Hydraulic System	MAIN HOIST CASE DRAIN for Gear Motor (Down Mode).	PRESSURE < 100 psi	Company Spec/Standard
	AUX. HOIST CASE DRAIN for Gear Motor (Down Mode).	PRESSURE < 100 psi	Company Spec/Standard
Hydraulic System	Check hydraulic tank oil level. Oil should be visible in the sight glass. Top up as required (3/4 Tank Minimum)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Check hydraulic oil condition. (Check if running hours are more than 100 hours from last oil change or during Annual Inspection) ** Refer to Onsite Hydraulic Oil Sample Procedure ** ** Replace and send oil sample to SKL if abnormal ** ** Take photo of Oil Sampling for Reference **	Rando HD-68	<input checked="" type="checkbox"/> SEND SKL LAB ( ) NOT SEND SKL LAB
	Drain off 1 liter of oil to remove condensed water. If water is present, drain until water is removed and top up with clean oil	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
Hydraulic System	Check for any hydraulic leaks	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO
	Check the hydraulic hose, piping and tubing for mechanical damage, corrosion, splits, blisters, cracking or excessive abrasion on the outer surface	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO

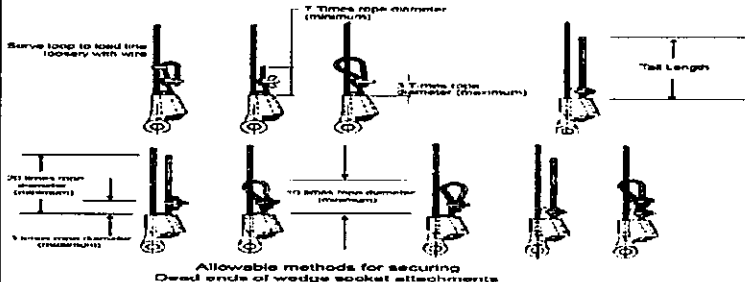
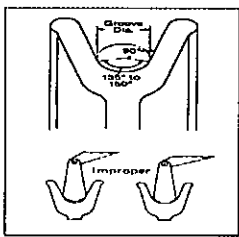
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SYSTEM	TASK	Specification	Record/Reading			
	Check that all hydraulic hose connections are sound and that all mounting and pivoting connections are secure.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Lubricate hydraulic swivel in pedestal and insure tie down restrains are in place and preventing the swivel from rotating with the crane structure.	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO			
	Ensure the filler breather on tank is not covered or clogged	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Visually inspect for missing or loose pins, pin keepers, bolts, nuts, fasteners on all pumps, motors and valves	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO			
	Check the filter bypass indicator, while engine is running	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO			
	With engine running (after all other items pass inspection), check the system for leaks around fittings, hoses, valves and reservoirs	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	With engine running, check the source of any unusual noise or vibration that may cause or indicate equipment damage or wear	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Ensure all hoses are properly rated for the system, see "Parameters" for each system for details.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Record hydraulic oil operating temperature. Note: Hydraulic fluid overheating temperature is over 180 F degrees or 82 C, degrees (reservoir temperature)	Industry Standard	<u>130</u> Degree F			
	Determine if hydraulic return pressure gauge is working and giving accurate measurements. Record readings					
	RECORD HYDRAULIC RETURN PRESSURE PARAMETERS:	60 PSI "maximum"	OEM Manual			
	Change hydraulic return filters and seals		OEM Manual			
	Function Testing and record pressures with engine at :	2,200 RPM	API RP 2D			
	BOOM FUNCTION TEST (Need Crane Mech to verify each platform)		OEM Manual			
	Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual	<u>200</u> PSI
			Full Speed Pressure	RECORD	OEM Manual	<u>1000</u> PSI
		DOWN	Cracking pressure	RECORD	OEM Manual	<u>900</u> PSI
			Full Speed Pressure	RECORD	OEM Manual	<u>1400</u> PSI
	MAIN HOIST FUNCTION TEST (Need Crane Mech to verify each platform)		OEM Manual			
	Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual	<u>200</u> PSI
			Full Speed Pressure	RECORD	OEM Manual	<u>550</u> PSI
		DOWN	Cracking pressure	RECORD	OEM Manual	<u>600</u> PSI
			Full Speed Pressure	RECORD	OEM Manual	<u>1400</u> PSI
	AUX HOIST FUNCTION TEST (Need Crane Mech to verify each platform)		OEM Manual			
	Boom Angle : 60 Degree (Recommend or as applicable)	UP	Cracking pressure	RECORD	OEM Manual	<u>900</u> PSI
Full Speed Pressure			RECORD	OEM Manual	<u>600</u> PSI	
DOWN		Cracking pressure	RECORD	OEM Manual	<u>600</u> PSI	
		Full Speed Pressure	RECORD	OEM Manual	<u>1550</u> PSI	
SWING FUNCTION TEST (Need Crane Mech to verify each platform)		OEM Manual				
Boom Angle : 60 Degree (Recommend or as applicable)	LEFT	Cracking pressure	RECORD	OEM Manual	<u>300</u> PSI	
		Full Speed Pressure	RECORD	OEM Manual	<u>800</u> PSI	
	RIGHT	Cracking pressure	RECORD	OEM Manual	<u>300</u> PSI	
		Full Speed Pressure	RECORD	OEM Manual	<u>800</u> PSI	
Electrical system and Crane Boom Lighting	Check the electrical junction boxes, wires and connections for deterioration, desiccant bags, (replace as required)	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Check the condition of the grounding and lighting protection system.	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Visually inspect boom floodlight and light guards for loose, missing, corroded	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Check condition pipe support, U-bolt, nuts of boom floodlight and Electric slipring for loose, missing, corroded	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Check Electric slipring/swivel for 360° continuous rotation	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO			
	Check Water ingress, condensation in electric slipring and boom floodlight	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO			
	Check freely movement and lubricate of boom floodlight	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO			
	With generator in operation, Intergize all lights to ensure proper function.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO			
	Check condition of crane boom lighting and safety net is secured with strong point. ***Safety net should be replace 24 months after installation (2 year)***	Last installation date _____	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO		
	Check function of crane sound signal	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO			
	Check function of crane boom lighting at boom upper section	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO			
	Check function of crane boom lighting at boom lower section	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO			
	Check function of crane boom lighting at winch skid	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO			
	Check function of crane boom lighting at crane cabin	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO			
	Check function beacon light at boom tip	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) N/A ( ) NO			
	Inspection wire rope guide & Roller assembly	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO			
	Operator Control Station	Check general condition of control panel, bolts, paint security, etc.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO		
		Determine if there is a serviceable fire extinguisher in the vicinity of the crane	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO		
		Determine if correct load chart is in use and easily visible for operator	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO		
		Determine if charts, indicators and hand signal chart are in the cabling and firmly attached	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO		
Determine if angle/radius indicator plate is easily visible to operator and is moving freely.		API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO			
Check condition of control levers and determine if they "dead-man" back to the neutral position.		API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO			

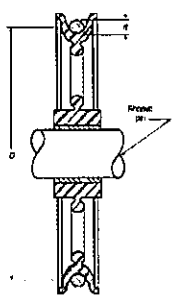
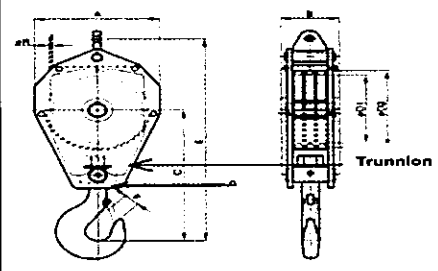
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	Check condition of pressure gauges.	API RP 2D	(X) YES ( ) NO
	Check proper control labels are firmly installed, completely legible and properly labeled	API RP 2D	(X) YES ( ) NO
	Check controls for freedom-of-movement	API RP 2D	(X) YES ( ) NO
	Check condition, Leak, freely movement of Dynamic swing break system ** Note: If HYD Oil loose in CYD reservoir must be refill	OEM Manual	(X) YES ( ) NO
	Check condition, Leak, freely movement of Accelerate System ** Note: If HYD Oil loose in CYD reservoir must be refill	OEM Manual	(X) YES ( ) NO
	Check all safety glass and rubber seal for proper condition	API RP 2D	(X) YES ( ) NO
	Function Test Horn	Industry Standard	(X) YES ( ) NO
	Ensure PRE/POST Check List and Pocket Manual in the cabin	Company Standard	(X) YES ( ) NO
	Visual check on fittings and connections for leaks. Fix leak if any.	OEM Manual	(X) YES ( ) NO
	Should any leaks exist, stop leak and recharge system, refer to maintenance manual	OEM Manual	(X) YES ( ) NO
Load Indicator System	Change Load cell fluid	OEM Manual	(X) YES ( ) NO
	Check general condition of tubing, hoses, pins bolts, paint, etc.	Industry Standard	(X) YES ( ) NO
	Insure load cell is free of obstructions	OEM Manual	(X) YES ( ) NO
	Check condition of gauge(s) face and clean glass as required.	OEM Manual	(X) YES ( ) NO
	Check weight Indicator function (Main)	Company Spec/Standard	(X) YES ( ) NO
	Check weight Indicator function (Aux)	Company Spec/Standard	(X) YES ( ) NO
	Check weight Indicator fluid, top up if required	Industry Standard	(X) YES ( ) NO
	Insure Safe Working Load, matches ratings on the Crane Load Chart	OEM Manual	(X) YES ( ) NO
	Insure Boom Length, matches the Crane Load Chart	OEM Manual	(X) YES ( ) NO
	Insure Boom Angle measurements and readings match the boom angle indicator.	OEM Manual	(X) YES ( ) NO
	Insure Boom Radius measurements indicate the distance from center line of the crane to the hook	OEM Manual	(X) YES ( ) NO
	Check Main load cell gap 1/4 (0.250) inch	OEM Manual	(X) YES ( ) NO
	Check Aux load cell gap 3/8(0.380) Inch (Compression Load Cell Type)	OEM Manual	(X) YES ( ) NO
	Check weight Indicator accuracy *maximum variance +/- 2%	Industry Standard	(X) YES ( ) NO
	Visually check Pedestal for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks weld, etc.	API RP 2D	(X) YES ( ) NO
Pedestal & Structure	Check water rain drain at pedestal must be not obstruct	Industry Standard	(X) YES ( ) NO
	Check pin and cotter pin of pedestal missing, corrosion, wear, damage and exercise pin.	Industry Standard	(X) YES ( ) NO
	Visually check Base - Plate connection and Base hoist Structure for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks weld, etc.	API RP 2D	(X) YES ( ) NO
	Check A fixed such as Handrail, Walkway, Grating, stationary structure without significant movement in response to waves and currents in normal operating conditions.	API RP 2C	(X) YES ( ) NO
	Visually check and lubricate maintenance jib. ***Note*** If on pedestal crane	OEM Manual	(X) YES ( ) NO
	Check maintenance jib is secure firmly. ***Note*** If on pedestal crane	OEM Manual	(X) YES ( ) NO
	Check and Verify entire box boom and Boom CYD for loss of protective coating and corrosion	API RP 2D	(X) YES ( ) NO
	Check and Verify entire box boom and Boom CYD for chipped/cracked paint, deformation, worn parts, dents, corroded areas, cracks, etc.	API RP 2D	(X) YES ( ) NO
	Check and Verify boom end connections, for bends, dents, corroded areas, cracked welds, and signs of mechanical damage, wear, etc. **any deviation should be reported**	API RP 2D	(X) YES ( ) NO
	Check and Verify boom rest and wooden support to ensure it's in good condition	API RP 2D	(X) YES ( ) NO
Box Boom & Luffing CYD	Inspect pin and pin holes of Upper tank and Lower tank for excessive clearance	OEM Manual	(X) YES ( ) NO
	BOOM CYLINDER PIN MAXIMUM TOLERANCE 1/8" (3mm)	Industry Standard	
	Check BOOM CYLINDERS for proper operation and good condition	API RP 2D	(X) YES ( ) NO
	Check Boom cylinder barrels and rods for leaks, mechanical damage and corrosion	Industry Standard	(X) YES ( ) NO
	Check and measurement boom foot pin and connection pins for clearance	Industry Standard	
	BOOM FOOT PINS & BOOM BOX CONNECTER PIN TOLERANCE 1/8" (3mm)	Industry Standard	
	Boom Foot Pin Tolerance	Industry Standard	0.013 inch
	Boom Box Connector Pin Tolerance	Industry Standard	0.014 inch
	Check connecting bolts of box boom loose, corrosion, wear, damage	OEM Manual	(X) YES ( ) NO
	Lubricate boom foot pins and bushings	OEM Manual	(X) YES ( ) NO
	Lubricate boom cylinder pins, bearings and bushings	OEM Manual	(X) YES ( ) NO
	Boom function test angle/radius to correction **Note: The cylinder(s) mechanism shall be capable of elevating the boom from a minimum of zero degrees to the maximum recommended boom angle.	API RP 2C	(X) YES ( ) NO
	Operation functional test and verify Boom Creeping down **Note: Test at angle 60°	Industry Standard	(X) YES ( ) NO
	Determine if parts-of-line match parts of line on the load chart in the crane cabin.	API RP 2D	(X) YES ( ) NO
	Determine if visible portion of wire rope adequately lubricated. If not lubricate wire rope	API RP 2D	(X) YES ( ) NO
	For each layer of wire rope on drum, check that all rope is parallel and each crossover point at hoist flanges is correct	API RP 2D	(X) YES ( ) NO
	The top layer of rope must not be lower to the flange tips 2.5 in for Smooth drum, 2 in for groove drum or 2.5 times of wire rope diameter	API RP 2C	(X) YES ( ) NO
Wire Rope	Inspect wire rope for, kinking, crushing, broken wires, necking down of rope diameter, worn outside wires, corroded or broken wires at end connection, cutting or unstranding.	API RP 2D	(X) YES ( ) NO
	**Note**Running Ropes of rotation-resistant construction used in the main or auxiliary Hoist: - Four (4) Randomly distributed broken wires within 30 rope diameter - Two (2) broken wires in one stand within 6 rope diameter	API RP2D Edition 7	None
	One valley break can indicate internal rope damage requiring close inspection of this section of the rope. When one or more valley breaks are found in one lay length the rope should be retired.	API RP2D Edition 7	None
	Reductions for the rope diameter, from initial wire rope dimensional measurements, in a nonworking area (an area away from the sheaves) compared to the lowest diameter of rope measured in three working areas (areas where the rope regularly goes over a sheave) of more than the following is observed: — 3/64 in. (0.047 in.) (1.2 mm) for diameters up to and including 3/4 in. (19.1 mm); — 1/16 in. (0.062 in.) (1.6 mm) for diameters of 7/8 in. to 1-1/8 in. (22.2 mm to 28.6 mm); — 3/32 in. (0.093 in.) (0.8 mm) for diameter of 1-1/4 in. to 1-1/2 in. (31.8 mm to 38.1 mm); — For rope diameters greater than 1-1/2 in., a 5 % diameter loss from baseline measurement. — Wear of one-third the original diameter of the outside individual wires	API RP2D Edition 7	None

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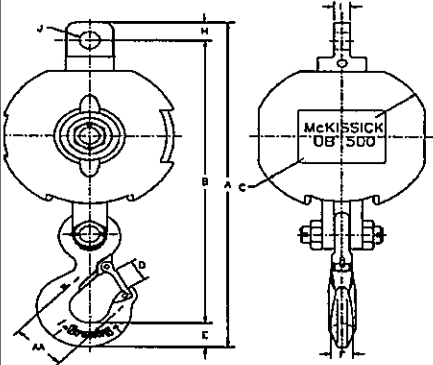
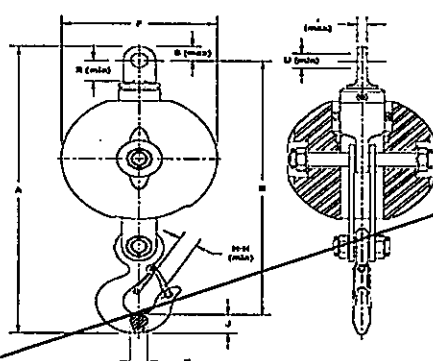
SYSTEM	TASK	Specification	Record/Reading															
	Increase in the length of an individual rope lay is observed. This increase in lay length and accompanying reduction in diameter can be caused by failure of the core. This can occur more readily in ropes or rotation-resistant construction.	API RP2D Edition 7	<input checked="" type="checkbox"/> YES ( ) NO															
	-Inspection and Verify running and standing rope from heat effect **Note: Not more than 250°C -There is evidence of heat damage from any source (i.e. engine exhaust, flare towers, stress corrosion cracking, etc.). Heat can be generated by passing a rope over a frozen or non-turning sheave, contact with structural members of the crane, improperly grounded welding leads or lightning strikes	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO															
	With the boom at the highest possible angle and the main load block or overhaul ball at the water level, ensure there is a minimum of 5 wraps of wire-rope remaining on the drums. Note: (Thal law, requires minimum of 2 wraps)	API SPEC 2C / Thal Law	<input checked="" type="checkbox"/> YES ( ) NO															
	Reference: - Running rope safety factor not less than 6 for wire rope that are running wire, (Thal law; Wire rope nominal breaking strength x number parts of line / Design factor 6) - Standing rope safety factor not less than 3.5 for wire rope that are stay cables, (Thal law)	Thal Law	<input checked="" type="checkbox"/> YES ( ) NO															
	Inspection corrosion, erosion, broken, loosen of pin, cotter pin, socket, and exercise pin of pendent line	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO															
	Measure and record nominal diameter of "running ropes" main and auxiliary (particularly on drum, equalizer sheave and at sockets, clips and dead end points) *****Nominal = several measurements added together divided by Number of measurements*****	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO															
	Inspect wire rope and record size below:	API RP 2D																
	MAIN WIRE ROPE OD:	FULL DRUM OEM Manual	0.651 inch															
		HALF DRUM OEM Manual	0.653 inch															
		WATER LEVEL OEM Manual	0.654 inch															
	AUX WIRE ROPE OD:	FULL DRUM OEM Manual	0.652 inch															
		HALF DRUM OEM Manual	0.653 inch															
		WATER LEVEL OEM Manual	0.653 inch															
	Slip-Cut 1 meter of all ropes at the wedge socket and re-wedge to prevent rust inside of wedge socket (at outward end of rope, not on hoist drum) Dead end tail length is never less than 6 inches, or: - Standard 6 to 8 Strand wire rope is not less than 7 times the rope diameter - Rotation Resistant Wire Rope is not less than 20 times the rope diameter	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO															
	U-bolt and Fist Grip Clips: Extreme care should be exercised to assure proper orientation of U-bolt clips. The U-bolt segment shall be in contact with the wire rope dead-end. The orientation, spacing, torquing, and number of all clips shall be in accordance with the crane manufacture's specifications.	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO															
	 <p>Allowable methods for securing dead ends of wedge socket attachments</p>	API SPEC 2C	yes.															
	Verify that the wedge socket and wedge are the correct size for the rope in use and record the size	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO															
Sheaves & Bearings	Lubricate all sheave bearings	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO															
	Visually inspect all sheaves and bushings for cracks, wear and deterioration	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO															
	Visually inspect wire rope track of sheave for rope imprints, wear and deterioration. If damage exist sheave should be resurfaced or replaced.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO															
	Pins retained by snap rings, bolt lock shafts, plates lock should be checked for missing or loose for all	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO															
	Check wire rope guards and keepers for proper location and condition.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO															
	Determine if wire rope is jumping the sheaves, by looking for signs of damage on the sheave brim	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO															
	Sheave Rope Profile for optimum Rope life the sheave groove profile should be correctly matched to the rope diameter	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO															
	Check rope sheave should be machine grooved to depth of not less than 1.5 times the nominal diameter of the rope	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO															
																		
	<table border="1"> <thead> <tr> <th></th> <th>MAIN POINT SHEAVES:</th> <th>Specification</th> <th>Record/Reading</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Industry Standard</td> <td>Sheave No. 1 <input checked="" type="checkbox"/> YES ( ) NO Sheave No. 2 <input checked="" type="checkbox"/> YES ( ) NO</td> </tr> <tr> <td></td> <td>AUX SHEAVES:</td> <td>Industry Standard</td> <td>Sheave No. 1 <input checked="" type="checkbox"/> YES ( ) NO</td> </tr> <tr> <td></td> <td>IDLER SHEAVES:</td> <td>Industry Standard</td> <td>Sheave AUX. <input checked="" type="checkbox"/> YES ( ) NO Sheave Main <input checked="" type="checkbox"/> YES ( ) NO</td> </tr> </tbody> </table>		MAIN POINT SHEAVES:	Specification	Record/Reading			Industry Standard	Sheave No. 1 <input checked="" type="checkbox"/> YES ( ) NO Sheave No. 2 <input checked="" type="checkbox"/> YES ( ) NO		AUX SHEAVES:	Industry Standard	Sheave No. 1 <input checked="" type="checkbox"/> YES ( ) NO		IDLER SHEAVES:	Industry Standard	Sheave AUX. <input checked="" type="checkbox"/> YES ( ) NO Sheave Main <input checked="" type="checkbox"/> YES ( ) NO	
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	IDLER SHEAVES:	Industry Standard	Sheave AUX. <input checked="" type="checkbox"/> YES ( ) NO Sheave Main <input checked="" type="checkbox"/> YES ( ) NO															
	Pins for bronze bushing and straight roller bearing should have a running clearance of .031 inch/ sheave of end play and should be adjusted accordingly. (count from left)	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO															
	MAIN POINT SHEAVES:	Industry Standard	Sheave No. 1 <u>18</u> inch Sheave No. 2 <u>18</u> inch															
	AUX SHEAVES:	Industry Standard	<u>14</u> inch															

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IDLER SHEAVES:		Industry Standard	Sheave AUX. <u>18</u> inch Sheave Main <u>18</u> inch.	
Ensure the sheaves are aligned and the fleet angle is correct **Remark: Wire rope User's Manual allows 2 degree on grooved winch drum, Smooth Drum should be not more than 1-1/2 degree		API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
Determine if wire rope size and sheave sizes/grooves are compatible and record size. Sheave pitch diameter (D) to nominal wire rope diameter (d) ratio (D/d) shall not be less than 18:1		API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO	
	MAIN POINT SHEAVES:	SHEAVE D / WIRE ROPE d = >18	API SPEC 2C	<u>18</u> inch (D) <u>58</u> inch (d) <u>28</u> (Ratio D/d)
	AUX SHEAVES:	SHEAVE D / WIRE ROPE d = >18	API SPEC 2C	<u>14</u> inch (D) <u>58</u> inch (d) <u>22</u> (Ratio D/d)
	IDLER SHEAVES:	SHEAVE D / WIRE ROPE d = > 18 (If applicable)	API SPEC 2C	<u>18</u> inch (D) <u>58</u> inch (d) <u>28</u> (Ratio D/d)
	MAIN BLOCK SHEAVES:	SHEAVE D / WIRE ROPE d = > 16	API SPEC 2C	<u>16</u> inch (D) <u>58</u> inch (d) <u>24</u> (Ratio D/d)
Load Block	Load Block: Check the load block for cleanliness, binding sheaves, damaged or worn sheaves, worn or distorted sheave pins, broken bolts, and worn cheek weights.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Hook: Check the hook damage, excessive wear to the hook safety latch, hook swivel trunnions, thrust collar, securing, damage or missing lubrication fittings, proper lubrication, cracks and gouges, and if visibly bent or twisted or has been exposed to welding or arching.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Hook: Tip has been bent more than 10 degree out of plane from the hook body	Industry Standard/API RP2D7	<input checked="" type="checkbox"/> YES ( ) NO	
	Pins for bronze bushing and straight roller bearing should have a running clearance of .031 inch/ sheave of end play and should be adjusted accordingly	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Hook or shackle to swivel case clearance is set at .031 to .062 inch, Clearance exceeding .12 to .18 (ONLY CROSBY BRAND)	OEM Crosby	<input checked="" type="checkbox"/> YES ( ) NO	
	OEM STANDARD RECOMMEND that Crane block removal from service until replaced and repair following below	OEM STANDARD		
	- Elongated center pin and hook trunnion holes exceeding 5% of Original diameter	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO	
	-Material loss due to wear exceeding 10% of original section	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO	
	-Sheave wire rope groove diameter smaller than 2.5%	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO	
	Loosened tie bolts nuts, center pin round nuts, cheek weight cap screws and hook nut cap screws. Tie bolt nuts to be torqued to 35-40 ft.Lbs and restaked, all other fasteners wrench tight	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO	
	Throat opening - any distortion causing an increase in throat opening of 5% not to exceed 1/4 in. (6 mm.) (or as recommended by the manufacturer)	ASME B30.10	<input checked="" type="checkbox"/> YES ( ) NO	
	Inspect rope track worn in sheave groove, sheave must be resurface or replace	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Ensure the load block is not using "Cast Iron" cheek weights they can not be used as per API	API SPEC 2C	<input checked="" type="checkbox"/> YES ( ) NO	
	Determine if all hooks are equipped with properly operating safety latches and check for proper functioning	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Lubricate sheave bearings and swivels	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Re-tighten nut firmly to point at which trunion will just rotate, the Re-tighten set-screw in nut and thread condition as in the picture below,	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Last NDE inspection record	Industry Standard	Last inspect date _____	
RECORD LOAD BLOCK INFORMATION:		Manufacturer: OEM Manual	<u>Melhusen</u>	
		Model: OEM Manual	<u>M 35 D 16 H</u>	
		Serial Number: OEM Manual	<u>0254339</u>	
Record Load block measurements and details for future comparison with historical data		Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	A - Block OD	Industry Standard	<u>19 3/4</u> mm/ inch	
	B - Block length	Industry Standard	<u>12 3/8</u> mm/ inch	
	C - Center of Pin to hook Saddle	Industry Standard	<u>32 1/2</u> mm/ inch	
	D1 - Sheave Diameter	Industry Standard	<u>16</u> mm/ inch	
	E - Block Width	Industry Standard	<u>38 1/2</u> mm/ inch	
	F - Throat Opening	Industry Standard	<u>7</u> mm/ inch	
	G - Trunnion	Industry Standard	<u>0.033</u> mm/ inch	
Aux. Ball	Inspect Auxiliary ball for cleanliness, binding swivel, work pad-eye hole. Inspect the hook damage, excessive wear to the hook safety latch, Bent connector plates, Severe corrosion pitting, hook swivel trunnions, thrust collar, securing, damage or missing lubrication fittings, Loose, missing or damaged retaining nuts, cotter pins or swivel set screws, Missing or illegible rating and warning tags, proper lubrication, cracks and gouges, and if visibly bent or twisted or has been exposed to welding or arching.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Hook: Tip has been bent more than 10 degree out of plane from the hook body	Industry Standard/API RP2D7	<input checked="" type="checkbox"/> YES ( ) NO	
	OEM STANDARD recommend that Crane overhaul ball removal from service until replaced and repair following below	OEM STANDARD		
	- Elongated ball pin holes, hook latch pin holes and swivel eye exceeding 5% of original diameter,	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO	
	-Swivel end play gap exceeding .08". Excessive end play indicates damaged Internal set screw	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO	
	-Material loss due to wear exceeding 10% of original section	OEM STANDARD	<input checked="" type="checkbox"/> YES ( ) NO	

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SYSTEM	TASK	Specification	Record/Reading	
L	Throat opening - any distortion causing an increase in throat opening of 5% not to exceed 1/4 in. (6 mm.) (or as recommended by the manufacturer)	ASME B30.10	<input checked="" type="checkbox"/> YES ( ) NO	
	All hooks that lift personnel are to have a positive locking safety latch while lifting personnel**	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	*** Temperature Effect: When hooks are to be used at temperature above 400° F. (204°C) or below -40°F (-40°C), the hook manufacturer or a qualified person should be consulted	ASME B30.10		
	*** Chemically Active Environment: The strength of hooks can be affected by chemically active environments, such as caustic or acid substances or fumes. The hook manufacturer or qualified person should be consulted before hooks are used in chemically active environment			
	Verify to ensure nut firmly at which trunion rotate. Identify to set-screw in nut/ swivel/ counter pin and thread condition.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Last NDE inspection record	Industry Standard	Last inspect date: _____	
	RECORD AUX BALL INFORMATION:		Manufacturer: OEM Manual Model: OEM Manual Serial Number: OEM Manual	McKISSICK OB 7500 MB 07T 200E 0434321
	Record Auxiliary Ball measurements and details for future comparison with historical data: For Model MB07T200E ONLY		Industry Standard	
		AA Dimensions 3.0 Inch	Industry Standard	3 mm/ Inch
		A Dimensions 24.89 Inch	Industry Standard	24.5 mm/ Inch
B Dimensions 21.71 Inch		Industry Standard	21.70 mm/ Inch	
C Dimensions 12.50 Inch		Industry Standard	12.50 mm/ Inch	
D Dimensions 1.61 Inch		Industry Standard	1.60 mm/ Inch	
E Dimensions 1.81 Inch		Industry Standard	1.80 mm/ Inch	
F Dimensions 1.38 Inch		Industry Standard	1.40 mm/ Inch	
H Dimensions 1.38 Inch		Industry Standard	1.40 mm/ Inch	
I Dimensions 0.88 Inch		Industry Standard	0.89 mm/ Inch	
J Dimensions 1.31 Inch		Industry Standard	1.30 mm/ Inch	
	Record Auxiliary Ball measurements and details for future comparison with historical data: For Model OB 7EE 200-4		Industry Standard	
	A Dimensions 27.25 Inch	Industry Standard	_____ mm/ Inch	
	B Dimensions 24.10 Inch	Industry Standard	_____ mm/ Inch	
	F Dimensions 12.00 Inch	Industry Standard	_____ mm/ Inch	
	H-H Dimensions 1.38 Inch	Industry Standard	_____ mm/ Inch	
	J Dimensions 1.81 Inch	Industry Standard	_____ mm/ Inch	
	K Dimensions 1.46 Inch	Industry Standard	_____ mm/ Inch	
	R Dimensions 1.55 Inch	Industry Standard	_____ mm/ Inch	
	S Dimensions 1.34 Inch	Industry Standard	_____ mm/ Inch	
	T Dimensions 1.03 Inch	Industry Standard	_____ mm/ Inch	
U Dimensions 1.31 Inch	Industry Standard	_____ mm/ Inch		
Safety system	Check Condition anti - two block , hanging chain , eye bolts , fix bolts , shackle for missing , corrosion , erosion , deformation	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Check anti - two block kick out plate for freely movement	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	Check anti-2-block device proper function of Main winch	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False	
	Check anti-2-block device proper function of Aux. winch	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False	
	Check relation of boom radius and boom angle (lowest, middle, highest) with reference to load chart. Recharge fluid W-15 to load indicator, if required.	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	Functional test of emergency lowering system (See procedure in Emergency Load Lowering Box). Note: Keep for 1 Yr PM to sustain crane mechanic competency. Caution: Function test must be performed on top deck with max 2-foot height.	Company Spec/Standard	<input checked="" type="checkbox"/> Function ( ) False	
	Visually check emergency load lowering kit. Ensure EMERGENCY LOWERING PROCEDURE and MATERIAL LIST are in the box. - Ensure ALL items shown on the list are in the box and in good condition	Company Spec/Standard	<input checked="" type="checkbox"/> YES ( ) NO	
	SECURE THE BOX WITH A TIE WRAP			
Slew Mechanism	Visually check for damage and excessive wear on gear teeth	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO	
	Visually check slew gear box in the area of oil seal for any leaks	API RP 2D	<input checked="" type="checkbox"/> YES ( ) NO	
	RECORD SLEW GEAR BOX INFORMATION:		Manufacturer: OEM Manual Model: OEM Manual Serial Number: OEM Manual	634. 250 A 0 317 001
	CHECK and RE-TORQUE swing drive gearbox mounting bolts at following brands: - ESKRIDGE, Model: 250 = 150 FT-LBS		API RP 2D	150 FT-LBS
	Check swing gearbox oil level/condition, top up if required	Meropa 220	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO
	Monitor slew gearbox oil condition by visually examine for burnt smell, metal particles, and/or other contaminants, record and change if found.		OEM Manual	<input checked="" type="checkbox"/> CHANGE OIL <input checked="" type="checkbox"/> NOT CHANGE OIL
	Change slew gear box oil		OEM Manual	<input checked="" type="checkbox"/> CHANGE OIL <input checked="" type="checkbox"/> NOT CHANGE OIL
	Grease all pivot points of slew ring (bearing)		OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO

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Grease open gears (pinion)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO								
Rotate crane 360 degree and check smoothness of operation	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO								
Check swing drive static parking brake for proper operation Caution: DO NOT stop the swing of the crane with this static brake (parking brake)	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO								
Check swing drive dynamic parking brake for proper operation	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO								
Check swing lock mechanism condition; corrosion, dent, loose all part, worn and wear	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO								
Check swing lock mechanism freely lock and unlock for function	OEM Manual	<input checked="" type="checkbox"/> YES ( ) NO								
Check condition of slew ring bolts e.g. Bolt grade and washers. Caution: Use only hardened flat washers under head of bolt. Do not use lock washers, or regular flat washers.	Industry Standard	<input checked="" type="checkbox"/> YES ( ) NO								
Monitor ball-ring grease sample. If found wear and tear particles, take sample and send to lab. **Wear assessment by grease sample analysis—wear may be monitored by periodic grease sample analysis as describe in this section. Grease samples should be collected every twelve months as a minimum and the results of the analysis recorded; this period should be shortened if obvious metal or contaminants are present.	API PR 2D	( ) SEND TO LAB <input checked="" type="checkbox"/> NOT SEND TO LAB								
Verify crane condition and load test as separate procedure.										
<p align="center"><b>Table 1—Static/Onboard Test Load and Radius</b></p> <table border="1"> <thead> <tr> <th>Static/Onboard Rated Load at a Specific Radius lb (kg)</th> <th>Test Loads in Excess of Static/Onboard Rated Load at a Specific Radius</th> </tr> </thead> <tbody> <tr> <td>≤ 40,000 (18,144)</td> <td>25 %</td> </tr> <tr> <td>&gt; 40,000 ≤ 100,000 (&gt;18,144 ≤ 45,356)</td> <td>10,000 lb (4536 kg)</td> </tr> <tr> <td>&gt; 100,000 (45,356)</td> <td>10 %</td> </tr> </tbody> </table>	Static/Onboard Rated Load at a Specific Radius lb (kg)	Test Loads in Excess of Static/Onboard Rated Load at a Specific Radius	≤ 40,000 (18,144)	25 %	> 40,000 ≤ 100,000 (>18,144 ≤ 45,356)	10,000 lb (4536 kg)	> 100,000 (45,356)	10 %	API 2C	<input checked="" type="checkbox"/> YES ( ) NO
Static/Onboard Rated Load at a Specific Radius lb (kg)	Test Loads in Excess of Static/Onboard Rated Load at a Specific Radius									
≤ 40,000 (18,144)	25 %									
> 40,000 ≤ 100,000 (>18,144 ≤ 45,356)	10,000 lb (4536 kg)									
> 100,000 (45,356)	10 %									
Verify crane condition and load test as separate procedure.	19.1	<input checked="" type="checkbox"/> YES ( ) NO								

Risk Level Definitions: The following 3 levels indicate the impact the noted deficiency poses to the operation or structural integrity of the equipment:

Level #2 = Restricted Operation		
Minor deficiency that is recommended to be promptly addressed, but poses no safety and/or environmental risk. The crane can still be operated at full duty.	Deficiency identified that has the potential to limit, de-rate or damage the crane, its surroundings and/or the environment. The duty and locked/ tagged out until the crane's duty and operation should be de-rated or service restricted.	The crane should be removed from duty and locked/ tagged out until the deficiency is rectified.

System:	Risk Level:	Component:	Location:	In Accordance with:	Date Originated:
			HYD. INDICATOR		
			Hyd. hose - 4x280" Ø 1/2 ea. Main/Aux from load indicator to tube		
			Hyd. hose - 4x40" Ø 1/2 ea. Main Load cell at boom connection.		
Recommended urgency timeframe for corrective action:			Completed Date:	Completed By:	

System:	Risk Level:	Component:	Location:	In Accordance with:	Date Originated:
Recommended urgency timeframe for corrective action:			Completed Date:	Completed By:	

System:	Risk Level:	Component:	Location:	In Accordance with:	Date Originated:
Recommended urgency timeframe for corrective action:			Completed Date:	Completed By:	

System:	Risk Level:	Component:	Location:	In Accordance with:	Date Originated:
Recommended urgency timeframe for corrective action:			Completed Date:	Completed By:	

System:	Risk Level:	Component:	Location:	In Accordance with:	Date Originated:
Recommended urgency timeframe for corrective action:			Completed Date:	Completed By:	

2nd M. 23 Nov 2022.

System	TASK		Specification	Record/Reading
Recommended urgency timeframe for corrective action:				
		Completed Date:	Completed By:	
System:	Risk Level:	Component:	In Accordance with:	
		Location:	Date Originated:	
Recommended urgency timeframe for corrective action:				
		Completed Date:	Completed By:	

20/11/2022

Completed by.

- ① Arpishah. Z.
- ② Udorn T.
- ③ Saranyu C.
- ④ Nappadol T.

## THE PEDESTAL CRANE CONDITION VERIFICATION

Date: <u>19 Nov 2022</u>			
Crane Owner: CTEP/ COTL		Field: <u>Bendhamas</u> Platform/ Vessel: <u>LANE</u>	
Crane Owner's representative: (Mech Supv/ M'Dent) <u>Samppan C.</u>			
Qualified inspector: (Qualified Crane Mechanic) <u>Arpisan C.</u>			
Inspector's company / agency: (Third Party or Outsource to witness if applicable)			
Manufacture: <u>Nautilus</u>		Fabrication by: <u>Oil States</u> Year of Fabrication: <u>2006</u> Country: <u>USA</u>	
Model / Serial: <u>180 81 - 80 MS</u>		Standard API Edition: <u>sixth edition 2004</u>	
Safe Working Load (SWL) --> OEM		<u>12.5</u> Metric Tonnes	
Safe Working Load (SWL) --> Existing via MOC, if applicable		<u>80</u> Metric Tonnes	
Boom length, Main		<u>80</u> Ft	
Boom length, Auxiliary if applicable		<u>1</u> Ft	
Part of line main hoist		<u>4</u> Part line	
Part of line auxiliary hoist		<u>1</u> Part line	
Safe Working Load at longest boom radius		<u>80</u> ft <u>7293</u> Metric Tonnes (Lbs)	
Safe Working Load at shortest boom radius		<u>13.5</u> ft <u>37519</u> Metric Tonnes (Lbs)	
The document of crane specification for Testing, Maintenance and Inspection are provided by:		<u>OEM</u> MOC / Crane Engineer	
Has the crane ever been modified by MOC? (To verify if this crane is modified with MOC --> Allow to test the crane. If this crane is modified without MOC --> Not allow to test the crane)		YES <u>NO</u>	
Does the rotating part have proper guard in place?		<u>YES</u> NO (Need mitigation plan)	
Is the ladder and hand rail in place?		<u>YES</u> NO (Need mitigation plan)	
Is the maintenance platform in place?		<u>YES</u> NO (Need mitigation plan)	
Is the SWL tag labelled on crane pedestal, main block or aux ball?		<u>YES</u> NO (Need mitigation plan)	
Verify if the crane major component damaged or not		YES (Need to repair or mitigate unsafe condition with MOC before testing) <u>NO</u> (Employers shall not allow employees work with damaged/ unsafe cranes or derricks)	
Inspect boom end connections, for bends, dents, corroded areas, cracked welds, and signs of mechanical damage, wear, etc. **any deviation should be reported**  Level #1 = Incidental: Minor deficiency that is recommended to be promptly addressed, but poses no safety and/or environmental risk. The crane can still be operated at full duty. --> Allow to test  Level #2 = Restricted Operation: Deficiency identified that has the potential to limit, de-rate or damage the crane, its surroundings and/or the environment. The duty and locked/ tagged out until the crane's duty and operation should be de-rated or service restricted. --> To be de-rated  Level #3 = Out of Service: The crane should be removed from duty and locked/ tagged out until the deficiency is rectified. --> Not Use		YES (To be verified) <u>NO</u>	
Function Load Testing			
1. Verify Crane SWL (Existing)		<u>3.0</u> Metric Tonnes	
2. Verify routine maximum actual load.		<u>2.4</u> Metric Tonnes	
3. Select the specimen load to be more than actual routine load 1.25 times but not more than SWL.  Example #1: Crane's SWL is 18 Metric Tonnes. The routine maximum actual load is 2.4 Metric Tonnes. Therefore, the load testing shall be $2.4 \times 1.25 = 3$ Metric Tonnes.  Example #2: Crane's SWL is 18 Metric Tonnes. The routine maximum actual load is 16 Metric Tonnes. By calculation, the load testing is $16 \times 1.25 = 20$ Metric Tonnes more than SWL (18 MTon). Therefore, the load testing shall be 18 Metric Tonnes equal to SWL.		<u>3.0</u> Metric Tonnes	
4. Use Auxiliary Winch if specimen load less than or equal 3 Metric Tonne		<u>YES</u> NO	
5. Use Main Winch if specimen load more than 3 Metric Tonne		<u>YES</u> NO	
6. The record of load testing: Fill in "Function Test Record" sheet attached.			

Act M. 23 Nov 2022

## RECORDED FUNCTION TEST PROCEDURE

1. CHECK AND RECORD READING RADIUS AND BOOM INDICATOR AT FOUR (4) VALUES INCLUDING MAXIMUM AND MINIMUM.

( ALL REDUIS MEASUREMENT ARE TO BE TAKEN FROM THE CENTERLINE OF CRANE ROTATION)

ACTUAL	INDICATED RADIUS (FT)
A) 15' (MINIMUM)	15
B) 20'	20
C) 25'	25
D) 30' ( INTERMEDIATE)	30
E) 40'	40
F) 50' (INTERMEDIATE)	50
G) 60'	60
H) 75' (MAXIMUM)	75

2. CHECK AND RECORD READING ON BOOM ANGLE / DEGREES.

SPECIFICATION	INDICATED BOOM ANGLE (DEGREES)
1). MAXIMUM. .... 81 ..... DEGREES	81
2). INTERMEDIATE. .... 60 ..... DEGREES	60
3). INTERMEDIATE. .... 45 ..... DEGREES	45
4). MINIMUM. .... 0 ..... DEGREES	0

3. READING ON LOAD INDICATOR WITHOUT SLINGS OR LOAD / LBS. (LOAD BLOCK + WIRE ROPE)

ACTUAL	INDICATOR READ FREE LOAD, (LBS)
1). MAXIMUM RADIUS 850 LBS.	800
2). MINIMUM RADIUS 750 LBS,	1000

4. CHECK AND RECORD ENGINE HIGH IDLE SPEED / RPM.

SPECIFICATION	INDICATED OF FUNCTIONAL (RPM)
1). IDLE SPEED 850 RPM	850
2). LOW SPEED - RPM	-
3). HIGH SPEED 2100 RPM	2200

5. FUNCTIONALLY TEST THE FOLLOWING.

ACTUAL	INDICATED OF FUNCTIONAL (TESTED)
A) MAIN HOIST ANTI -TWO BLOCK.	function
B) AUXILIARY HOIST ANTI -TWO BLOCK.	function
C) HIGH BOOM ANGLE KICK OUT.	-
D) LOW BOOM ANGLE KICK OUT.	-
E) PRIME MOVER SHUTDOWN.	function
F) EMERGENCY SHUTDOWN.	function
G) ROTATE CRANE 360 LEFT.	smooth
H) ROTATE CRANE 360 RIGHT.	smooth

6. RECORD HYDRAULIC RELIEF VALVE PRESSURE SETTING ON FOLLOWING HYDRAULIC FUNCTION:

SPECIFICATION	INDICATED PRESSURE (PSI)
A) MAIN HOIST 3000 PSI.	3000
B) AUXILIARY HOIST 2800 PSI.	2800
C) BOOM HOIST 3000 PSI.	3000

TEST CONDUCTED BY: Arisale C

POSITION: CR. Mech.

CRANE OPERATOR: Moppral T.

POSITION: CR. Mech

COMMENTS:

DATE:

Jae M. 23 Nov 2022





# Inspection Report

## Work Order Details

### Inspection Type

Ultrasonic Flare Meter (THA)

### Work Order #

1184049

### Description

1Y ULTRASONIC FLARE METER-BEPP

### Scheduled Date

05/11/2022

### Status

85 - Closed

### Local Code 11

UFM

### Local Code 13

GDF

### Work Center

BEIEROV

### Branch Plant

3800BLQNTA

### Fields

BENCHAMAS

### Platform Tag

BENCHAMAS

### PM Description

1Y ULTRASONIC FLARE METER-BEPP

### SD Category

### Plan Date

3/23/2022 12:00:00 AM

## Equipment Details

### Equipment #

BEPP-FLARE-GAS-METER

### Description

6M ULTRASONIC FLARE METER-BEPP

### Area

BENCHAMAS

### Equipment Class

S - System

## Assignment and Status

### Completed by

Kraisorn Thongwan

### Completed on

7/19/2022 5:40:18 PM

### Status

Approved

### Approved by

Ponlasit Thongsawang

### Approved on

## Inspection Summary

Action by: Kraisorn T./ Suphachai P./ 18 Jul 22.

### Reviewer Summary

Equipment is accuracy and normal condition

### Equipment Details

Field Name	Original Value	New Value
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## Inspection Items

### General

Item	Response	Completion
INSPECTION INTERVAL	1Y	KZGK@chevron.com 7/19/2022 7:50:09 AM
PLATFORM	Benchasmas	KZGK@chevron.com 7/19/2022 7:50:12 AM

## MFGR, INDUSTRY REFERENCES AND ENGINEERING RECOMMENDATION

Item	Response	Completion
- FLOW MEASUREMENT MANUAL Rev.2 - P&ID NO. D-COT-BEN-10-064	Yes	KZGK@chevron.com 7/19/2022 7:50:15 AM

## PREPARATION TO PERFORM PM TASK

Item	Response	Completion
Coordinate with fe construction to prepare scaffolding as required.	Yes	KZGK@chevron.com 7/19/2022 5:06:48 PM
Coordinate with operator to make equipment available for PM.	Yes	KZGK@chevron.com 7/19/2022 5:06:49 PM
Certified pressure calibrators or other certified calibration equipment.	Yes	KZGK@chevron.com 7/19/2022 5:06:49 PM

Certified resistance decade box or rtd or calibrator and thermometer.	Yes	KZGK@chevron.com 7/19/2022 5:06:51 PM
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## VISUAL INSPECTION

Item	Response	Completion
Inspect all accessible instrument systems for damages, leaks, loose or broken connections.	Yes	KZGK@chevron.com 7/19/2022 5:06:54 PM

## PERFORM CALIBRATION CHECK ON TRANSMITTERS - Verify the "AS FOUND" pressure PIT-P1610 and record the readings. (CRITERIA : ACCURACY WITH IN 0.1% OF SPAN)

Item	Response	Completion
Flush out PIT-P1610 impulse lines.	Yes	KZGK@chevron.com 7/19/2022 5:06:57 PM
Desired Input 14.70 PSI and Desired output 9.8% AS FOUND	INC As Found: 14.6 PSI As Left: 14.6 PSI DEC As Found: 14.7 PSI As Left: 14.7 PSI	KZGK@chevron.com 7/19/2022 5:07:56 PM
Desired Input 37.50 PSI and Desired output 25% AS FOUND	INC As Found: 37.51 PSI As Left: 37.51 PSI DEC As Found: 37.50 PSI As Left: 37.50 PSI	KZGK@chevron.com 7/19/2022 5:08:27 PM
Desired Input 75.00 PSI and Desired output 50% AS FOUND	INC As Found: 75 PSI As Left: 75 PSI DEC As Found: 75 PSI As Left: 75 PSI	KZGK@chevron.com 7/19/2022 5:08:44 PM
Desired Input 112.50 PSI and Desired output 75% AS FOUND	INC As Found: 112.5 PSI As Left: 112.5 PSI DEC As Found: 112.5 PSI As Left: 112.5 PSI	KZGK@chevron.com 7/19/2022 5:09:00 PM
Desired Input 150.00 PSI and Desired output 100% AS FOUND	INC As Found: 149.99 PSI As Left: 149.99 PSI DEC As Found: 150.0 PSI As Left: 150.0 PSI	KZGK@chevron.com 7/19/2022 5:09:25 PM

## PERFORM CALIBRATION CHECK ON TRANSMITTERS - If Pressure transmitter fail to meet the criteria

Item	Response	Completion
If the "AS FOUND" readings of any pressure transmitter fail to meet the criteria, make the adjustment/calibration and reperform verify until the results of that pressure transmitter meet the criteria. then the latest readings shall be recorded as "AS LEFT"	Yes	KZGK@chevron.com 7/19/2022 5:26:11 PM

## PERFORM CALIBRATION CHECK ON TRANSMITTERS - Verify temperature spot reading against a certified thermometer.

Item	Response	Completion
TIT-P1610	Spot reading: 89.21 DEG F Certified thermometer: 89.19 DEG F	KZGK@chevron.com 7/19/2022 5:31:59 PM
TIT-P1620	Spot reading: 91.27 DEG F Certified thermometer: 91.30 DEG F	KZGK@chevron.com 7/19/2022 5:32:15 PM

## PERFORM CALIBRATION CHECK ON TRANSMITTERS - Verify the "AS FOUND" pressure PIT-P1620 and record the readings. (CRITERIA : ACCURACY WITH IN 0.1% OF SPAN)

Item	Response	Completion
Flush out PIT-P1620 impulse lines.	Yes	KZGK@chevron.com 7/19/2022 5:09:27 PM
Desired Input 14.70 PSI and Desired output 9.8% AS LEFT	INC As Found: 14.6 PSI As Left: 14.6 PSI DEC As Found: 14.5 PSI As Left: 14.5 PSI	KZGK@chevron.com 7/19/2022 5:09:56 PM
Desired Input 37.50 PSI and Desired output 25% AS LEFT	INC As Found: 37.5 As Left: 37.5 DEC As Found: 37.5 As Left: 37.5	KZGK@chevron.com 7/19/2022 5:10:17 PM
Desired Input 75.00 PSI and Desired output 50% AS LEFT	INC As Found: 74.9 PSI As Left: 75 PSI DEC As Found: 75 PSI As Left: 75 PSI	KZGK@chevron.com 7/19/2022 5:10:36 PM
Desired Input 112.50 PSI and Desired output 75% AS LEFT	INC As Found: 112.5 PSI As Left: 112.5 PSI DEC	KZGK@chevron.com 7/19/2022 5:10:55 PM

As Found: 112.5 PSI  
As Left: 112.5 PSI

Desired Input 150.00 PSI and Desired output 100% AS LEFT	INC As Found: 149.9 PSI As Left: 149.9 PSI DEC As Found: 150 PSI As Left: 150 PSI	KZGK@chevron.com 7/19/2022 5:26:09 PM
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**PERFORM CALIBRATION CHECK ON TRANSMITTERS - Verify the "AS FOUND"temperature TIT-P1610 and record the readings. (CRITERIA : ACCURACY WITH IN 0.64 OF SPAN)**

Item	Response	Completion
Desired output 0% 0.00 DEG F AS FOUND	Simulation (Ohms): 93.033 As Found (DEG F): 0.3 As Left (DEG F): 0.3	KZGK@chevron.com 7/19/2022 5:27:39 PM
Desired output 25% 50.00 DEG F AS FOUND	Simulation (Ohms): 103.903 As Found (DEG F): 50.3 As Left (DEG F): 50.3	KZGK@chevron.com 7/19/2022 5:27:57 PM
Desired output 50% 100.00 DEG F AS FOUND	Simulation (Ohms): 114.682 As Found (DEG F): 100.3 As Left (DEG F): 100.3	KZGK@chevron.com 7/19/2022 5:28:42 PM
Desired output 75% 150.00 DEG F AS FOUND	Simulation (Ohms): 125.373 As Found (DEG F): 150.3 As Left (DEG F): 150.3	KZGK@chevron.com 7/19/2022 5:28:53 PM
Desired output 100% 200.00 DEG F AS FOUND	Simulation (Ohms): 135.974 As Found (DEG F): 200.2 As Left (DEG F): 200.2	KZGK@chevron.com 7/19/2022 5:29:19 PM

**PERFORM CALIBRATION CHECK ON TRANSMITTERS - Verify the "AS FOUND"temperature TIT-P1620 and record the readings. (CRITERIA : ACCURACY WITH IN 0.64 OF SPAN)**

Item	Response	Completion
Desired output 0% 0.00 DEG F AS FOUND	Simulation (Ohms): 93.033 As Found (DEG F): 0.2 As Left (DEG F): 0.2	KZGK@chevron.com 7/19/2022 5:29:45 PM
Desired output 25% 50.00 DEG F AS FOUND	Simulation (Ohms): 103.903 As Found (DEG F): 50.2 As Left (DEG F): 50.2	KZGK@chevron.com 7/19/2022 5:30:14 PM
Desired output 50% 100.00 DEG F AS FOUND	Simulation (Ohms): 114.682 As Found (DEG F): 100.2 As Left (DEG F): 100.2	KZGK@chevron.com 7/19/2022 5:30:50 PM
Desired output 75% 150.00 DEG F AS FOUND	Simulation (Ohms): 125.373 As Found (DEG F): 150.2 As Left (DEG F): 150.2	KZGK@chevron.com 7/19/2022 5:31:06 PM
Desired output 100% 200.00 DEG F AS FOUND	Simulation (Ohms): 135.974 As Found (DEG F): 200.1 As Left (DEG F): 200.1	KZGK@chevron.com 7/19/2022 5:31:32 PM

**PERFORM CALIBRATION CHECK ON TRANSMITTERS - If Temperature transmitter fail to meet the criteria**

Item	Response	Completion
If the "AS FOUND" readings fail to meet the criteria, make the adjustment/calibration and reperform verify until the results meet the criteria. then the latest readings shall be recorded as "AS LEFT"	Yes	KZGK@chevron.com 7/19/2022 5:31:37 PM

**ZERO VERIFICATION AND TRANSDUCER CLEANING**

Item	Response	Completion
Retract the sensors and close the isolation valves.	Yes	KZGK@chevron.com 7/19/2022 5:32:20 PM
Put both transducers in a close box or PVC pipe with the distance between transducer's head equals to path length.	Yes	KZGK@chevron.com 7/19/2022 5:32:21 PM
Record the zero reading. Reset zero if required for FE-P1610A NOTE : $\pm 0.03$ m/s = NORMAL $>0.03 <1$ m/s = SET ZERO CUT OFF $> 1$ m/s = CONSULT WITH VENDOR / M&M (ISSUE WO)	As Found: 0.02 m/s As Left: 0.02 m/s	KZGK@chevron.com 7/19/2022 5:33:59 PM
Record the zero reading. Reset zero if required for FE-P1610B NOTE : $\pm 0.03$ m/s = NORMAL $>0.03 <1$ m/s = SET ZERO CUT OFF $> 1$ m/s = CONSULT WITH VENDOR / M&M (ISSUE WO)	As Found: 0.01 m/s As Left: 0.01 m/s	KZGK@chevron.com 7/19/2022 5:34:11 PM
Record the zero reading. Reset zero if required for FE-P1620A NOTE : $\pm 0.03$ m/s = NORMAL $>0.03 <1$ m/s = SET ZERO CUT OFF $> 1$ m/s = CONSULT WITH VENDOR / M&M (ISSUE WO)	As Found: 0.03 m/s As Left: 0.03 m/s	KZGK@chevron.com 7/19/2022 5:34:28 PM
Record the zero reading, Reset zero if	As Found: 0.02 m/s	KZGK@chevron.com

required for FE-P1620B NOTE : $\pm 0.03$ m/s = NORMAL >0.03 <1 m/s = SET ZERO CUT OFF > 1m/s = CONSULT WITH VENDOR / M&M (ISSUE WO)	As Left: 0.02 m/s	7/19/2022 5:34:37 PM
Install the transducers back and open the isolation valves.	Yes	KZGK@chevron.com 7/19/2022 5:34:39 PM

## FINAL INSPECTION

Item	Response	Completion
Return the system to service.	Yes	KZGK@chevron.com 7/19/2022 5:34:58 PM
Retrieve diagnostic data and compare to standard value to ensure that all data within the range. record value in the table.	Yes	KZGK@chevron.com 7/19/2022 5:34:58 PM
If any value is out of range, both sensors are required to be cleaned (see transducer removal procedure) NOTE : mark sensors exact position before removing and installing back to ensure its proper position after cleaning. if any sensor is not exactly installed to its position, the system may not measure correctly	Yes	KZGK@chevron.com 7/19/2022 5:34:59 PM
Check system for leaks.	Yes	KZGK@chevron.com 7/19/2022 5:35:01 PM

## CHECK DIAGNOSTIC OF PARAMETIC GF868 AT CONTROL ROOMS DETAILS

Item	Response	Completion
FQI-P1610 HP FLARE METER DIAGNOSTIC DATA (BASELINE CONDITION).	SS up : Display the signal strength for the upstream transducer. (50-75) CH#1 AS FOUND: 61.6 SS do : Display the signal strength for the downstream transducer. (50-75) CH#1 AS FOUND: 62 Q up : Display the signal quality for the upstream transducer. ( $\geq 1200$ ) CH#1 AS FOUND: 1237 Q down : Display the signal quality for the downstream transducer. ( $\geq 1200$ ) CH#1 AS FOUND: 1304 AMP up : Display the value for the amplitude discriminator of the upstream transducer. ( $24 \pm 5$ ) CH#1 AS FOUND: 25 AMP down : Display the value for the amplitude discriminator of the downstream transducer. ( $24 \pm 5$ ) CH#1 AS FOUND: 26 P# up : Display signal peaks for the upstream transducer. (100-2300) CH#1 AS FOUND: 273 P# down : Display signal peaks for the downstream transducer. (100-2300) CH#1 AS FOUND: 274 Sndsp : Display sound speed of media in pipe. (N/A) CH#1 AS FOUND: 1118.43	KZGK@chevron.com 7/19/2022 5:36:48 PM
FQI-P1620 HP FLARE METER DIAGNOSTIC DATA (BASELINE CONDITION).	SS up : Display the signal strength for the upstream transducer. (50-75) CH#2 AS FOUND: 60.7 SS do : Display the signal strength for the downstream transducer. (50-75) CH#2 AS FOUND: 60.5 Q up : Display the signal quality for the upstream transducer. ( $\geq 1200$ ) CH#2 AS FOUND: 1222 Q down : Display the signal quality for the downstream transducer. ( $\geq 1200$ ) CH#2 AS FOUND: 1337 AMP up : Display the value for the amplitude discriminator of the upstream transducer. ( $24 \pm 5$ ) CH#2 AS FOUND: 25 AMP down : Display the value for the amplitude discriminator of the downstream transducer. ( $24 \pm 5$ ) CH#2 AS FOUND: 24 P# up : Display signal peaks for the upstream transducer. (100-2300) CH#2 AS FOUND: 313 P# down : Display signal peaks for the downstream transducer. (100-2300) CH#2 AS FOUND: 312 Sndsp : Display sound speed of media in pipe. (N/A) CH#2 AS FOUND: 910.21	KZGK@chevron.com 7/19/2022 5:39:00 PM

## PM TASK REPORT

Item	Response	Completion
Scan this job card and attach to work order.	Yes	KZGK@chevron.com 7/19/2022 5:39:03 PM
Close PM work order and record any corrective actions in CMMS.	Yes	KZGK@chevron.com 7/19/2022 5:39:04 PM



# Inspection Report

## Work Order Details

**Inspection Type**  
Sewage (THA)

**Work Order #**  
1174620-BEIEROV

**Description**  
1Y SEWAGE TREATMENT SYSTEM

**Scheduled Date**  
04/06/2022

**Status**  
85 - Closed

**Local Code 11**  
SEW

**Local Code 13**

**Service Type**  
MD365

**Work Center**  
BEIEROV

**Branch Plant**  
3800BLQNTA

**Fields**  
BENCHAMAS

**Platform Tag**  
BENCHAMAS

**ECA Ranking**  
2

**PM Status**  
50

**PM Description**  
1Y SEWAGE TREATMENT SYSTEM

**SD Category**

**Plan Date**  
4/12/2022 12:00:00 AM

## Equipment Details

**Equipment #**  
BELQ-WS-Q0001

**Description**  
2W SEWAGE TREATMENT SYSTEM

**Parent #**  
BELQ-WS

**Area**  
Benchamas

**Sub Area**  
BELQ-EDG

**Equipment Class**  
VE - Vessel

## Assignment and Status

**Completed by**  
Ponlasit Thongsawang

**Completed on**  
3/21/2022 1:47:11 PM

**Status**  
Approved

**Approved by**  
Ponlasit Thongsawang

**Approved on**

## Inspection Summary

Completed by Suphachai P. 21 Mar 2022

### Reviewer Summary

Equipment is accuracy and normal condition

### Equipment Details

Field Name	Original Value	New Value
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## Inspection Items

### General

Item	Response	Completion
INSPECTION INTERVAL	1Y	UFNK@chevron.com 3/21/2022 11:26:20 AM

### PRE-REQUISITE TASKS

Item	Response	Completion
COORDINATE WITH OPERATOR FOR ANY TASKS TO BE DONE ON THE SEWAGE UNIT	Yes	UFNK@chevron.com 3/21/2022 11:26:24 AM
PREPARE SPARE PARTS AND TOOLS	Yes	UFNK@chevron.com 3/21/2022 11:26:24 AM
USING PROTECTION EQUIPMENT (PPE), AVOID CONTACT WITH SEWAGE	Yes	UFNK@chevron.com 3/21/2022 2:16:27 PM

### VISUAL INSPECTION



Item	Response	Completion
BEFORE SHUTDOWN THE UNIT, CHECK FOR UNUSUAL NOISE, VIBRATION ON THE MOTORS OR BLOWER	Yes	UFNK@chevron.com 3/21/2022 11:26:27 AM
CHECK MECHANICAL PARTS, VALVES, FITTINGS FOR ANY LEAKS OR LOOSE CONNECTIONS, LEAKS OR DAMAGED	Yes	UFNK@chevron.com 3/21/2022 11:26:28 AM
CHECK CONTROL PANEL FOR PROPER INDICATION	Yes	UFNK@chevron.com 3/21/2022 11:26:28 AM

## PERFORM UNIT SHUTDOWN & FLUSHING PROCEDURE

Item	Response	Completion
PERFORM MANUAL BLOWDOWN SURGE TANK (V1) AND EFFLUENT TANK (V2)	Yes	UFNK@chevron.com 3/21/2022 11:26:30 AM
PERFORM MANUAL BACK FLUSH ON THE BOOK CELL	Yes	UFNK@chevron.com 3/21/2022 11:26:32 AM

## FUNCTION TEST AND CHECK CONDITION - Effluent tank

Item	Response	Completion
PERFORM FUNCTION TEST ON PRESSURE SWITCH HIGH	Pass/Fail: Pass Failure Code:	UFNK@chevron.com 3/21/2022 11:26:37 AM

## FUNCTION TEST AND CHECK CONDITION - Surge tank

Item	Response	Completion
PERFORM FUNCTION TEST ON LEVEL SWITCH HIGH START PUMP	Pass/Fail: Pass Failure Code:	UFNK@chevron.com 3/21/2022 11:26:34 AM
PERFORM FUNCTION TEST ON LEVEL SWITCH LOW STOP PUMP	Pass/Fail: Pass Failure Code:	UFNK@chevron.com 3/21/2022 11:26:35 AM
PERFORM FUNCTION TEST ON LEVEL SWITCH HIGH ALARM	Pass/Fail: Pass Failure Code:	UFNK@chevron.com 3/21/2022 11:26:35 AM

## ELECTRICAL MOTORS

Item	Response	Completion
PERFORM INSULATION RESISTANCE TEST (RESISTANCE SHALL BE > 1.5 MΩ)	550 MΩ	UFNK@chevron.com 3/21/2022 1:43:23 PM
CHECK MOTOR STARTER AND CONTACTS FOR DEFECTS	Yes	UFNK@chevron.com 3/21/2022 11:26:45 AM
CHECK MACERATOR MOTOR RUNNING CURRENT (A)	A1: 2.19 A A2: 2.38 A A3: 2.28 A	UFNK@chevron.com 3/21/2022 1:43:48 PM

## GENERAL INSPECTION ON SEWAGE UNIT (MSD)

Item	Response	Completion
CHECK THAT VENT PRESSURE IS POSITIVE APPROX. 2 WC TO RELIEF GAS FROM (V2)	Yes	UFNK@chevron.com 3/21/2022 11:26:53 AM

## BOOK CELL INSPECTION

Item	Response	Completion
PERFORM BOOK CELL MANUAL BACK FLUSH BEFORE OPENING	Yes	UFNK@chevron.com 3/21/2022 11:26:55 AM
OPEN BOOK CELL AND CLEAN SOLIDS BUILD UP CLEAN DEPOSITS FROM TERMINAL ANODES, CATHODES, GROUND ROD OF BOOK CELL AND BI-POLAR ELECTRODES USING SOFT BRUSH AND WATER	Yes	UFNK@chevron.com 3/21/2022 2:16:39 PM
CHANGE PARTS, O-RING OR SEALS AS REQUIRED	Not Applicable	UFNK@chevron.com 3/21/2022 11:26:58 AM
REASSEMBLE BOOK CELLS USING PROPER TORQUE ON BOOK CELL BOLTS 10 LB-FT	Yes	UFNK@chevron.com 3/21/2022 11:27:11 AM

## PUMP (MECH TASK PERFORM BY IE)

Item	Response	Completion
CHANGE LUBE OIL IF REQUIRED.	Yes	UFNK@chevron.com 3/21/2022 2:16:36 PM

## JOB COMPLETION

Item	Response	Completion
RESTORE AND OPERATE THE UNIT PER OPERATING PROCEDURES (POSTED ON THE UNIT)	Yes	UFNK@chevron.com 3/21/2022 2:16:32 PM
CHECK FOR LEAKS AND PROPER OPERATION	Yes	UFNK@chevron.com 3/21/2022 11:28:17 AM
RECORD BOOK CELL OF THE FOLLOWING DC VOLTS (VOLT)	As Found: 110 Volt As Left: 110 Volt	UFNK@chevron.com 3/21/2022 2:18:53 PM
RECORD BOOK CELL OF THE FOLLOWING DC CURRENT (AMP)	As Found: 47.8 Amp	UFNK@chevron.com



## Maintenance activities daily report

Work Order Number: 1200575 Equipment Number: BENT-ZAH-6005  
 Work Center : BENRMT Op St : 99 GWP: -  
 Setup Crew : 2 Est Dur : 4  
 Actual Start : 1 Dec 2022 Actual Finish Date: 1 Dec 2022  
 Actual Hour : 8

### Related Links.

Component Code: ☐ Filter ☐ Hose/Tubing ☐ Regulator ☐ Fitting ☐ Isolator/Insulator  
☐ Bearing ☐ Gasket/Seal ☐ Belt ☐ Coupling ☐ Packing  
☐ Gearbox ☐ Pump ☐ Actuator ☐ Mech. Seal ☐ Bolt/Fastener  
☐ Body ☐ Valve ☒ Other: 3W BENT-BEWA cleaning pigging

Failure Action : ☐ Charged ☐ Cleaned ☐ Flushed ☐ Installed ☐ Lubricated  
☐ Overhauled ☐ Replaced ☐ Removed ☐ Repaired ☐ Adjusted  
☐ Tightened ☐ Refurbished ☒ Pm/Pdm No Corrective Action  
☐ Pm/Pdm Corrective Action ☐ Other : \_\_\_\_\_

### Category codes

Work Order Classification	No code	FND	FSD	PMC	RAO	REP	PMS	
Primary Discipline	E	I	M	O	Q	T	W	
Secondary discipline (Local Code 3)	CSS	EEL	IIT	NIME	MTT	OOP	AGM	
Local code 4	BIW	NBI						
Shutdown classification(Optional)	Online	EON	FR	SSD	TSD	TSN	UD	UO
Work identify	ORD	PMI	HAZ					

### Attachment.

Problem Descriptions : 3W BENT-BEWA cleaning pigging

As Found : N/A

Action Taken : Am follow job task completed

Action By : Khammuang / Phoowanart

Possible root cause : N/A

Recommendation : N/A

Result (Out Come) : Normal to operation

Job Completed Date : 1 Dec 2022

Entry By / Date : Khammuang / 1 Dec 2022

Supervisor review : Uthai pol T / 3 Dec 22

Revision	Date	Reason for Issue/Change	CMOR #	Enter by
Rev.01	12-Nov-15	Review/Revise		Mongkol Y.

**JOB CARD NUMBER:** 3W BEWJ-BEWA CLEANING PIGGING-RMT

**SKID/EQUIPMENT:** BEWJ-ZAH-6305\_10" PIPELINE\_PIG LAUNCHER NO. 1

**OPT. SEQUENCE:** 10 3W BEWJ-BEWA CLEANING PIGGING-RMT

**WORK CENTER:** BENRMT

CREW SIZE	EST. HRS	RESOURCE DESCRIPTIONS
2	8	BENCHAMAS REMOTE TEAM

**MFGR, INDUSTRY REFERENCES AND ENGINEERING RECOMMENDATION:**

- N/A

**EQUIPMENT UNDER THIS PM TASK:**

- PIG LAUNCHER NO. ZAH-6305 FROM BEWJ TO BEWA

**PIG TYPE/PIPELINE CONFIGURATION:**

- 10" ARTICULATED BIDI PIG
- PIPELINE WITH SUBSEA SIDE ENTRY WYE WITH BEWJ/5D BENDING

**JOB INSTRUCTIONS:**

**RMT TASKS**

**PIG Launching Procedure**

**1 SAFETY**

1. Required Basic PPE and addition PPE.
  - Full Face or Goggle + Half mask
  - Respirator with cartridge filter of Mercury vapor e.g.: 3M type with P/N6069 or Equivalent
  - Tyvex Suite
  - Rubber Gloves
2. A Mercury Spill Kit and Blue drum must be available on site prior to the starting of this procedure.
3. No Hot Work allow during Pigging operations (open/close barrel hatch)
4. Radio communications has required at all times during pig operation.
5. High Risk Activities review with Supervisor:

HIGH RISK ACTIVITIES REVIEW	DONE	CHECKED BY
Review with Supervisor	<i>[Signature]</i>	

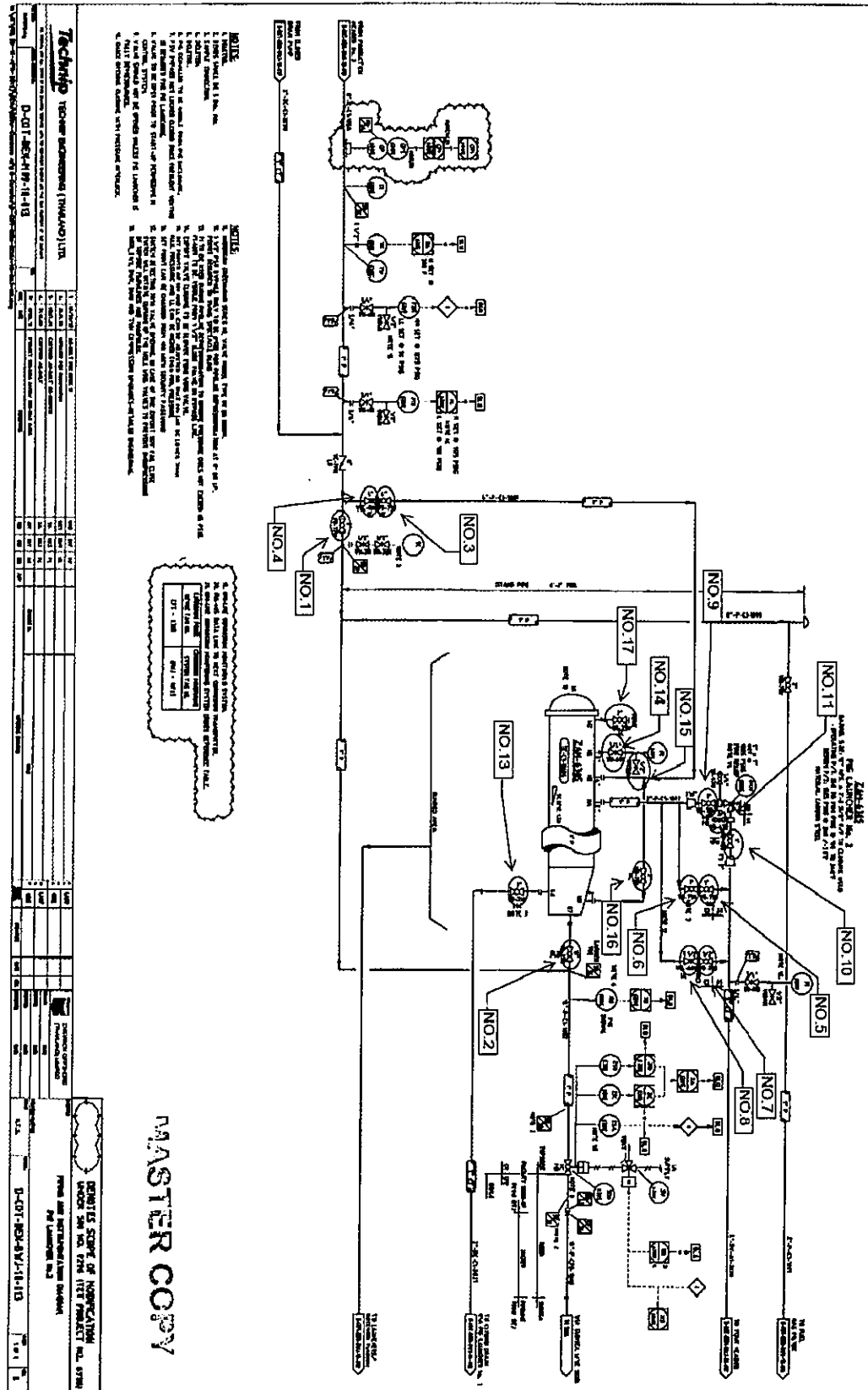




Figure 1.

### 3 EQUIPMENT INSPECTION

EQUIPMENT INSPECT	Y	N	DONE	CHECKED BY
No any leaks from PIG Launcher	/		Hammy	Poonavans
Electrical heat traced on piping of PIG Launcher is good working and no damage	/		Hammy	Poonavans
No excessive corrosion on valves and equipment that unsafe for operate	/		Hammy	Poonavans
Is the 10" ARTICULATED BIDI PIG good condition	/		Hammy	Poonavans

**NOTE:** If you have any doubts, STOP and ask your Supervisor.

### 4 PROCEDURE

**REMARK :** Switch Utility Gas Supply source from Pipeline to Test Separator instead (prevent liquid carried over to UG system).

- 4.1 Ensure pre-launch inspection is completed and required PPE is worn.
- 4.2 Inform to CCR start PIG Launching operations. And contact to receiver platform to confirm they are ready to receive the PIG.

**NOTE:** PIG Launcher may become pressurized due to slight passing of isolation valves in the closed position. That will be normal.

- 4.3 Ensure PIG Launcher pressure gauge is reading correctly and confirm pressure gauge zero check. If pressure gauge does not read correctly the gauge must be replace.

- 4.4 Refer to Fig. 1, To confirm the status valves as following :

VALVES STATUS	DONE	CHECKED BY
OPEN Pipeline normal flow valve no. 1	Hammy	Poonavans
CLOSED PIG Launcher Isolate valve no. 2	Hammy	Poonavans
CLOSED Kicker valve no.3 & no.4	Hammy	Poonavans
CLOSED PIG Launcher Bleed valve no.5, no.6, no.7, no.8	Hammy	Poonavans
CLOSED PIG Launcher Drain valve no.13	Hammy	Poonavans
OPEN ( locked open upstream PSV ) valve no.9 (PSV 6305)	Hammy	Poonavans
OPEN (locked open downstream PSV ) valve no.10 (PSV6305)	Hammy	Poonavans
CLOSED Vent valve no.11 (PSV630S)	Hammy	Poonavans
CLOSED Pressure gauge bleed valve no.15	Hammy	Poonavans
OPEN Gauge valve no.14	Hammy	Poonavans

CLOSED Equalizing VALVE no.16

Khannay / Poonanab

#### 4.5 Pressure Leak Testing the PIG Launcher:

PRESSURE LEAK TEST THE PIG LAUNCHER:	DONE	CHECKED BY
Ensure PIG Launcher valves status are correctly position as <b>step 4.4</b>	Khannay	Poonanab
<b>OPEN</b> Kicker valve no.3 & no.4 slightly to pressure up into PIG Launcher.	Khannay	Poonanab
Monitor on pressure gauge should start to slowly pressurize until it equals the pipeline pressure.	Khannay	Poonanab
<b>CLOSED</b> Kicker valve no.4 & no.3	Khannay	Poonanab
Check for any leaks on PIG barrel hatch As found leak Yes _____ No <u>/</u>	Khannay	Poonanab
If "NO" leak follow to next step 4.6	Khannay	Poonanab

**NOTE :** If "YES" PIG barrel hatch is leaking. Stop pressure test then follow to PIG launcher depressurized step ( 4.6 ) and repair on any leaks point. After that repeat step 4.5 pressure leak test again.

#### 4.6 Depressurizing PIG Launcher:

DEPRESSURIZING PIG LAUNCHER	DONE	CHECKED BY
Slowly <b>OPEN</b> Pig Launcher Drain valve no.13	Khannay	Poonanab
<b>OPEN</b> Vent valve no.7 ,valve no .8	Khannay	Poonanab
Monitor on pressure gauge PI-6306 is drop untill it show 0 psi.	Khannay	Poonanab
<b>CLOSE</b> Vent valve no.7,no. 8	Khannay	Poonanab
<b>CLOSE</b> PIG Launcher Drain valve no.13	Khannay	Poonanab
Observe on Pressure gauge PI-6306, no pressure build up Pressure build up Yes _____ No <u>/</u>	Khannay	Poonanab
If "NO" pressure build up follow to next step 4.7	Khannay	Poonanab

**NOTE:** If 'YES' PIG barrel pressure build up, excersise valves no.1, 2,3 and 4 are proper closed position. If the pressure still build up look like valve badly passing. Stop Pigging and inform CCR or your Supervisor.

#### 4.7 If require Sovent chemical re-fill, follow below procedure. **If not**, follow next step 4.8:

**CAUTION:** WHEN OPEN THE PIG LAUNCHER HATCH, NEVER PLACE YOURSELF IN FRONT OF THE HATCH. ALWAYS REMIND THAT THE PIG LAUNCHER COULD STILL BE PRESSURIZED.

OPENING THE PIG LAUNCHER & FILL UP CHEMICAL

DONE

CHECKED BY

Ensure PIG Launcher pressure must be present 0 psi.		
<b>OPEN Bleed valve no.15</b> (To confirm No pressure in PIG barrel)		
Remove top flange 2" of nozzle valve no. 17		
Connect or Hook up chemical hose into nozzle of PIG barrel		
<b>OPEN valve no. 17</b> Fill up Chemical in to pig barrel.		
<b>CLOSE valve no. 17</b> after chemical fill up completed		
Disconnect chemical hose from nozzle of PIG barrel		
Reinstall top flange 2" of nozzle valve no. 17 back on position		
<b>CLOSE Bleed valve no.15</b>		
<b>OPEN Kicker valve no.3 &amp; 4</b>		
Monitor on pressure gauge PI-6306 is present pressure equal pipeline		
<b>CLOSE Kicker valve no.3 &amp; 4</b>		
Observe for any leaks on PIG barrel hatch As found leak Yes ____ No ____		
If 'YES' return to Step 4.6 ( depressurize ) and fix leak. Then return to step 4.7 (Fill up Chemical )		
<b>OPEN PIG Launcher Isolate valve no.2</b> for 1 Min.		
<b>CLOSE PIG Launcher Isolate valve no.2</b>		
<b>DEPRESSURIZING PIG LAUNCHER</b>	<b>DONE</b>	<b>CHECKED BY</b>
Slowly <b>OPEN</b> Pig Launcher Drain valve no.13		
<b>OPEN Vent valve no.7,no.8</b>		
Monitor on pressure gauge PI-6306 is drop untill it show 0 psi.		
<b>CLOSE Vent valve no.7,no.8</b>		
<b>CLOSE PIG Launcher Drain valve no.13</b>		

4.8 Open PIG Launcher hatch & Loading Pig:

**CAUTION:** WHEN OPEN THE PIG LAUNCHER HATCH, NEVER PLACE YOURSELF IN FRONT OF THE HATCH. ALWAYS REMIND THAT THE PIG LAUNCHER COULD STILL BE PRESSURIZED.

<b>OPENING THE PIG LAUNCHER &amp; LOADING THE PIG</b>	<b>DONE</b>	<b>CHECKED BY</b>
Ensure PIG Launcher pressure must be present 0 psi	Thammy	Poornath
<b>OPEN Bleed valve no.15</b> (confirm No pressure in PIG barrel)	Thammy	Poornath
Open the PIG Launcher hatch	Thammy	Poornath
Check any foreign objects is inside the PIG Launcher Yes ____ No <input checked="" type="checkbox"/>	Thammy	Poornath
If 'YES' inform CCR or Supervisor of any found	Thammy	Poornath
Check O-ring on hatch is good condition Yes <input checked="" type="checkbox"/> No ____	Thammy	Poornath
If "NO" Replace new O-ring before Pigging	Thammy	Poornath
Insert PIG with correctly direction and push it untill to the end inside of barrel	Thammy	Poornath

Close the PIG Launcher hatch and ensure it is tightened securely	Thammy	Poonam
CLOSE Bleed valve no.15	Thammy	Poonam

**WARNING:** DO NOT USE METAL OBJECTS FOR ANY ACTIVITIES INTO THE PIG BARREL.

#### 4.9 Launch PIG

**CAUTION:** PIGGING OPERATION MUST BE CONFIRM TO CCR AND RECEIVER PLATFORM BEFORE LAUNCH

LAUNCH PIG	DONE	CHECKED BY
CCR and Receiver PF confirm ready to PIG operation	Thammy	Poonam
OPEN Equalizing valve no.16	Thammy	Poonam
OPEN Kicker Ball valve no.3	Thammy	Poonam
OPEN Kicker Glove valve no. 4 slightly open	Thammy	Poonam
Monitor on pressure gauge PI-6306 is present pressure equal pipeline	Thammy	Poonam
CLOSE Equalizing valve no.16	Thammy	Poonam
Observe for any leaks on PIG barrel hatch As found leak Yes _____ No <u>/</u>		
If 'YES' CLOSED kicker valve no.3,no.4 then return to Step 4.6 (Depressurize) and fix leak. Then return to Step 4.9 (Launch PIG)	Thammy	Poonam
OPEN PIG Launcher Isolate valve no.2	Thammy	Poonam
CLOSE Pipeline normal flow valve no.1	Thammy	Poonam

**NOTE:** AFTER ABOVE STEP PIG SHOULD BE LAUNCHED OUT OF PIG BARREL.

#### 4.10 Checking that the PIG has been Launched:

After PIG launched could be wait for 10 Min. then perform next step

CHECKING THAT THE PIG HAS BEEN LAUNCHED	DONE	CHECKED BY
Inform CCR and PIG receiver PF of the time the PIG was launched Time : <u>0935</u> Pressure: <u>357</u> psi Temp : <u>183</u> F	Thammy	Poonam
OPEN Pipeline Normal flow valve no.1	Thammy	Poonam
CLOSE PIG Launcher Isolate valve no.2	Thammy	Poonam
CLOSE Kicker Line valve no.3 and no.4	Thammy	Poonam
DEPRESSURIZING PIG LAUNCHER	Thammy	Poonam
Slowly OPEN PIG Launcher Drain valve no.13	Thammy	Poonam
OPEN Vent valve no.7,no. 8	Thammy	Poonam
Monitor on pressure gauge PI-6306 is drop until it shows 0 psi.	Thammy	Poonam
CLOSE Vent valve no.7,no.8	Thammy	Poonam

<b>CLOSE PIG Launcher Drain valve no.13</b>	Thommy	Revanar
Observe on Pressure gauge PI-6306 No pressure build up Pressure build up Yes _____ No <input checked="" type="checkbox"/>		
If 'NO' pressure build up follow to next step open PIG barrel hatch	Thommy	Revanar

**NOTE :** If "YES" PIG barrel pressure build up. excersise valves no.1, 2,3 & 4 are proper closed position. If the pressure still build up, stop procedure and inform CCR or your Supervisor.

OPEN PIG BARREL HATCH FOR CONFIRM NO PIG	DONE	CHECKED BY
<b>OPEN Bleed valve no.15 ( confirm No pressure in PIG barrel )</b>	Thommy	Revanar
Ensure PIG launcher pressure must be present 0 psi.	Thommy	Revanar
Open the PIG barrel hatch. Check <b>NO PIG</b> present	Thommy	Revanar
Check O-ring condition and lube grease on hatch	Thommy	Revanar
Close the PIG launcher hatch and ensure it is tightened securely.	Thommy	Revanar
<b>CLOSE Bleed valve no.15</b>	Thommy	Revanar

**NOTE :** If found PIG still in barrel then repeat in steps 4.9 ( Launch PIG ) again.

#### 4.11 Pressure Leak Test PIG Launcher after Launched:

PRESSURE LEAK TEST PIG LAUCHER	DONE	CHECKED BY
<b>OPEN Kicker valve no.3 and valve no.4</b> slightly to pressure up into PIG barrel.	Thommy	Revanar
Monitor on pressure gauge should start to slowly pressurize until it equals the pipeline pressure.	Thommy	Revanar
<b>CLOSED Kicker valve no. 4 and valve no.3</b>	Thommy	Revanar
Check for any leaks on PIG barrel hatch As found leak Yes _____ No <input checked="" type="checkbox"/>	Thommy	Revanar
<b>DEPRESSURIZING PIG LAUNCHER</b>	Thommy	Revanar
Slowly <b>OPEN</b> Pig Launcher Drain valve no.13	Thommy	Revanar
<b>OPEN Vent valve no.7,no.8</b>	Thommy	Revanar
Monitor on pressure gauge PI-6306 is drop until it shows 0 psi.	Thommy	Revanar
<b>CLOSE Vent valve no.7,no.8</b>	Thommy	Revanar
<b>CLOSE PIG Launcher Drain valve no.13</b>	Thommy	Revanar

**NOTE:** If "YES" PIG barrel hatch is leaking. Stop pressure test then follow to PIG launcher depressurized step and repair on any leaks point. After that repeat step pressure leak test again.

**REMARK :** Please keep area tidy clean and good housekeeping. Hazardous waste must be kept in Blue drum.



#### 4.12 Return Utility Gas Supply source

### 5) FINAL CHECK:

TASK COMPLETED 6 (YES) (NO)

5.1 RECHECK ALL ACCESSIBLE INSTRUMENT SYSTEM FOR  
DAMAGE, FAULTS, LEAKS, LOOSE OR BROKEN  
CONNECTION.

(☒) ( ) REMARKS \_\_\_\_\_

5.2 REMOVE THE BYPASS/FORCE AND SIGN OFF ISOLATION LOG  
FROM LISTED IN BCP, RETURN THE SYSTEM TO NORMAL  
OPERATION.

(☒) ( ) REMARKS \_\_\_\_\_

5.3 SIGN OFF WORK PERMIT AND CLOSE WORK  
ORDER.

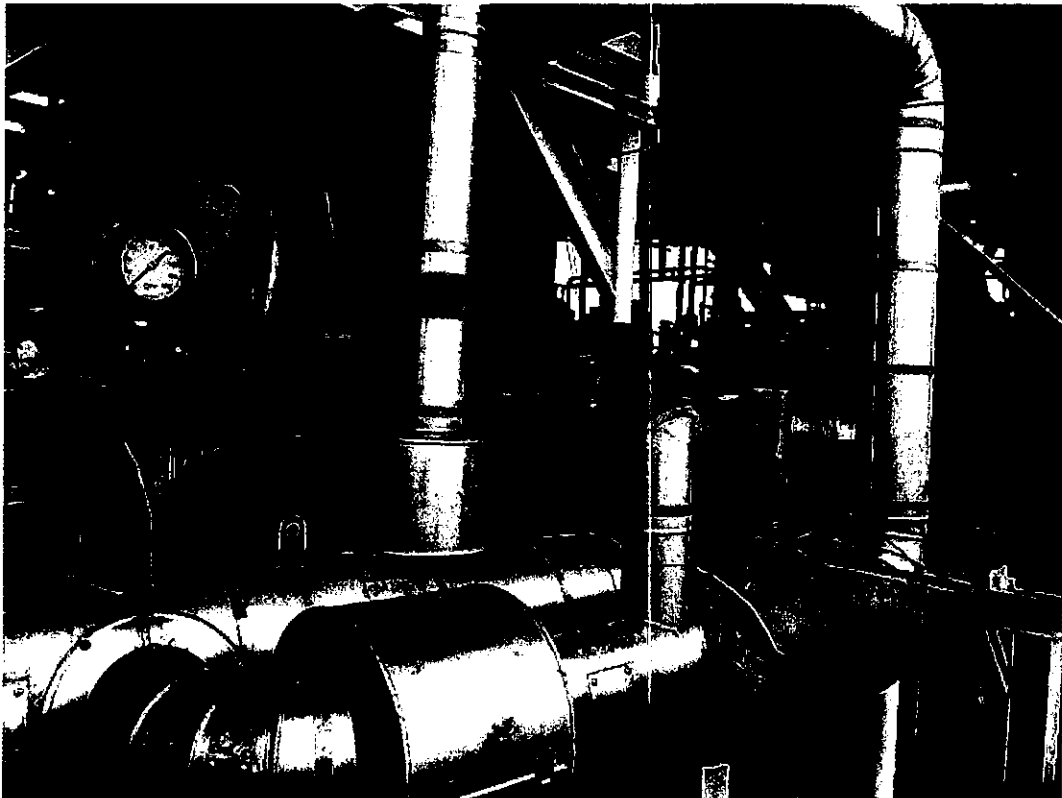
(☒) ( ) REMARKS \_\_\_\_\_

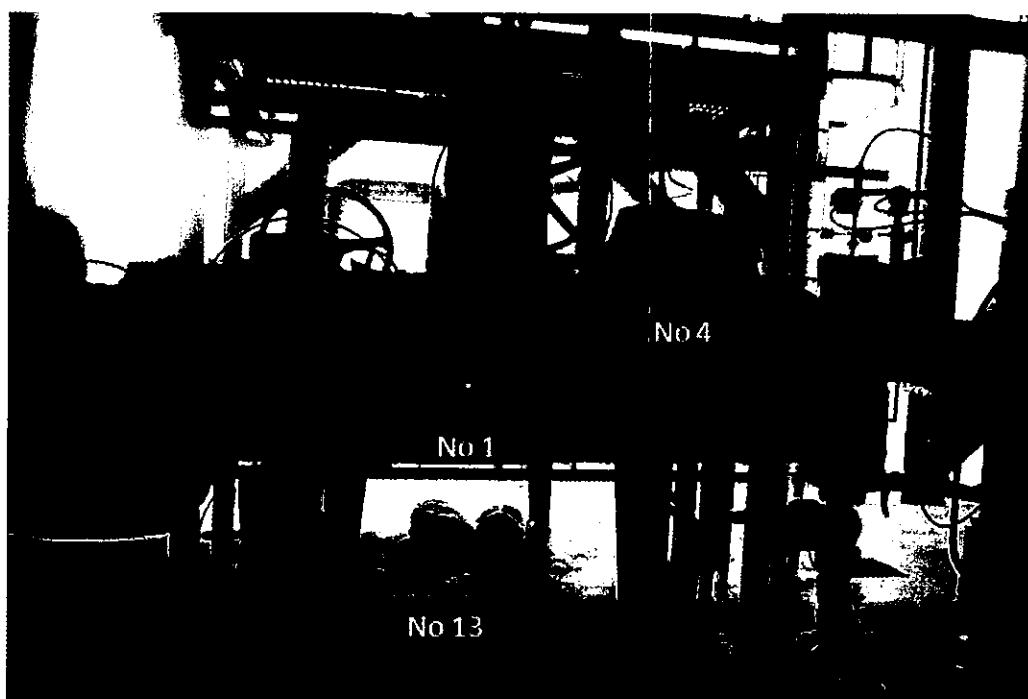
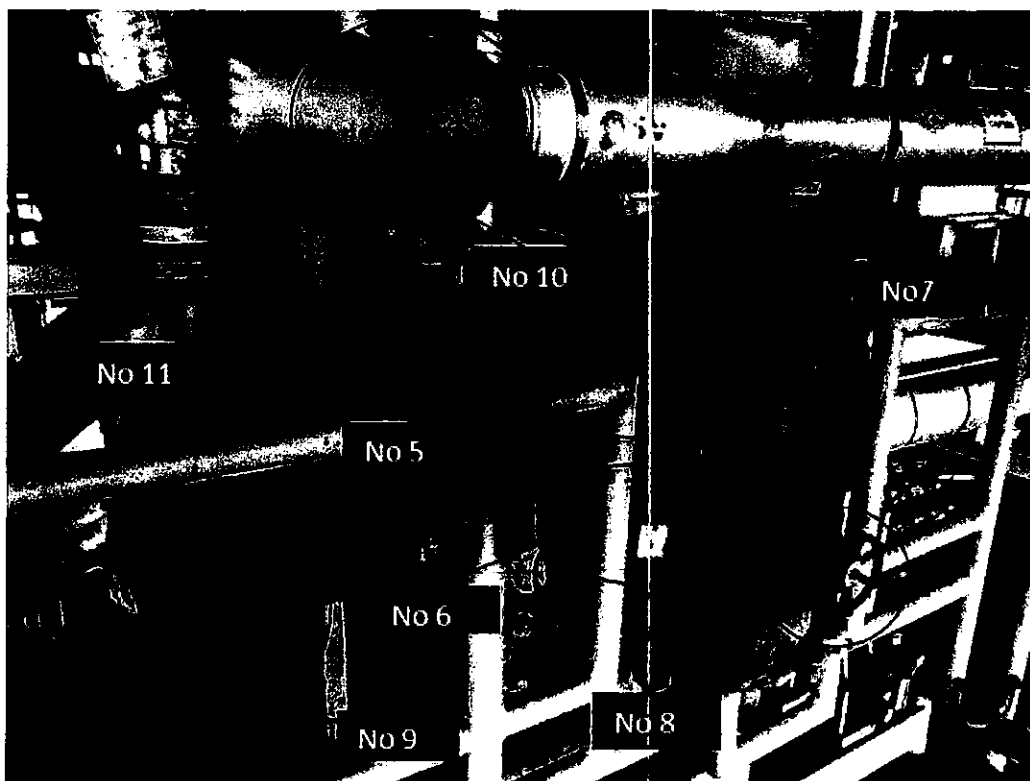
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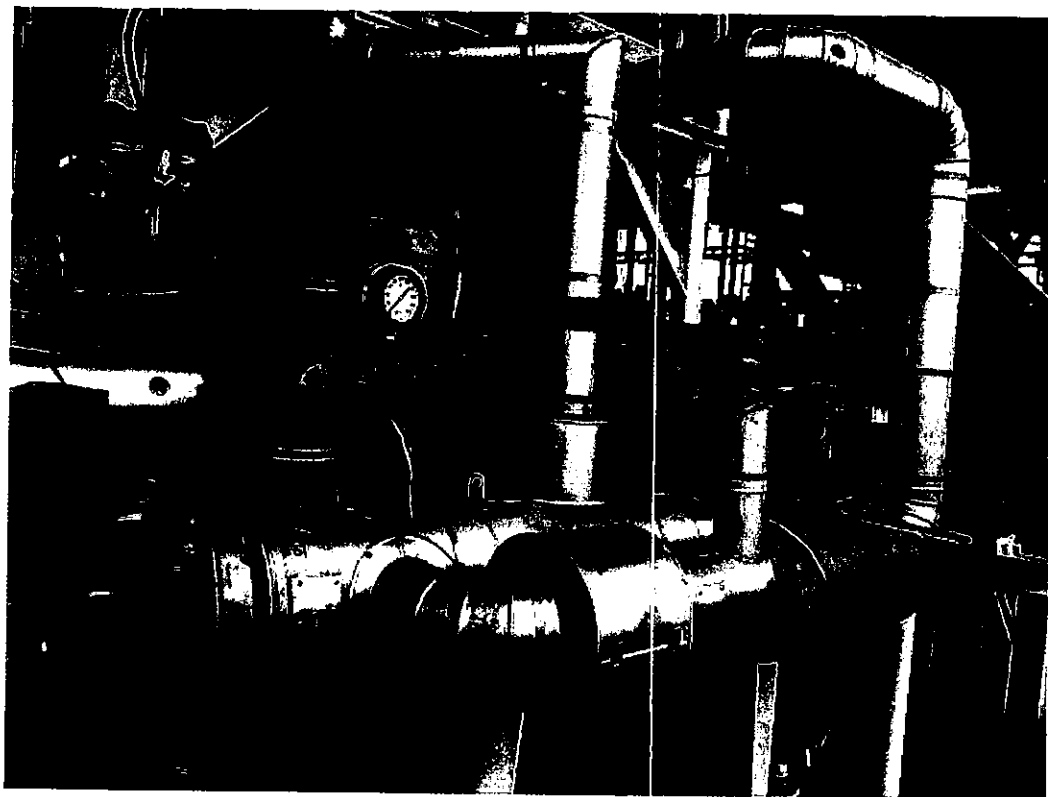
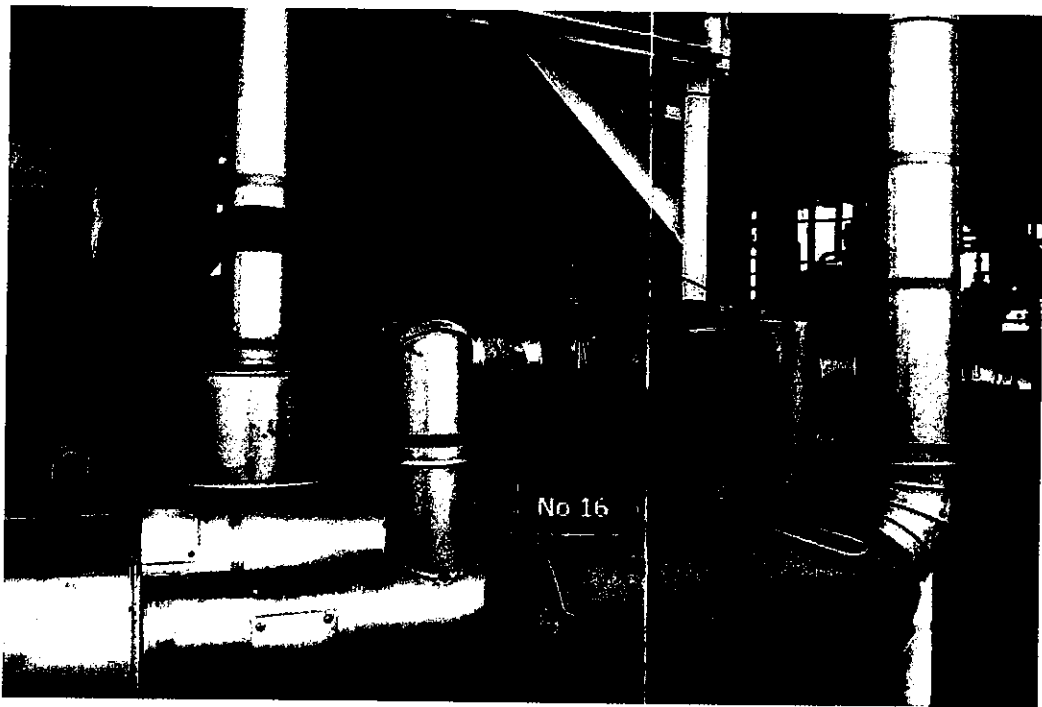
COMPLETED BY: Khammang, Phonwanart DATE: 1 Dec 2022

COMMENT: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SUPERVISOR : Khammang T DATE : 3 Dec 22











## Maintenance activities daily report

Work Order Number: 1199893 Equipment Number: LAWC-16LAPLC-PL  
 Work Center: BENRMT Op St: 99 GWP: -  
 Setup Crew: 4 Est Dur: 12  
 Actual Start: 1-DEC-22 Actual Finish Date: 2-DEC-22  
 Actual Hour: 48

### Related Links.

Component Code: ☐ Filter ☐ Hose/Tubing ☐ Regulator ☐ Fitting ☐ Isolator/Insulator  
☐ Bearing ☐ Gasket/Seal ☐ Belt ☐ Coupling ☐ Packing  
☐ Gearbox ☐ Pump ☐ Actuator ☐ Mech. Seal ☐ Bolt/Fastener  
☐ Body ☐ Valve ☐ Other: \_\_\_\_\_

Failure Action: ☐ Charged ☐ Cleaned ☐ Flushed ☐ Installed ☐ Lubricated  
☐ Overhauled ☐ Replaced ☐ Removed ☐ Repaired ☐ Adjusted  
☐ Tightened ☐ Refurbished ☒ Pm/Pdm No Corrective Action  
☐ Pm/Pdm Corrective Action ☐ Other: \_\_\_\_\_

### Category codes

Work Order Classification	No code	FND	FSD	PMC	RAO	REP	PMS	
Primary Discipline	E	I	M	O	Q	T	W	
Secondary discipline (Local Code 3)	CSS	EEL	IIT	NIME	MTT	OOP	AGM	
Local code 4	BIW	NBI						
Shutdown classification(Optional)	Online	EON	FR	SSD	TSD	TSN	UD	UO
Work identify	ORD	PMI	HAZ					

### Attachment.

Problem Descriptions: LAWC 45D PIPING TO BENW.

As Found: N/A

Action Taken: PM work, follow job task

Action By: Khamnuang/Poonamart, Karnon/Chanit, Yuthorn/Ponthep.

Possible root cause: PM Generated

Recommendation: Maintain PM

Result (Out Come): Normal to operation

Job Completed Date: 1 Dec 22

Entry By / Date: Cheeraporn / 2 Dec 22

Supervisor review: Kittipol T / 3 Dec 22





<u>Revision</u>	<u>Date</u>	<u>Reason for Issue/Change</u>	<u>CMOR #</u>	<u>Enter by</u>
Rev.01	13-Nov-15	Review/Revise		Mongkol Y.
Rev.02	6-Dec-18	PM interval change	0354/16	Supapong B.

**JOB CARD NUMBER:** 3W LAW-C-BEWW CLEANING PIGGING-RMT  
**SKID/EQUIPMENT:** LAW-C-L1040\_16" PIPELINE\_PIG LAUNCHER NO. 1  
**OPT. SEQUENCE:** 10 3W LAW-C-BEWW CLEANING PIGGING-RMT  
**WORK CENTER:** BENRMT  
**CREW SIZE** 2 **EST. HRS** 8 **RESOURCE DESCRIPTIONS**  
BENCHAMAS REMOTE TEAM

**MFGR, INDUSTRY REFERENCES AND ENGINEERING RECOMMENDATION:**

- N/A

**EQUIPMENT UNDER THIS PM TASK:**

- PIG LAUNCHER NO. L-1040 FROM LAW-C TO BEWW

**PIG TYPE/PIPELINE CONFIGURATION:**

- 16" ARTICULATED BIDI PIG
- PIPELINE with SUBSEA SYMMETRICAL WYE ( NOT TIE)/5D BENDING

**JOB INSTRUCTIONS:****Pre-Pigging Checklist****1 Platform Condition: TASK COMPLETED (YES) (NO)**

- 1.1 Verify PPD Chemical Injection system still function operated normal rate with CCR and Chemist, if no chemical injection, consider to inject 50 Gallon of Chemical and maintain condition by 2-3 days and Consider for Progressive Pigging or Consult Ops Support Engineer. ( ) ( ) REMARKS \_\_\_\_\_
- 1.2 Compare Pipeline Pressure Drop with last pigging, if found higher pressure drop. Consider on Progressive Cleaning, or Consult Ops Support Engineer  
Last Pigging dP ..... psig, Current dP ..... psig ( ) ( ) REMARKS \_\_\_\_\_
- 1.3 Verify All Operated wells temperature, if found temperature below 70 F at least 1 individual well. Consider on Progressive Cleaning or Consult Ops Support Engineer ( ) ( ) REMARKS \_\_\_\_\_

**2. Cleaning History: TASK COMPLETED (YES) (NO)**

- 2.1 Wax Condition on Last Time (Soft/Medium/Hard) .....  
Wax Quantity on Last Pigging ..... Drums ( ) ( ) REMARKS \_\_\_\_\_
- 2.2 Compare Pipeline Pressure Drop with last pigging, if found higher pressure drop. Consider on Progressive Cleaning or Consult Ops Support Engineer  
Last Pigging dP ..... psig, Current dP ..... psig ( ) ( ) REMARKS \_\_\_\_\_
- 2.3 If the task overdue, Consult Ops Support Engineer ( ) ( ) REMARKS \_\_\_\_\_

**RMT TASKS****PIG Launching Procedure**

This procedure is used for Phase platform LAWC to BEWW

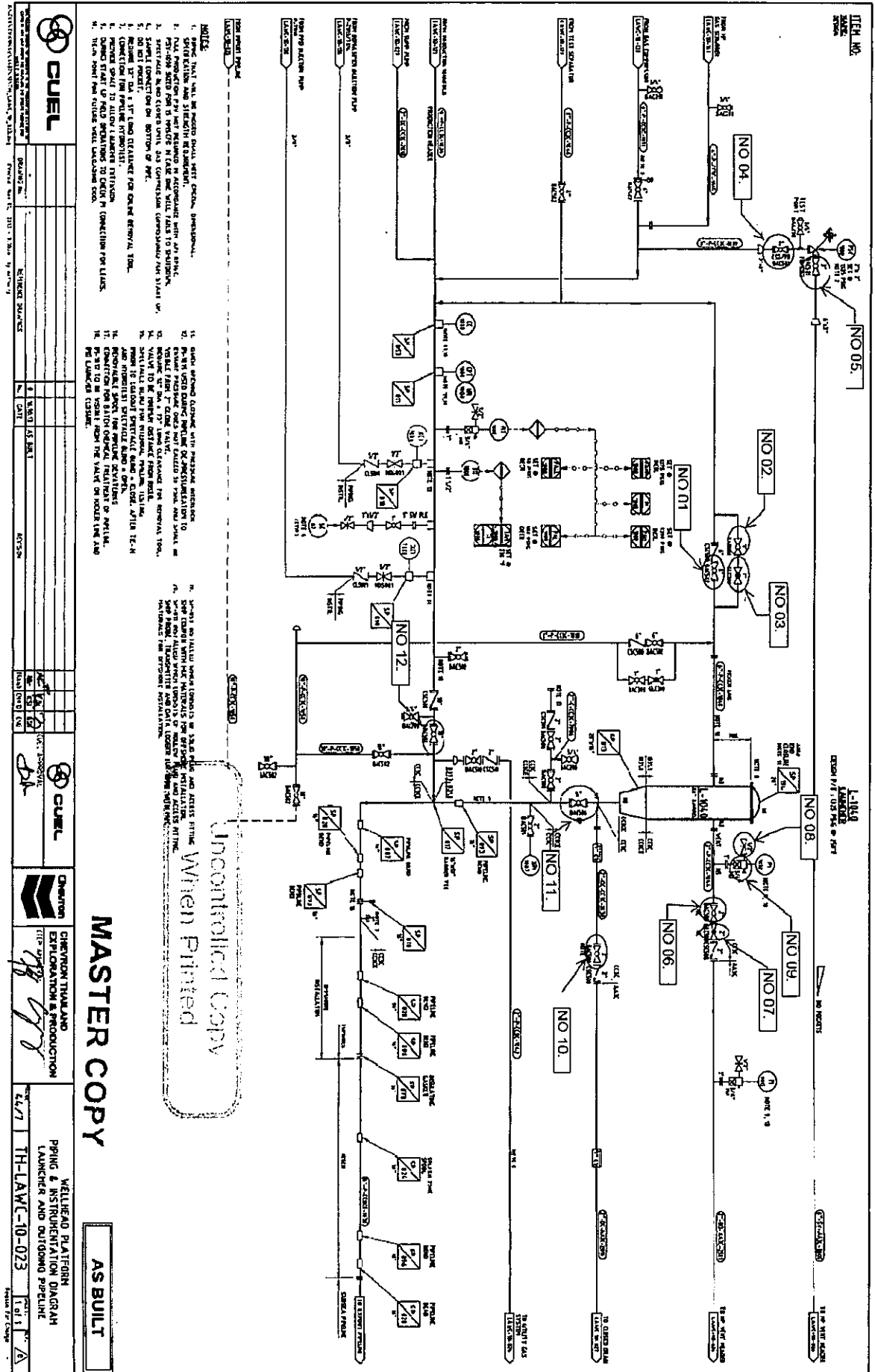
**1. SAFETY****1.1. Required Basic PPE and addition PPE.**

- 1.1.1. Face shield , goggle
- 1.1.2. Respirator with cartridge filter of Mercury vapor e.g.: 3M type with P/N 6069
- 1.1.3. Tyvex suite
- 1.1.4. Rubber glove.

**1.2. A Mercury Spill Kit and Blue drum must be available on site prior to the starting of this procedure.****1.3. No Hot Work allow during Pigging operations (open/close barrel hatch)****1.4. Radio communications has required at all times during pig operation.****1.5. High Risk Activities review with Supervisor:**

HIGH RISK ACTIVITIES REVIEW	DONE	CHECKED BY
Review with Supervisor	<i>[Signature]</i>	

**2. DIAGRAM**



**Figure 1.**





### 3. EQUIPMENT INSPECTION

EQUIPMEN INSPECT	Y	N	DONE	CHECKED BY
No any leaks from PIG Launcher	/		Hammy	Borhanas
Electrical heat traced on piping of PIG Launcher is good working and no damage	/		Hammy	Borhanas
No excessive corrosion on valves and equipment that unsafe for operate	/		Hammy	Borhanas
Is the 16" ARTICULATED BIDI PIG good condition	/		Hammy	Borhanas

NOTE: If you have any doubts, STOP and ask your Supervisor.

### 4. PROCEDURE

4.1. Ensure pre-launch inspection is completed and required PPE is worn.

NOTE: Switch Utility Gas Supply source from Pipeline to Test Separator instead (prevent liquid carried over to UG system).

4.2. Use Crane to remove the cover hatch on top deck and barricade working area.

4.3. Inform CCR to start PIG Launching operations. And contact to receiving platform to confirm that they are ready to receive the PIG.

NOTE: PIG Launcher may become pressurized due to slight passing of isolation valves in the closed position. That will be normal.

4.4. Ensure PIG Launcher pressure gauge is reading correctly and confirm pressure gauge zero check. If pressure gauge does not read correctly the gauge must be replace.

4.5. Refer to Fig. 1, Confirm the status valves as followed:

VALVES STATUS	DONE	CHECKED BY
CLOSED Kicker valve no.1	Hammy	Borhanas
CLOSED Equalizing valve no.2 & 3	Hammy	Borhanas
OPEN (locked open upstream PSV) valve no.4	Hammy	Borhanas
OPEN (locked open downstream PSV) valve no.5	Hammy	Borhanas
CLOSED Vent valve no.6 & 7	Hammy	Borhanas
CLOSED Pressure gauge bleed valve no.8	Hammy	Borhanas
OPEN Gauge valve no.9	Hammy	Borhanas
CLOSED PIG Launcher Drain valve no.10	Hammy	Borhanas
CLOSED PIG Launcher Isolate valve no.11	Hammy	Borhanas
OPEN Pipeline normal flow valve no.12	Hammy	Borhanas



## 4.6. Pressure Leak Testing the PIG Launcher:

RESSURE LEAK TEST THE PIG LAUNCHER	DONE	CHECKED BY
Ensure PIG Launcher valves status are correctly position as step 4.5	<input checked="" type="checkbox"/>	Poornant
OPEN Equalizing valve no.2 & 3 slightly to pressure up into PIG Launcher	<input checked="" type="checkbox"/>	Poornant
Monitor on pressure gauge should start to slowly pressurize until it equals the pipeline pressure	<input checked="" type="checkbox"/>	Poornant
CLOSED Equalizing valve no.2 & 3	<input checked="" type="checkbox"/>	Poornant
Check for any leaks on PIG barrel hatch As found leak Yes _____ No <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Poornant
If "NO" leak follow to next step 4.7	<input checked="" type="checkbox"/>	Poornant

**NOTE:** If "YES" PIG barrel hatch is leaking. Stop pressure test then follow to PIG launcher depressurized step ( 4.7 ) and repair on any leaks point. After that repeat step 4.6 pressure leak test again.

## 4.7. Depressurizing PIG Launcher:

DEPRESSURIZING PIG LAUCHER	DONE	CHECKED BY
Slowly OPEN Pig Launcher Drain valve no.10	<input checked="" type="checkbox"/>	Poornant
OPEN Vent valve no.6 & 7	<input checked="" type="checkbox"/>	Poornant
Monitor on pressure gauge PI-1012 is drop untill it show 0 psi.	<input checked="" type="checkbox"/>	Poornant
CLOSE Vent valve no.6 & 7	<input checked="" type="checkbox"/>	Poornant
CLOSE PIG Launcher Drain valve no.10	<input checked="" type="checkbox"/>	Poornant
Observe on Pressure gauge PI-1012 No pressure build up Pressure build up Yes _____ No <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Poornant
If "NO" pressure build up follow to next step 4.8	<input checked="" type="checkbox"/>	Poornant

**NOTE:** If 'YES' PIG barrel pressure build up. excersise valves no.1, 2 and 11 are proper closed position. If the pressure still build up look like valve badly passing. Stop Pigging and inform CCR or your Supervisor.

## 4.8. If require Sovent chemical re-fill, follow below procedure. If not, follow next step 4.9:

**CAUTION:** WHEN OPEN THE PIG LAUNCHER HATCH, NEVER PLACE YOURSELF IN FRONT OF THE HATCH. ALWAYS REMIND THAT THE PIG LAUNCHER COULD STILL BE PRESSURIZED.

OPENING THE PIG LAUNCHER & FILL UP CHEMICAL	DONE	CHECKED BY
OPEN Bleed valve no.8 (To confirm No pressure in PIG barrel)		
Ensure PIG Launcher pressure must be present 0 psi.		



Open the PIG Launcher hatch		
Check any foreign objects is inside the PIG Launcher Yes ____ No ____		
If 'YES' inform CCR or Supervisor of any found		
Check O-ring on hatch is good condition Yes ____ No ____		
If "NO" Replace new O-ring before Pigging		
Fill up Chemical		
CLOSE the PIG Launcher hatch and ensure it is tightened securely		
CLOSE Bleed valve no.8		
OPEN Equalizing valve no.2 & 3		
Monitor on pressure gauge PI- 1012 is present pressure equal pipeline		
CLOSE Equalizing valve no.2 & 3		
Observe for any leaks on PIG barrel hatch As found leak Yes ____ No ____		
If 'YES' return to Step 4.7 (Depressurize) and fix leak. Then return to Step 4.8 (Fill up Chemical )		
OPEN PIG Launcher Isolate valve no.11 for 1 Min.		
CLOSE PIG Launcher Isolate valve no.11		
DEPRESSURIZING PIG LAUNCHER	DONE	CHECKED BY
Slowly OPEN Pig Launcher Drain valve no.10		
OPEN Vent valve no.6,7		
Monitor on pressure gauge PI-6300 is drop untill it show 0 psi.		
CLOSE Vent valve no.6, 7		
CLOSE PIG Launcher Drain valve no.10		

## 4.9. Open PIG Launcher hatch &amp; Loading Pig:

**CAUTION:** WHEN OPEN THE PIG LAUNCHER HATCH, NEVER PLACE YOURSELF IN FRONT OF THE HATCH. ALWAYS REMIND THAT THE PIG LAUNCHER COULD STILL BE PRESSURIZED.

OPENING THE PIG LAUNCHER & LOADING THE PIG	DONE	CHECKED BY
Ensure PIG Launcher pressure must be present 0 psi.	<i>[Signature]</i>	<i>[Signature]</i>
OPEN Bleed valve no.8 (To confirm No pressure in PIG barrel)	<i>[Signature]</i>	<i>[Signature]</i>
OPEN the PIG Launcher hatch	<i>[Signature]</i>	<i>[Signature]</i>
Check any foreign objects is inside the PIG Launcher Yes ____ No <u>✓</u>	<i>[Signature]</i>	<i>[Signature]</i>
If 'YES' inform CCR or Supervisor of any found	<i>[Signature]</i>	<i>[Signature]</i>
Check O-ring on hatch is good condition Yes <u>✓</u> No ____	<i>[Signature]</i>	<i>[Signature]</i>
If "NO" Replace new O-ring before Pigging	<i>[Signature]</i>	<i>[Signature]</i>
Insert PIG with correctly direction and push it untill to the end inside	<i>[Signature]</i>	<i>[Signature]</i>



## BENCHAMAS - PM

of barrel	<i>[Signature]</i>	<i>[Signature]</i>
CLOSE the PIG Launcher hatch and ensure it is tightened securely	<i>[Signature]</i>	<i>[Signature]</i>
CLOSE Bleed valve no.8	<i>[Signature]</i>	<i>[Signature]</i>

**WARNING:** DO NOT USE METAL OBJECTS FOR ANY ACTIVITIES INTO THE PIG BARREL.

## 4.10.Launch PIG:

**CAUTION:** PIGGING OPERATION MUST BE CONFIRM TO CCR AND RECEIVER PLATFORM BEFORE LAUNCH

LAUNCH PIG	DONE	CHECKED BY
CCR and Receiver PF confirm ready to PIG operation	<i>[Signature]</i>	<i>[Signature]</i>
OPEN Equalizing valve no.2 & 3	<i>[Signature]</i>	<i>[Signature]</i>
OPEN Kicker Ball valve no.1	<i>[Signature]</i>	<i>[Signature]</i>
Monitor on pressure gauge PI-1012 is present pressure equal pipeline	<i>[Signature]</i>	<i>[Signature]</i>
CLOSE Equalizing valve no.2 & 3	<i>[Signature]</i>	<i>[Signature]</i>
Observe for any leaks on PIG barrel hatch As found leak Yes _____ No <u>/</u>		
If 'YES' close kicker valve no.1 then return to Step 4.7 (Depressurize) and fix leak. Then return to Step 4.10 (Launch PIG )	<i>[Signature]</i>	<i>[Signature]</i>
OPEN PIG Launcher Isolate valve no.11	<i>[Signature]</i>	<i>[Signature]</i>
CLOSE Pipeline normal flow valve no.12	<i>[Signature]</i>	<i>[Signature]</i>

**NOTE:** AFTER ABOVE STEP PIG SHOULD BE LAUNCHED OUT OF PIG BARREL.

## 4.11.Checking that the PIG has been Launched:

After PIG launched could be wait for 10 Min. then perform next step

CHECKING THAT THE PIG HAS BEEN LAUNCHED	DONE	CHECKED BY
Inform CCR and PIG receiver PF of the time the PIG was launched Time : <u>2110</u> Pressure: <u>428</u> psi Temp : <u>178</u> F	<i>[Signature]</i>	<i>[Signature]</i>
OPEN Pipeline Normal flow valve no.12	<i>[Signature]</i>	<i>[Signature]</i>
CLOSE PIG Launcher Isolate valve no.11	<i>[Signature]</i>	<i>[Signature]</i>
CLOSE Kicker Line valve no.1	<i>[Signature]</i>	<i>[Signature]</i>
DEPRESSURIZING PIG LAUNCHER	<i>[Signature]</i>	<i>[Signature]</i>
Slowly OPEN PIG Launcher Drain valve no.10	<i>[Signature]</i>	<i>[Signature]</i>
OPEN Vent valve no.6 & 7	<i>[Signature]</i>	<i>[Signature]</i>
Monitor on pressure gauge PI-1012 is drop until it shows 0 psi.	<i>[Signature]</i>	<i>[Signature]</i>
CLOSE Vent valve no.6 & 7	<i>[Signature]</i>	<i>[Signature]</i>

**BENCHAMAS - PM**

<b>CLOSE PIG Launcher Drain valve no.10</b>	<i>Khomm</i>	<i>Pochanas</i>
Observe on Pressure gauge PI-1012 No pressure build up Pressure build up Yes _____ No <u>/</u>		
If 'NO' pressure build up follow to next step open PIG barrel hatch	<i>Khomm</i>	<i>Pochanas</i>

**NOTE :** If "YES" PIG barrel pressure build up and to exercise valves no.1,2 & 11 are proper closed position. If the pressure still build up, stop procedure and inform CCR or your Supervisor.

<b>OPEN PIG BARREL HATCH FOR CONFIRM NO PIG</b>	<b>DONE</b>	<b>CHECKED BY</b>
Ensure PIG launcher pressure must be present 0 psi.	<i>Khomm</i>	<i>Pochanas</i>
<b>OPEN Bleed valve no.8</b> (To confirm No pressure in PIG barrel)	<i>Khomm</i>	<i>Pochanas</i>
Open the PIG barrel hatch. Check <b>NO PIG</b> present	<i>Khomm</i>	<i>Pochanas</i>
Check O-ring condition and lube grease on hatch	<i>Khomm</i>	<i>Pochanas</i>
<b>CLOSE</b> the PIG launcher hatch and ensure it is tightened securely	<i>Khomm</i>	<i>Pochanas</i>
<b>CLOSE</b> Bleed valve no.8	<i>Khomm</i>	<i>Pochanas</i>

**NOTE :** If found PIG still in barrel then repeat in steps 4.10 ( Launch PIG ) again.

#### 4.12. Pressure Leak Test PIG Launcher after Launched:

<b>PRESSURE LEAK TEST PIG LAUNCHER</b>	<b>DONE</b>	<b>CHECKED BY</b>
<b>OPEN</b> Equalizing valve no.2 & 3 slightly to pressure up into PIG barrel	<i>Khomm</i>	<i>Pochanas</i>
Monitor on pressure gauge should start to slowly pressurize until it equals the pipeline pressure	<i>Khomm</i>	<i>Pochanas</i>
<b>CLOSED</b> Equalizing valve no.2 & 3	<i>Khomm</i>	<i>Pochanas</i>
Check for any leaks on PIG barrel hatch As found leak Yes _____ No <u>/</u>	<i>Khomm</i>	<i>Pochanas</i>
<b>DEPRESSURIZING PIG LAUNCHER</b>	<i>Khomm</i>	<i>Pochanas</i>
Slowly <b>OPEN</b> Pig Launcher Drain valve no.10	<i>Khomm</i>	<i>Pochanas</i>
<b>OPEN</b> Vent valve no.6 & 7	<i>Khomm</i>	<i>Pochanas</i>
Monitor on pressure gauge PI-1012 is drop until it shows 0 psi.	<i>Khomm</i>	<i>Pochanas</i>
<b>CLOSE</b> Vent valve no.6 & 7	<i>Khomm</i>	<i>Pochanas</i>
<b>CLOSE</b> PIG Launcher Drain valve no.10	<i>Khomm</i>	<i>Pochanas</i>

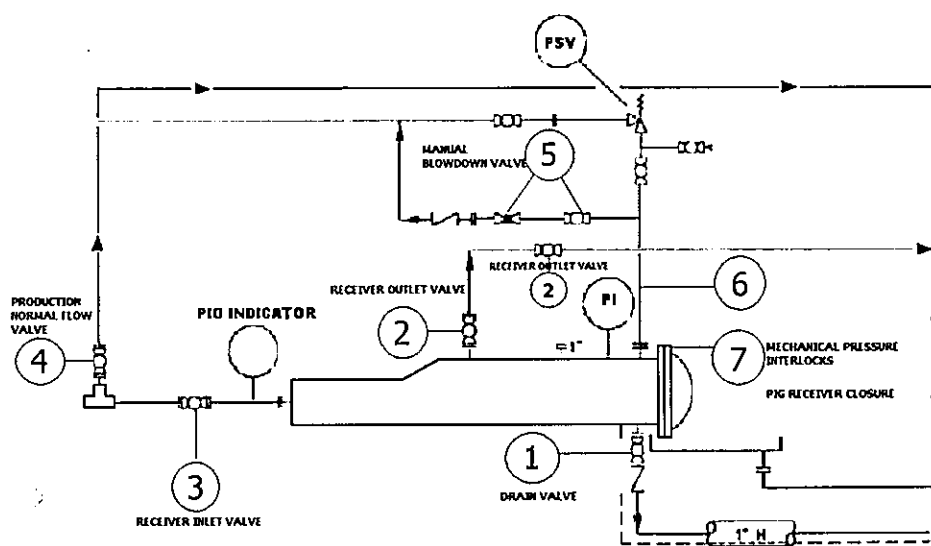
**NOTE:** If "YES" PIG barrel hatch is leaking. Stop pressure test then follow to PIG launcher depressurized step and repair on any leaks point. After that repeat step pressure leak test again.

**REMARK :** Please keep area tidy clean and good housekeeping. Hazardous waste must be kept in Blue drum.

#### 4.13. Return Utility Gas Supply source

## 5 LINE UP PIG RECEIVER

TYPICAL PIG RECEIVER



### 5.1 Poly pig run ( install pig basket)

- Leak test receiver. Use steps a thru h in the section below.
- Ensure that receiver drain valve ( 1 ) is closed.
- All other valves will be in the required position as per leak test.
- Open receiver outlet valve. ( 2 )
- Open receiver inlet valve. ( 3 )
- Close production normal flow valve ( 4 )
- Notify facility launching pig that the receiver is aligned and ready to receive the pig.
- Record pipeline pressure and temperature.

## 6 RECEIVING THE PIG

- Monitor & record pressure/ temperature as follow

Time	Pressure	Temperature	Remark




- b) As the pig arrives at the platform, partially close the receiver outlet valve. This will minimize the affect of the pressure upstream and downstream of the pig.
- c) Once the pig has arrived in the receiver. **DO NOT TRUST PIG INDICATOR TO BE CORRECT. NOTIFY CCR THAT IT IS BELIEVED THE PIG HAS ARRIVED.**
- d) Close receiver outlet valve. ( 2 )
- e) Close receiver inlet valve. ( 3 )  
**DO NOT OPEN VALVE TO NORMAL FLOW.**

## 7 REMOVING THE PIG FROM THE RECEIVER

- a) Ensure the receiver inlet valve ( 3 ) and outlet valve ( 2 ) is closed.
- b) Open receiver drain valve ( 1 ) to empty any liquids.
- c) Close receiver drain valve ( 1 ) after draining.
- d) Open receiver manual blowdown valve ( 5 ) to vent. Open the valve slowly.
- e) Monitor pressure at pressure indicator until pressure is at zero.
- f) Open vent upstream of pressure indicator to ensure no pressure.
- g) Close manual blowdown valve. ( 5 )
- h) Slowly remove mechanical pressure interlocks. ( 7 )  
**DO NOT STAND IN FRONT OF RECEIVER CLOSURE. NEVER TRUST THAT THE PRESSURE INDICATOR IS A TRUE INDICATION OF ZERO PRESSURE IN THE RECEIVER.**
- i) Open the receiver door. ( 7 )  
**DO NOT STAND IN FRONT OF RECEIVER CLOSURE. NEVER TRUST THAT THE PRESSURE INDICATOR IS A TRUE INDICATION OF ZERO PRESSURE IN THE RECEIVER.**  
**ONCE PIG HAS BEEN VISUALLY CONFIRMED TO BE IN RECEIVER:**  
**OPEN PRODUCTION TO NORMAL FLOW. ( 4 )**  
**DO NOT OPEN PRODUCTION TO RECEIVER. ( 3 )**
- j) Remove the pig from the receiver. Take care to keep any free mercury or mercury residue contained in a proper Hazardous Waste container.
- k) Close receiver door and install mechanical pressure interlocks. ( 7 )
- l) Close vent upstream of pressure indicator.
- m) Record the time the pig arrived and notify the launching facility.
- n) Record the amount of solids / sludge / wax / mercury, if any received.

## 8 LEAK TEST RECEIVER

- a) Ensure receiver outlet valve is closed. ( 2 )
- b) Ensure manual blowdown valves are closed. ( 5, 8 )
- c) Ensure receiver drain valve is closed. ( 1 )
- d) Ensure receiver door and mechanical pressure interlocks are closed and secure. ( 7 )
- e) Ensure the vent upstream of pressure indicator is closed.
- f) Slowly open receiver inlet valve until pressure reaches system pressure. ( 3 )
- g) Monitor for leaks at receiver door and mechanical pressure interlocks. ( 7 )
- h) If any leaks are observed, close receiver inlet valve, perform steps ( a ) thru ( i ) of removing pig from the receiver listed above, make necessary repairs and repeat leak test.
- i) If no leaks, open receiver drain valve to remove liquids. ( 1 )
- j) Close receiver drain valve after draining. ( 1 )

## 9) FINAL CHECK:

**TASK COMPLETED (YES) (NO)**



- 5.1 RECHECK ALL ACCESSIBLE INSTRUMENT SYSTEM FOR  
DAMAGE, FAULTS, LEAKS, LOOSE OR BROKEN  
CONNECTION.
- 5.2 REMOVE THE BYPASS/FORCE AND SIGN OFF ISOLATION LOG  
FROM LISTED IN BCP, RETURN THE SYSTEM TO NORMAL  
OPERATION.
- 5.3 SIGN OFF WORK PERMIT AND CLOSE WORK  
ORDER.

(✓)( ) REMARKS \_\_\_\_\_

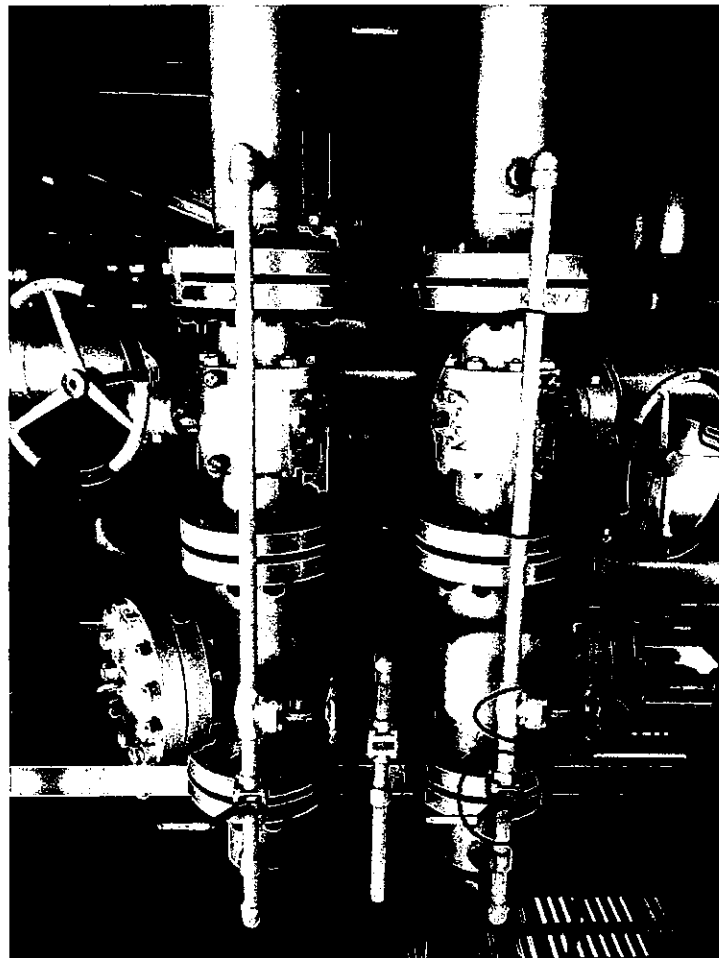
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(✓)( ) REMARKS \_\_\_\_\_

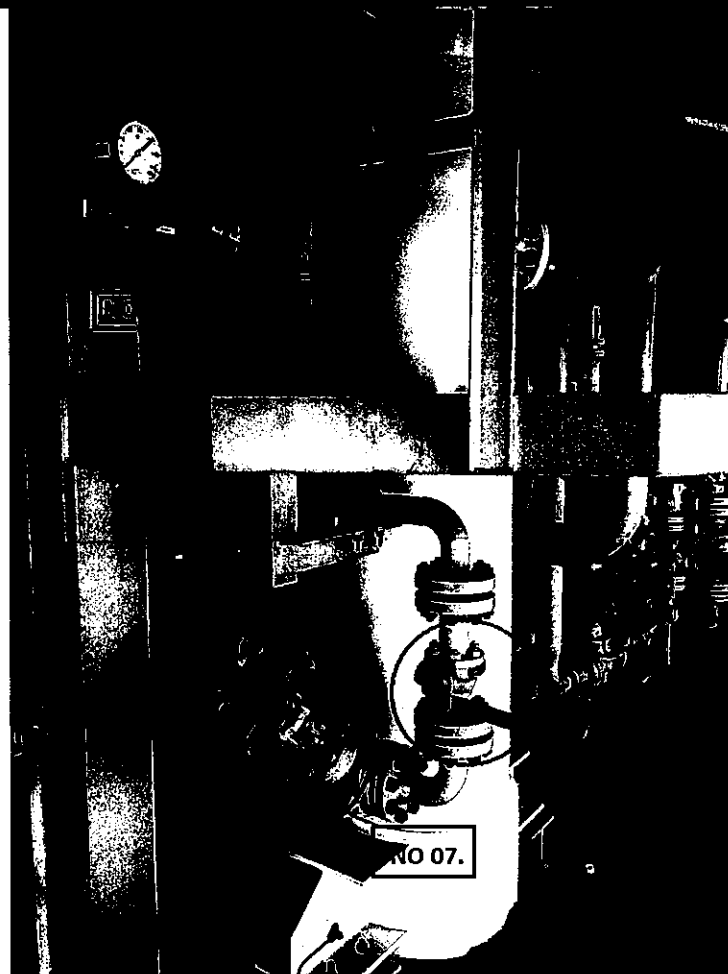
COMPLETED BY: Mammuang Phosawat DATE: 1 Dec 2022

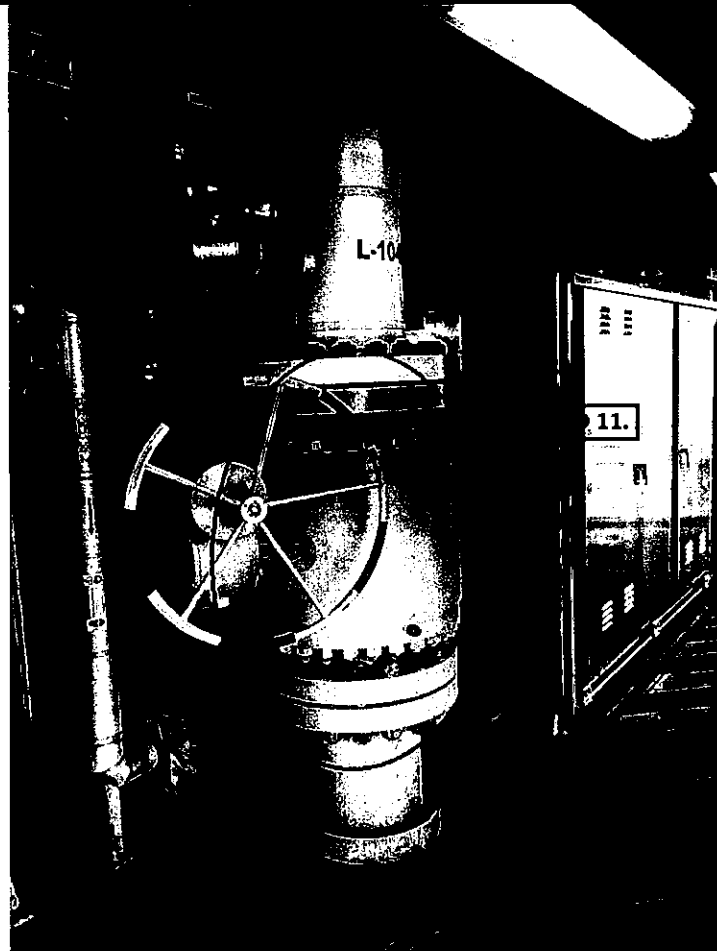
COMMENT: \_\_\_\_\_

SUPERVISOR : Kittapol T , DATE : 3-Dec-22













HS 6690A, B, C

5 3 2  
C D E

**ภาคผนวก 18**  
***Specification ของแท่นเจาะ***



## Shelf Drilling Chaophraya 350 Foot Jack-Up Drilling Unit

General Description	
<b>Design</b> .....	LeTourneau Super 116 E
<b>Year Built</b> .....	2016
<b>Hull Dimensions</b> .....	243 ft. x 206 ft. x 26 ft.
<b>Spud Can Diameter</b> .....	50.5 ft.
<b>Legs (3)</b> .....	477 ft. long square legs
<b>Quarters Capacity</b> .....	160 persons
<b>Maximum Water Depth</b> .....	350 ft.
<b>Cantilever Envelope</b> .....	70 ft. by 30 ft.
<b>Max Variable Load (drilling)</b> .....	Approx. 7,700 kips*
<i>*depending on water depth and geographical location</i>	

Drilling Equipment	
<b>Derrick</b>	Lee C. Moore bottleneck derrick, 170 ft high with 35 ft x 32 ft base, static hook load capacity 1,500,000 lbs. with fourteen (14) 1-3/4" drilling lines
<b>Drawworks</b>	NOV 1625 UDBE, 3,000 HP, driven by three (3) GE 752 DC motors each rated 1,085 HP continuous, outfitted with a Baylor 7838 auxiliary electric brake
<b>Rotary Table</b>	NOV RST-495, 1,100 short tons, hydraulic with 49-1/2 maximum opening
<b>Top Drive</b>	NOV TDS-8, 750 short tons, with PH-100 pipe-handler
<b>Pipe Handling</b>	Main Well Center: NOV ST-80, PS-21 power slips Offline Stand-building: NOV ST-80, Forum 14K-R Offline Activity Crane
<b>Mud Pumps</b>	Three (3) NOV 14-P-220 triplex mud pumps 2,200 HP, 7500 psi, each pump is driven by two (2) DC motors rated 1,085 HP continuous
<b>Solids Control</b>	Four (4) NOV Brandt VSM 300 balanced elliptical motion shale shakers
<b>Instrumentation</b>	NOV Rig-Sense drilling instrumentation system

Storage Capacities	
<b>Liquid Mud</b> .....	5,200 bbls.
<b>Base Oil</b> .....	980 bbls.
<b>Brine</b> .....	980 bbls.
<b>Drill Water</b> .....	19,672 bbls.
<b>Fuel</b> .....	2,100 bbls.
<b>Bulk Material (7 silos)</b> .....	12,250 cu.ft.
<b>Sack Storage</b> .....	5,000 sacks

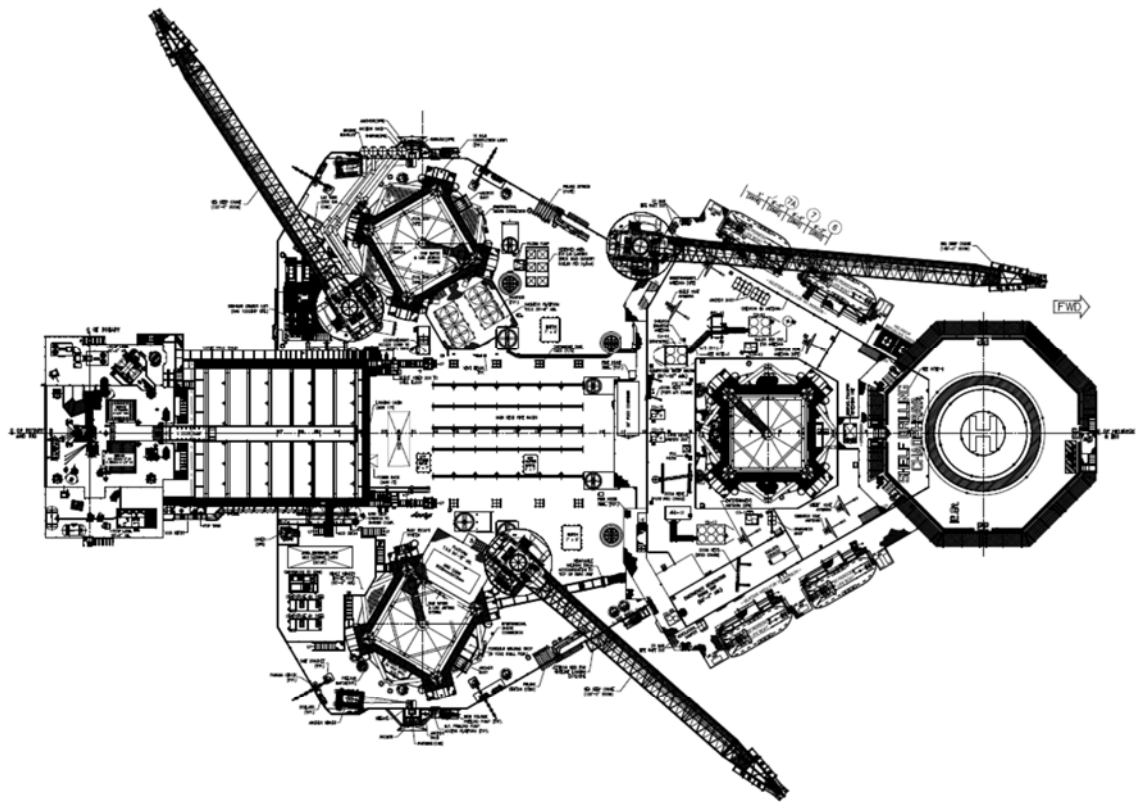
Power Equipment	
<b>Main Power</b>	Five (5) Caterpillar 3516C HD DITA diesel engines each rated at 2,150 HP @ 1,200 rpm and driving Kato 6P63300 1,596 KW AC generators
<b>Power Dist.</b>	Four (4) NOV Bridge SCR and two (2) NOV VFD, 600 V AC
<b>Emer. Power</b>	One (1) Caterpillar 3512C diesel engine rated 1,476 BHP @ 1,200 rpm driving a Kato 1,120 kW AC generator 1,120

Well Control Equipment	
<b>BOP Stack</b>	One (1) Hydril GX 13.5/8" 5K annular preventer and two (2) Cameron Type U 13.5/8" 10K double ram preventers
<b>BOP Handling</b>	Hercu-Link two (2) points hoist system, 50 short tons each

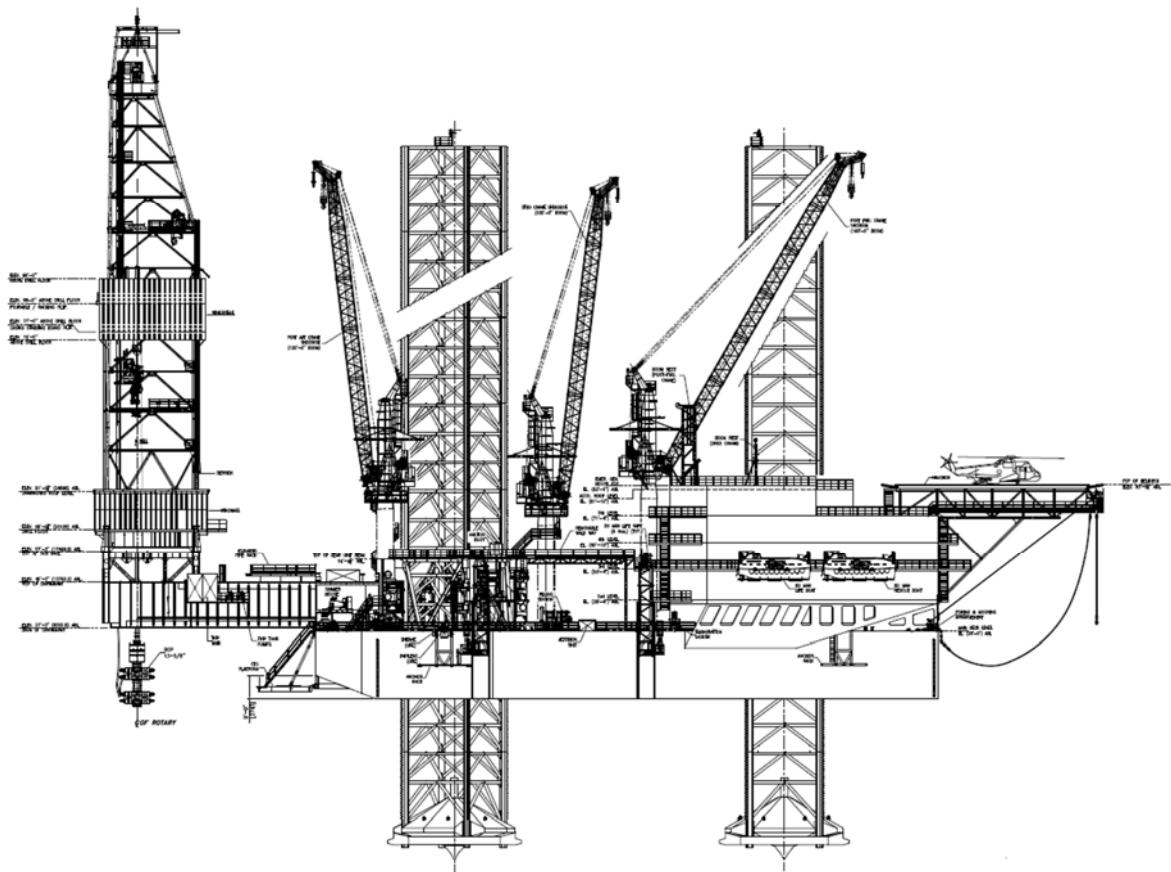
Cranes	
Two (2) SEADEEP SH2000-36 electro-hydraulic cranes with 120 ft boom, rated 57.8 short tons @ 25 ft radius; one (1) SEADEEP SH2000-42 electro-hydraulic crane with 140 ft boom, rated 77.3 short tons @ 29.5 ft radius; two (2) Palfinger PK65002MD cranes; Forum 14K-R overhead crane for offline activity.	

Special Features	
Offline activity including making up drill pipe and casing stands off critical path. Capable for in-field rig move with 600 kips of setback in the derrick. Designed to fill all preload tanks in two hours and one hour to dump.	

R-Mar-2018



TOP PLAN  
SCALE - 1:200



OUT BOARD PROFILE  
SCALE - 1:200

## Shelf Drilling Chaophraya

R-Mar-2018



## Shelf Drilling Krathong 350 Foot Jack-Up Drilling Unit

General Description	
<b>Design</b> .....	LeTourneau Super 116 E
<b>Year Built</b> .....	2017
<b>Hull Dimensions</b> .....	243 ft. x 206 ft. x 26 ft.
<b>Spud Can Diameter</b> .....	50.5 ft.
<b>Legs (3)</b> .....	477 ft. long square legs
<b>Quarters Capacity</b> .....	160 persons
<b>Maximum Water Depth</b> .....	350 ft.
<b>Cantilever Envelope</b> .....	70 ft. by 30 ft.
<b>Max Variable Load (drilling)</b> .....	Approx. 7,700 kips*
<i>*depending on water depth and geographical location</i>	

Drilling Equipment	
<b>Derrick</b>	Lee C. Moore bottleneck derrick, 170 ft high with 35 ft x 32 ft base, static hook load capacity 1,500,000 lbs. with fourteen (14) 1-3/4" drilling lines
<b>Drawworks</b>	NOV 1625 UDBE, 3,000 HP, driven by three (3) GE 752 DC motors each rated 1,085 HP continuous, outfitted with a Baylor 7838 auxiliary electric brake
<b>Rotary Table</b>	NOV RST-495, 1,100 short tons, hydraulic with 49-1/2 maximum opening
<b>Top Drive</b>	NOV TDS-8, 750 short tons, with PH-100 pipe-handler
<b>Pipe Handling</b>	Main Well Center: NOV ST-80, PS-21 power slips Offline Stand-building: NOV ST-80, Forum 14K-R Offline Activity Crane
<b>Mud Pumps</b>	Three (3) NOV 14-P-220 triplex mud pumps 2,200 HP, 7500 psi, each pump is driven by two (2) DC motors rated 1,085 HP continuous
<b>Solids Control</b>	Four (4) NOV Brandt VSM 300 balanced elliptical motion shale shakers
<b>Instrumentation</b>	NOV Rig-Sense drilling instrumentation system

Storage Capacities	
<b>Liquid Mud</b> .....	5,200 bbls.
<b>Base Oil</b> .....	980 bbls.
<b>Brine</b> .....	980 bbls.
<b>Drill Water</b> .....	19,672 bbls.
<b>Fuel</b> .....	2,100 bbls.
<b>Bulk Material (7 silos)</b> .....	12,250 cu.ft.
<b>Sack Storage</b> .....	5,000 sacks

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Well Control Equipment	
<b>BOP Stack</b>	One (1) Hydril GX 13.5/8" 5K annular preventer and two (2) Cameron Type U 13.5/8" 10K double ram preventers
<b>BOP Handling</b>	Hercu-Link two (2) points hoist system, 50 short tons each

Cranes	
Two (2) SEADEEP SH2000-36 electro-hydraulic cranes with 120 ft boom, rated 57.8 short tons @ 25 ft radius; one (1) SEADEEP SH2000-42 electro-hydraulic crane with 140 ft boom, rated 77.3 short tons @ 29.5 ft radius; two (2) Palfinger PK65002MD cranes; Forum 14K-R overhead crane for offline activity.	

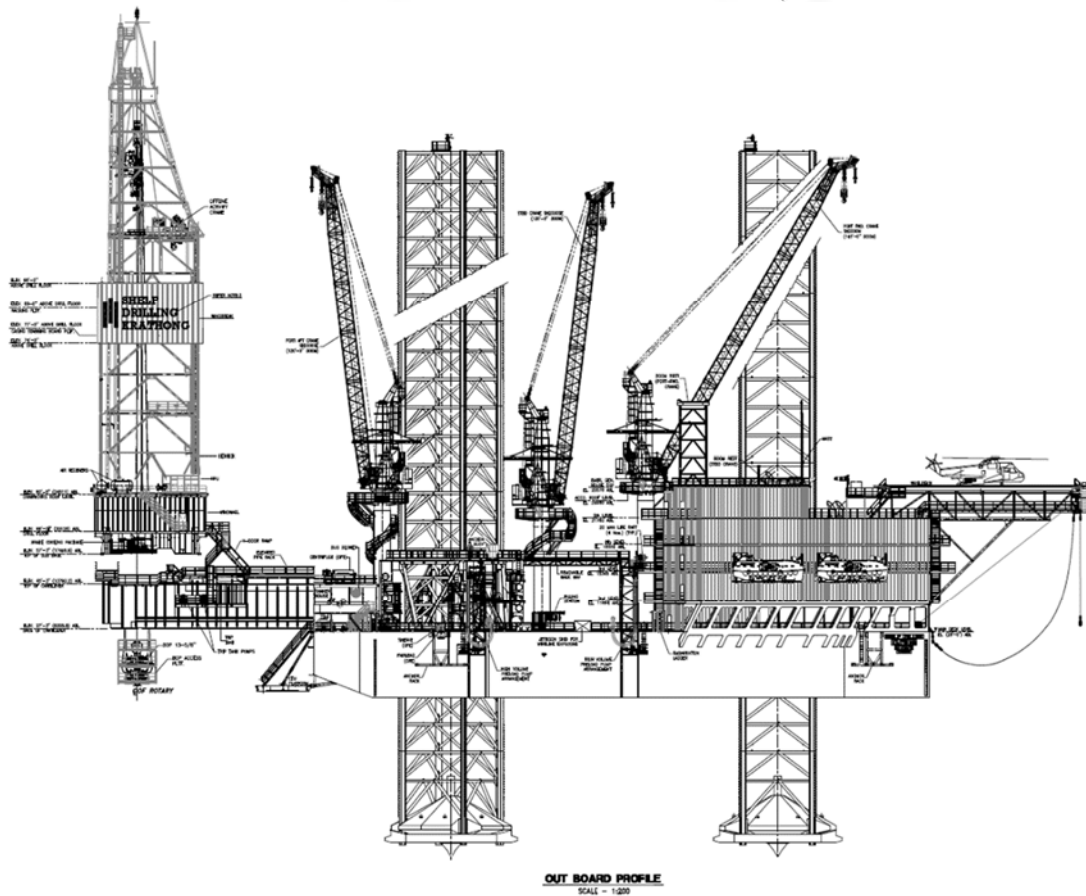
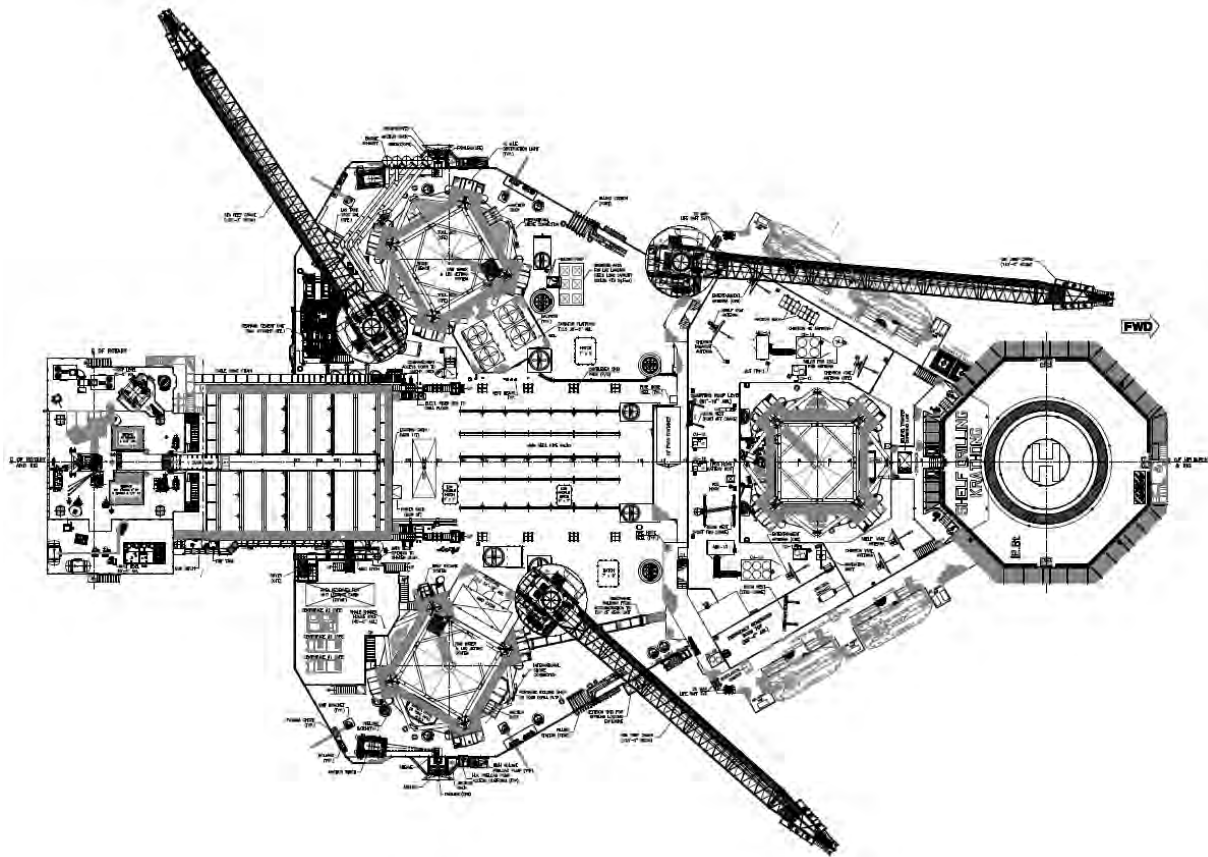
Special Features	
Offline activity including making up drill pipe and casing stands off critical path. Capable for in-field rig move with 600 kips of setback in the derrick. Designed to fill all preload tanks in two hours and one hour to dump.	

R-Mar-2018



These specifications are intended for general reference purposes only, as actual equipment and specifications may vary based upon subsequent changes, the contract situation and customer needs. All equipment shall be operated and maintained at all times, in compliance with Shelf Drilling policies and procedures, and within its stated operational limits or continuous rated capacity, in order to assure maximum operational efficiency.





## Shelf Drilling Krathong

R-Mar-2018



ภาคผนวก 19

รายการอุปกรณ์ตอบสนองต่อการหกรั่วไหลของน้ำมัน (*Spill Equipment Inspection*)








4	Oil Skimmer Equipment	Oil Skimmer connected with pump (LAMOR)	Proper condition.			
5	Oil Skimmer Equipment	Portable Lifting Equipment	Proper condition.			
6	Boom Equipment	Boom on Reel Drum	Boom good condition.			
7	Boom Equipment	Backpack Inflator (LAMOR ; Type DAB ; Model 200)	Inspected all engine condition and Test run found satisfied.			

8	Boom Equipment	Hydraulic Power Pack (LAMOR ; Type LPP ; Model 7HA/B8)	Inspected all engine condition and Test run found satisfied.			
9	Dispersant Spray Equipment	High Pressure Engine/Pump (HATZ ; Model 1B20)	Inspected all engine condition and Test run found satisfied.	 		
10	Boat Spray Equipment	High Pressure Engine/Pump ( Model 100-TS ) S/N : OP 4158 , S/N : OP 4166	Inspected engine condition and Test run found satisfied 1 Unit in CR-6780. ( CR-7052 still onboard BEWS and waiting transfer to BEWW )	 		

11	OSR Unit	Position	Position of OSR on BEWW.		
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## OSR MONTHLY INSPECTION

<b>Container / Basket Detail</b>	<p>*<b>OSRE-1B</b> consist ; Oil Skimmer Equipment. ( New unit replaced 14 Oct 22 )</p> <p>*<b>OSRE-2B</b> consist ; Boom Equipment. ( New unit replaced 14 Oct 22 )</p> <p>CR-6006 consist ; Dispersant Spray unit</p> <p>CR-6780 consist ; Boat spray equipment.</p> <p>CR-7052 consist ; Boat spray equipment.</p> <p>BE-1013 consist ; Chemical EC9500A 2 drums + Slickgone NS 4 drums</p> <p>BE-1014 consist ; Chemical Slickgone NS 6 drums</p> <p>CR-6885 consist ; Chemical EC9500A 3 drums + slickgone NS 1 drums.</p> <p>CR-6067 consist ; Chemical EC9500A 2 drums+ slickgone NS 2 drums.</p> <p>CR-6215 consist ; Chemical EC9500A 3 drums+ slickgone NS 1 drums</p>	 
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Date : 24 Dec 2022	W/O: 1201812	Tasks: PM 1M Schedule	By: Narin S. / Nakorn S.	Location: BEWF	Follow Up Action	Completed (By / Date)
Item	Equipment	Description	Remark / Comment	Photo		
1	Chemical	Slickgone NS 14 drums ; EC9500A 10 drums	Proper condition.			
2	Oil Skimmer Equipment	Centrifugal Pump (LAMOR ; Model LWP-D-15LP)	Inspected all engine condition and Test run found satisfied.			
3	Oil Skimmer Equipment	Hydraulic Power Pack (LAMOR ; Type LPP ; Model 36L/38 cc.)	Inspected all engine condition and Test run found satisfied.			



4	Oil Skimmer Equipment	Oil Skimmer connected with pump (LAMOR)	Proper condition.			
5	Oil Skimmer Equipment	Portable Lifting Equipment	Proper condition.			
6	Boom Equipment	Boom on Reel Drum	Boom good condition.			
7	Boom Equipment	Backpack Inflator (LAMOR ; Type DAB ; Model 200)	Inspected all engine condition and Test run found satisfied.			

8	Boom Equipment	Hydraulic Power Pack (LAMOR ; Type LPP ; Model 7HA/B8)	Inspected all engine condition and Test run found satisfied.			
9	Dispersant Spray Equipment	High Pressure Engine/Pump (HATZ ; Model 1B20)	Inspected all engine condition and Test run found satisfied.	   		
10	Boat Spray Equipment	High Pressure Engine/Pump ( Model 100-TS ) S/N : OP 4158 , S/N : OP 4166	Inspected engine condition and Test run found satisfied 2 Unit in CR-6780 and CR-7052.	   		
11	OSR Unit	Position	Position of OSR on BEWF.	   		

Update Month : 25 December 2022

Department : Marine

No.	ITEM CODE	Description	Material Number Model / Maker	Last Year ROB	Unit	MONTH																								TTL REC V	TTL ISSUE	BALANCE	MIN STOCK	STATUS	Location	Remarks
						Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec								
						rcv	con	rcv	con	rcv	con	rcv	con	rcv	con	rcv	con	rcv	con	rcv	con	rcv	con	rcv	con	rcv	con	rcv	con							

Consumables

SOPEP Equipment (In SOPEP Locker)

1		Absorbent Pads (Oil only)		20	Ea																								20	0	20	1	OK		
2		Contaminated Waste Bags (30L)		1	Pack																								1	0	1	1	OK		
3		Portable pumps		1	Set																								1	0	1	1	OK		
4		Empty drum (200L)		1	Drum																								1	0	1	1	OK		
5		Saw dust at least 10 kg		25	Kg																								25	0	25	1	OK		
6		Drum of organic soap (20 Lite / 1 Bottle)		1	Bottle																								1	0	1	1	OK		
7		Plastic paddle		1	Ea																								1	0	1	1	OK		
8		Corn Broom		1	Ea																								1	0	1	1	OK		
9		Bags of Rags (25 Kg. / 1 Bag)		6	Bag																								6	0	6	5	OK		
10		Fine sand (25 Kg. / 1 Bag)		1	Bag																								1	0	1	1	OK		
11		Rubber Squeegees		1	Ea																								1	0	1	1	OK		
12		Oil spill dispersant chemicals 20kg/Pail (Rig Wash)		9	Pail																								9	0	9	0	OK		

SOPEP Equipment (Additional from SOPEP list)

1		Floating Oil Absorbent Boom		1	Set																								1	0	1	1	OK		
2		Absorbent Pillows (Oil only)		700	Sheet																								700	0	700	1	OK		
3		Absorbent Rolls (Oil only)		2	Rolls																								2	0	2	1	OK		
4																																			
5																																			


PPE (In Yellow Box near SOPEP Locker)

1		Oil and Chemical Resistant Gloves (Red)		22	Pairs																								22	0	22	1	OK		
2		Oil and Chemical Resistant Gloves (Gray)		12	Pairs																								12	0	12	1	OK		
3		Disposable Coveralls (Tyvex suit) Size M		15	Suits																								15	0	15	1	OK		
4		Disposable Coveralls (Tyvex suit) Size L		10	Suits																								10	0	10	1	OK		
5		Disposable Coveralls (Tyvex suit) Size XL		10	Suits																								10	0	10	1	OK		
6		Rubber boots		2	Pairs																								2	0	2	1	OK		
7		Wide vision glasses (Goggles)		2	Ea																								2	0	2	1	OK		
8		Disposable masks (15 Ea / Box)	3M Model 8247	1	Box																								1	0	1	1	OK		
9																																			

Update Month : 25 December 2022

Inventory for Movable Spill Kit

1		Oil Absorbent Boom (length 2.5 m)		2	Ea																								2	0	2	1	OK		
2		Cotton Rags (20 kg)		1	Bag																								1	0	1	1	OK		
3		Saw Dust (25 kg)		2	Bag																								2	0	2	1	OK		
4		Absorbent Sheet (Oil only)		25	Sheet																								25	0	25	1	OK		
5		Corn Broom		1	Ea																								1	0	1	1	OK		
6		Mop		1	Ea																								1	0	1	1	OK		
7		Rubber Squeegee		1	Ea																								1	0	1	1	OK		
8		Plastic Bag		1	Pack																								1	0	1	1	OK		
9		Dust pan (Plastic Flat)		1	Ea																								1	0	1	1	OK		
10		Dust pan (Lobby)		1	Ea																								1	0	1	1	OK		

Inspected by:   
Thanapat R.  
Senior Marine Technician

Verified By:   
Sunsum S.  
Marine Supervisor

ภาคผนวก 20

บันทึกรายชื่อและปริมาณการจัดเก็บสารเคมี (Chemical Inventory)

MONTHLY CHEMICAL ORDER AND DELIVERY RECORD 2022

No.	Product Name	Chemical Name	Chemical Pack Size	Actual Chemical call out												
				Monthly Chemical Order (gallons)												
				Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Sum
1	CRW323	Corrosion Inhibitor	530	4240	2650	3710	3180	3180	1060	2650	2650	3180	3,710	3,180	3,180	36,570
2	CRO80157	Corrosion Inhibitor	530	530	1060	1060	530	1060	530	530	0	1590	530	530	530	8,480
3	DMO87023	Demulsifier	530	8480	8480	9010	8480	9010	4240	8480	8480	8480	9,010	8,480	9,540	100,170
4	RBW80122	Water clarifier	530	0	1060	0	0	0	0	0	0	0	-	-	-	1,060
5	RBW700	Water Clarifier	530	530	530	530	530	1060	530	530	530	530	530	530	1,060	7,420
6	OSW80490	Oxygen Scavenger	530	0	0	0	0	0	0	0	0	0	-	-	-	0
7	XC80105	Biocide	530	0	0	0	0	0	0	0	1060	0	-	-	-	1,060
8	XC31550	Biocide	530	0	0	0	0	0	0	0	530	0	-	-	-	530
9	SCW85763	Scale Inhibitor	530	1060	0	1060	1060	530	530	1060	530	530	1,060	1,590	1,060	10,070
10	PAO50283	PPD	530	4770	4770	4770	4770	2650	2120	5300	4770	3710	2,650	2,650	3,180	46,110
11	PAO85605	Parrafin solvent	530	0	0	0	0	0	0	0	0	0	-	-	-	0
12	DFO80257	Antifoam	530	2650	2650	2120	2120	2120	1060	2120	2650	1590	-	1,060	2,120	22,260
Total				22,260.00	21,200.00	22,260.00	20,670.00	19,610.00	10,070.00	20,670.00	21,200.00	19,610.00	17,490.00	18,020.00	20,670.00	233,730.00

Location	Chemical		Tank No.	Pump Type.	Pump No.	Inject Location	Previous Check Date	Stock (USG)	Lastest Check Date	Stock (USG)	Actual Injection Rate (USG/D)	Recommended Injection Rate (USG/D)	Day Left (Day)	Next Top Up Date	Colour Code	Total Stock Onboard (USG)	Remark
BEPP																	
	CRO80157	Corrosion Inhibitor	712483	Electric Pump	/MMSCF( 100 MM = 100 L d	Upstream compressor	10-Feb-23	170	15-Feb-23	290	12	12	46	11-Mar-23		554	Day Tank
	CRO80157	Corrosion Inhibitor	112966					530		264							530 gal arrived Jan 27
	DMO87023	Demulsifier	157659	Electric Pump		Upstream LP slug cather		270		264	0	10	794	19-Apr-25		794	Day Tank
	DMO87023	Demulsifier	112947					530		530							530 gal arrived Jan 27
	CRW323	Corrosion Inhibitor		Electric Pump		BEPP					0	10	0	15-Feb-23		0	Day Tank
	DFO80257	De-Foamer	212178	Electric Pump		Upstream LP Separator		420		270	32	30	51	23-Feb-23		1630	530 gal arrived Mar 06
	DFO80257	De-Foamer	157649					300		300							530 gal arrived Jan 27
	DFO80257	De-Foamer	163287							530							530 gal arrived Feb 16
	DFO80257	De-Foamer	189912							530							530 gal arrived Feb 16
	RBW80122	Water Clarifier	189911	Electric Pump		Upstream flash vessel		340		340	0	40	340			340	Day Tank
	SCW85763	Scale Inhibitor	189915	Electric Pump		Downstream filter booter pump to BEWA		390		325	10	10	86	19-Mar-23		855	Day Tank
	SCW85763	Scale Inhibitor	712464							530							530 gal arrived Feb 16
	TEA 99 (EC1005A)	Triethanolamine	drum	Upstream glycol contractor		Nalco											liter for adjuts to High pH of TEG
	DFW82243	Antifoam for Glycol	drum	Upstream glycol pump surge tank		Baker Hughes											2 drums, 1 gal/week (batch injecti
BEWA																	
	CRW323	Corrosion Inhibitor				wellhead and pw re-injection	15-Feb-23	0	17-Feb-23	0	0	5	0			0	Day Tank
	DFO80257	De-Foamer	157669	Checkpoint		Inlet FWKOD		350		290	40	40	34	24-Feb-23		1350	Day Tank
	DFO80257	Demulsifier	157676					530		530							530 gal arrived Jan 27
	DFO80257	Demulsifier	712487					530		530							530 gal arrived Feb 9
	DMO87023	Demulsifier	112965	Checkpoint		Inlet header before FWKOD		194		390	20	50	59	8-Mar-23		1180	Day Tank
	DMO87023	Demulsifier	163278					530		260							530 gal arrived Jan 27
	DMO87023	Demulsifier	212176					530		530							530 gal arrived Jan 27
	RBW700	Water Clarifier	178077	Checkpoint		Inlet FWKOD		200		400	20	20	33	9-Mar-23		660	Day Tank
	RBW700	Water Clarifier	COTL-011					530		260							530 gal arrived Jan 27
	XC31550	Biocide	6-11	Checkpoint		Suction water injection		0		0			0			0	Day Tank
	XC80105	Biocide		Checkpoint		Suction water injection		0		0			0			0	
	OSW80490																



**CHEMICAL AND WASTE INSPECTION CHECKLIST**

By: Kamolpoo Iamsaard

Survey Date:  
Location/Area:

Ver. 2012/01  
2-Oct-22  
Benchamas Lab



Inspection Items	Yes	No	N/A	Comments
<b>1. Chemical List (รายการสารเคมี)</b>				
• Chemical list is available in the storage area e.g. Store, chemical storage cabinets, etc. indicating chemical name and storage location. (จัดให้มีรายการสารเคมีที่ใช้งานอยู่ในบริเวณสถานที่จัดเก็บ เช่น Store และหน้าตู้ที่มีการเก็บสารเคมี มีการขึ้นชื่อของสารเคมีและสถานที่จัดเก็บ)	✓			
<b>2. MSDS (ข้อมูลความปลอดภัยของเคมีภัณฑ์)</b>				
• MSDS document of chemicals are available at working or storage location e.g. Store, Control Room, Mechanic Shop, and Lab in an orderly manner. (จัดให้มีเอกสารข้อมูลความปลอดภัยของสารเคมีประจำสถานที่ปฏิบัติงาน และสถานที่จัดเก็บ เช่น Store, Control Room, Mechanic Shop และ Lab ที่สามารถค้นหาสารเคมีได้รวดเร็วเมื่อมีเหตุฉุกเฉิน)	✓			
<b>3. Containers (ภาชนะบรรจุสารเคมี/ของเสีย)</b>				
• Containers are in good condition, e.g. metal drum is not rusty or distorted, plastic drum is not torn or distorted, the color is not faded or changed, and the container does not bulge that could cause a spill or leakage. (ภาชนะบรรจุอยู่ในสภาพดี เช่น ถ้าเป็นถังเหล็กต้องไม่มีสนิมหรือรอยบุบหรือรอยบวม ถังพลาสติกต้องไม่ยุบ สีของถังต้องไม่จางหรือเปลี่ยน หรือผิวเรียบไม่บุบ จนอาจเป็นเหตุให้เกิดการหกหรือไหลได้)	✓			
(B) Keep containers of chemical/wastes that can vaporize closed unless being used. (ภาชนะบรรจุสารเคมีหรือของเสียที่ระเหยได้ เช่น น้ำมัน ไขมัน ของแข็งแบบแข็งปรอท จะต้องปิดมิดชิดอยู่เสมอหากไม่ได้ใช้ระหว่างการใช้งาน)	✓			
• Dispensed containers must be appropriate according to chemical types, e.g. use closed top metal drum for oil/thinner; use plastic bottle and metal box as inner and outer packages for elemental mercury, respectively. (ภาชนะบรรจุของเสียเหมาะสมกับประเภทของสารเคมีที่บรรจุ เช่น ใช้ถังเหล็กสำหรับน้ำมัน หรือถังที่ปิดมิดชิด ใช้ขวดพลาสติกและกล่องเหล็กเป็นบรรจุภัณฑ์ด้านในและด้านนอกสำหรับสารปรอท ตามลำดับ)	✓			
• Waste containers must be appropriate according to waste types, e.g. use metal drum (200L) for used oil/thinner or oily rags; use metal box for used fluorescent lamp; use plastic UN drum closed top for mercury contaminated material. (ภาชนะบรรจุของเสียเหมาะสมกับประเภทของของเสียที่บรรจุ เช่น ใช้ถังเหล็กสำหรับน้ำมัน, ใช้น้ำมันหรือถังที่ปิดมิดชิดหรือผ้าใบเขื่อนน้ำมัน ใช้กล่องเหล็กสำหรับหลอดไฟที่ใช้น้ำมัน ใช้ถังพลาสติกมาตรฐาน UN สำหรับของแข็งแข็งปรอท)	✓			
<b>4. Labeling (การติดฉลากสารเคมี/ของเสีย)</b>				
• Chemical/Waste containers have the Chevron standard labels attached for each chemical/waste and remove all other labels if recycle drum was used. The label should also be in good condition, not faded or torn, and easy to read. These also apply to all dispensed containers used to take chemical from original container or drum. (ภาชนะบรรจุสารเคมีหรือของเสียมีฉลากตามมาตรฐานของเชฟรอนติดอยู่บนภาชนะบรรจุโดยฉลากต้องอยู่ในสภาพที่ดี ไม่จาง ไม่ฉีกขาด และสามารถอ่านได้ชัดเจนหากมีการนำภาชนะบรรจุมาใช้ซ้ำต้องติดฉลากที่ถูกต้องออก ทั้งนี้ให้รวมทั้งภาชนะแบ่งถ่ายสารเคมีด้วย)	✓			
<b>5. Chemical and Waste Storage and Handling (การจัดเก็บสารเคมีและของเสีย)</b>				
• Chemical storage area is dry, cool (not extreme temperature), and well ventilated. (สถานที่เก็บสารเคมีจะต้องแห้ง, ไม่ร้อนจัด และมีการระบายอากาศที่ดี)	✓			
• Not keeping the expired or not used chemical at offshore and need to send out the expired chemical to dispose at onshore. (ไม่เก็บสารเคมีที่หมดอายุหรือไม่มีการใช้แล้วไว้ที่ Offshore และต้องดำเนินการส่งสารเคมีที่หมดอายุไปกำจัดบนฝั่ง)	✓			
• Flammable chemicals are stored in flammable cabinets and labeled properly. These also apply to all dispensed containers used to take chemical from original container or drum. (สารเคมีไวไฟต้องเก็บไว้ในตู้เก็บเฉพาะและต้องมีฉลากติดไว้อย่างถูกต้องเหมาะสม รวมทั้งภาชนะแบ่งถ่ายสารเคมีด้วย)	✓			
• Compressed gases cylinders are stored upright and properly chained at all times, including empty cylinders. (ถังบรรจุก๊าซความดันจะต้องตั้งตรงและมีการยึดด้วยโซ่อย่างแน่นหนาตลอดเวลา รวมถึงถังเปล่าที่ใช้แล้วด้วย)	✓			
• Compressed gas cylinders capped properly, secured and not stored incompatible materials e.g. oxygen and acetylene together when not in use (ถังบรรจุก๊าซที่ไม่ได้ใช้จะต้องมีฝามิดชิดให้เรียบร้อยและไม่จัดเก็บก๊าซที่ไม่เข้าพวก เช่น ก๊าซอะเซทิลีน และ ก๊าซออกซิเจนไว้ด้วยกัน)	✓			
• Incompatible chemical/wastes must be stored separately, e.g. corrosive and flammable or corrosive and oxidizing agents together where spills can find their way to mix with each other resulting in fire or toxic gas (ของเสียที่เข้ากันไม่ได้ต้องเก็บไว้แยกจากกัน เช่น สารกัดกร่อนกับสารไวไฟ หรือ สารกัดกร่อนกับสารออกซิไดซ์ ซึ่งถ้ามีการหกหรือรั่วไหลอาจมีโอกาสมาสัมผัสกันหรือผสมกัน แล้วทำให้เกิดสารพิษหรือ ไฟไหม้ได้)	✓			
• Onsite spill response kits are available and inspected on the availability of all response kits. (มีอุปกรณ์ที่ใช้สำหรับจัดการในกรณีสารเคมีหรือของเสียหกหรือไหล และอุปกรณ์มีอยู่ครบถ้วนตามรายการ)	✓			
• Secondary containment is provided if the spill can find its way getting directly to outside environment (sea, soil, waterbody) following secondary containment screening process in TSP-33. (มีภาชนะรองรับที่กักเก็บสารเคมีตามขั้นตอนการคัดเลือกภาชนะรองรับที่กักเก็บใน TSP-33 ถ้าสารเคมีดังกล่าวมีความเสี่ยงที่จะเกิดการรั่วไหลออกไปยังสภาพแวดล้อมได้โดยตรง เช่น ลงสู่ทะเล ดิน หรือ แหล่งน้ำ)	✓			
• Emergency eye wash/shower station are available and functioning e.g. water pressure, water cleanliness (ที่ล้างตาฉุกเฉินและฝักบัวฉุกเฉินสามารถใช้งานได้ เช่น แรงดันน้ำ ความสะอาดของน้ำ เป็นต้น)	✓			
• Waste must be segregated in appropriate containers according to their types, e.g. recyclable waste (glass, paper, aluminium can, plastic bottles, etc); hazardous wastes (used oil, Hg contaminated sludge, paint cans, used filter, fluorescent lamp, used PPE, contaminated material, infectious waste, etc.) (ของเสียจะต้องถูกคัดแยกไว้ในภาชนะที่เหมาะสมตามประเภทของเสีย เช่น วัสดุรีไซเคิล (แก้ว กระดาษ กระป๋องอลูมิเนียม ขวดพลาสติก เป็นต้น), ของอันตราย (น้ำมันใช้แล้ว ภาชนะกอนปนเปื้อนปรอท กระป๋องสี ตัวกรองที่ใช้งานแล้ว หลอดไฟฟลูออเรสเซนต์ PPE ที่ใช้งานแล้ว วัสดุปนเปื้อน ของตัดเฉือน เป็นต้น)	✓			
• All chemical/waste shall be stored in an orderly manner according to good housekeeping practices, with no undesirable odor, leachate, or pests. (พื้นที่จัดเก็บสารเคมีหรือของเสียต้องสะอาด ปราศจากกลิ่น และแมลงรบกวน)	✓			

Reference: TSP-33 <C:\Users\cqpyd\Links\HAZCOM Process\TSP-33\_Chemical\_Handling\_and\_Storage.docx>

Application : Conduct plant inspection by using this checklist at least on monthly basis

: HESS to support for this inspection. However, it is a good tool for other sectors to conduct inspection by using this checklist as well.

CHEMICAL AND WASTE INSPECTION CHECKLIST

By:Nuttawut Sutham

Survey Date:  
Location/Area:

Ver. 2012/01  
4-Nov-22  
Bencharmas Lab



Inspection Items	Yes	No	N/A	Comments
<b>1. Chemical List (รายการสารเคมี)</b>				
• Chemical list is available in the storage area e.g. Store, chemical storage cabinets, etc. indicating chemical name and storage location.(จัดไว้มีรายการสารเคมีที่ใช้งานอยู่ในบริเวณสถานที่จัดเก็บ เช่น Store และหน้าตู้ที่มีการเก็บสารเคมี มีการขึ้นชื่อของสารเคมีและสถานที่จัดเก็บ)	✓			
<b>2. MSDS (ข้อมูลความปลอดภัยของเคมีภัณฑ์)</b>				
• MSDS document of chemicals are available at working or storage location e.g. Store, Control Room, Mechanic Shop, and Lab in an orderly manner.(จัดไว้มีเอกสารข้อมูลความปลอดภัยของสารเคมีประจำสถานที่ปฏิบัติงาน และสถานที่จัดเก็บ เช่น Store, Control Room, Mechanic Shop และ Lab ที่สามารถค้นหาสารเคมีได้รวดเร็วเมื่อมีเหตุฉุกเฉิน)	✓			
<b>3. Containers (ภาชนะบรรจุสารเคมี/ของเสีย)</b>				
• Containers are in good condition, e.g. metal drum is not rusty or distorted, plastic drum is not torn or distorted, the color is not faded or changed, and the container does not bulge that could cause a spill or leakage. (ภาชนะบรรจุอยู่ในสภาพดี เช่น ถังเป็นถังเหล็กต้องไม่มีสนิมหรือบุบ หรือบุบ สังกะสีต้องไม่บุบ สีของถังต้องไม่จางหรือเปลี่ยน หรือตัวเรือนไม่บุบ จมูกอาจเป็นเหตุให้เกิดการหกหรือไหลได้)	✓			
• Keep containers of chemical/wastes that can vaporize closed unless being used. (ภาชนะบรรจุสารเคมีหรือของเสียที่ระเหยได้ เช่น น้ำมันโซลันท์ ของเสียเป็นเบี่ยงป่อง จะต้องปิดมิดชิดอยู่เสมอหากไม่ได้ใช้ระหว่างการใช้งาน)	✓			
• Dispensed containers must be appropriate according to chemical types, e.g. use closed top metal drum for oil/thinner; use plastic bottle and metal box as inner and outer packages for elemental mercury, respectively.(ภาชนะบรรจุสารเคมีเหมาะสมกับประเภทของสารเคมีที่บรรจุ เช่น ใช้ถังเหล็กสำหรับน้ำมันหรือที่ปิดฝาปิดชิด ใช้ขวดพลาสติกและกล่องเหล็กเป็นบรรจุภัณฑ์ด้านในและด้านนอกสำหรับสารปรอท ตามลำดับ)	✓			
• Waste containers must be appropriate according to waste types, e.g. use metal drum (200L) for used oil/thinner or oily rags, use metal box for used fluorescent lamp; use plastic UN drum closed top for mercury contaminated material. (ภาชนะบรรจุของเสียเหมาะสมกับประเภทของของเสียที่บรรจุ เช่น ใช้ถังเหล็กสำหรับน้ำมัน, ถังเบเกอร์โซลันท์ปิดฝาปิดชิดหรือฟองเบี่ยงป่องน้ำมัน ใช้กล่องเหล็กสำหรับหลอดไฟโซลันท์ ใช้ถังพลาสติกมาตรฐาน UN สำหรับของเสียเป็นเบี่ยงป่อง)	✓			
<b>4. Labelling (การติดฉลากสารเคมี/ของเสีย)</b>				
• Chemical/Waste containers have the Chevron standard labels attached for each chemical/waste and remove all other labels if recycle drum was used. The label should also be in good condition, not faded or torn, and easy to read. These also apply to all dispensed containers used to take chemical from original container or drum.(ภาชนะบรรจุสารเคมีหรือของเสียมีฉลากตามมาตรฐานของเชvron ติดอยู่บนภาชนะบรรจุโดยฉลากต้องอยู่ในสภาพที่ดี ไม่จาง ไม่ฉีกขาด และสามารถอ่านได้ชัดเจนหากมีการนำภาชนะบรรจุมาใช้ซ้ำต้องฉีกฉลากที่ไม่ถูกต้องออก ทั้งนี้ให้รวมที่ภาชนะแบ่งย้ายสารเคมีด้วย)	✓			
<b>5. Chemical and Waste Storage and Handling (การจัดเก็บสารเคมีและของเสีย)</b>				
• Chemical storage area is dry, cool (not extreme temperature), and well ventilated.(สถานที่เก็บสารเคมีจะต้องแห้ง, ไม่ร้อนจัด และมีการระบายอากาศที่ดี)	✓			
• Not keeping the expired or not used chemical at offshore and need to send out the expired chemical to dispose at onshore.(ไม่เก็บสารเคมีที่หมดอายุหรือไม่มีการใช้ในโรงไฟฟ้า Offshore และต้องดำเนินการส่งสารเคมีที่หมดอายุไปกำจัดบนฝั่ง)	✓			
• Flammable chemicals are stored in flammable cabinets and labeled properly. These also apply to all dispensed containers used to take chemical from original container or drum.(สารเคมีไวไฟต้องเก็บไว้ในตู้เก็บเฉพาะและต้องฉีกฉลากติดไว้อย่างถูกต้องเหมาะสม รวมทั้งภาชนะแบ่งย้ายสารเคมีด้วย)	✓			
• Compressed gases cylinders are stored upright and properly chained at all times, including empty cylinders.(ถังบรรจุก๊าซความดันจะต้องตั้งตรงและมีการมัดด้วยโซ่อย่างแน่นหนาตลอดเวลารวมถึงถังเปล่าที่ใช้แล้วด้วย)	✓			
• Compressed gas cylinders capped properly, secured and not stored incompatible materials e.g. oxygen and acetylene together when not in use (ถังบรรจุก๊าซที่ปิดฝาปิดมิดชิดอย่างเรียบร้อยและไม่จัดเก็บก๊าซที่ไม่เข้าพวก เช่น ก๊าซอะเซทิลีน และ ก๊าซออกซิเจนไว้ด้วยกัน)	✓			
• Incompatible chemical/wastes must be stored separately, e.g. corrosive and flammable or corrosive and oxidizing agents together where spills can find their way to mix with each other resulting in fire or toxic gas (ของเสียที่เข้ากันไม่ได้ต้องเก็บไว้แยกจากกัน เช่น สารกัดกร่อนกับสารไวไฟ หรือ สารกัดกร่อนกับสารออกซิไดซ์ ซึ่งถ้ามีการหกหรือรั่วไหลอาจมีโอกาสมาสัมผัสกันหรือผสมกัน แล้วทำให้เกิดสารพิษหรือไฟไหม้ได้)	✓			
• Onsite spill response kits are available and inspected on the availability of all response kits.(มีอุปกรณ์ที่ใช้สำหรับจัดการในกรณีสารเคมีหรือของเสียหกหรือไหล และอุปกรณ์มีอยู่ครบถ้วนตามรายการ)	✓			
• Secondary containment is provided if the spill can find its way getting directly to outside environment (sea, soil, waterbody) following secondary containment screening process in TSP-33.(มีภาชนะรองรับที่กักเก็บสารเคมีตามขั้นตอนการคัดเลือกรับรองรองรับที่กำหนดไว้ใน TSP-33 ถ้าสารเคมีส่งผลกระทบต่อสิ่งแวดล้อมที่จะเกิดการรั่วไหลออกไปยังสภาพแวดล้อมได้โดยตรง เช่น ลงสู่ทะเล ดิน หรือ แหล่งน้ำ)	✓			
• Emergency eye wash/shower station are available and functioning e.g. water pressure, water cleanliness(ที่ล้างตาจากเงาและผิวหนังฉุกเฉินสามารถใช้งานได้ เช่น แรงดันน้ำ ความสะอาดของน้ำ เป็นต้น)	✓			
• Waste must be segregated in appropriate containers according to their types, e.g. recyclable waste (glass, paper, aluminium can, plastic bottles, etc.); hazardous wastes (used oil, Hg contaminated sludge, paint cans, used filter, fluorescent lamp, used PPE, contaminated material, infectious waste, etc.) (ของเสียจะต้องถูกคัดแยกไว้ในภาชนะที่เหมาะสมตามประเภทของเสีย เช่น วัสดุรีไซเคิล (แก้ว กระดาษ กระป๋องอลูมิเนียม ขวดพลาสติก เป็นต้น), ของอันตราย (น้ำมันใช้แล้ว กากตะกอนเป็นเบี่ยงป่อง กระป๋องสี ตัวกรองที่ใช้ในงานแล้ว หลอดไฟฟลูออเรสเซนต์ PPE ที่ใช้งานแล้ว วัสดุเป็นพิษ ขยะติดเชื้อ เป็นต้น)	✓			
• All chemical/waste shall be stored in an orderly manner according to good housekeeping practices, with no undesirable odor, leachate, or pests. (พื้นที่จัดเก็บสารเคมีหรือของเสียต้องสะอาด ปราศจากกลิ่น และแมลงรบกวน)	✓			

Reference: TSP-33 <C:\Users\cgyd\Links\HAZCOM Process\TSP-33\_Chemical\_Handling\_and\_Storage.docx>

Application : Conduct plant inspection by using this checklist at least on monthly basis

: HESS to support for this inspection. However, it is a good tool for other sectors to conduct inspection by using this checklist as well.

Ver. 2012/01

Survey Date: 5-Dec-22

Location/Area: Benchamas Lab



Survey Date: \_\_\_\_\_  
Location/Area: \_\_\_\_\_

Inspection Items	Yes	No	N/A	Comments
<b>1. Chemical List (รายการสารเคมี)</b>				
<ul style="list-style-type: none"> <li>Chemical list is available in the storage area (e.g. Store, chemical storage cabinets, etc. indicating chemical name and storage location) (จัดให้มีรายการสารเคมีที่ใช้งานอยู่ในบริเวณสถานที่จัดเก็บ เช่น Store และตู้หน้ำตู้ที่มีการเก็บสารเคมี มีการขึ้นบ่งชี้ชื่อของสารเคมีและสถานที่จัดเก็บ)</li> </ul>	√			
<b>2. MSDS (ข้อมูลความปลอดภัยของเคมีภัณฑ์)</b>				
<ul style="list-style-type: none"> <li>MSDS document of chemicals are available at working or storage location (e.g. Store, Control Room, Mechanic Shop, and Lab in an orderly manner) (จัดให้มีเอกสารข้อมูลความปลอดภัยของสารเคมีประจำสถานที่ปฏิบัติงาน และสถานที่จัดเก็บ เช่น Store, Control Room, Mechanic Shop และ Lab ที่สามารถค้นหาสารเคมีได้รวดเร็วเมื่อมีเหตุฉุกเฉิน)</li> </ul>	√			
<b>3. Containers (ภาชนะบรรจุสารเคมี/ของเสีย)</b>				
<ul style="list-style-type: none"> <li>Containers are in good condition, e.g. metal drum is not rusty or distorted, plastic drum is not torn or distorted, the color is not faded or changed, and the container does not bulge that could cause a spill or leakage. (ภาชนะบรรจุอยู่ในสภาพดี เช่น ถ้าเป็นถังสังกะสีไม่มีสนิมชား เหมะ หรือเป็นถังพลาสติกไม่มีรอยร้าว สีของถังยังไม่จางหรือเปลี่ยน หรือตัวถังไม่บุ๋ม จะอาจเป็นเหตุให้เกิดการหกหรือไหลได้)</li> </ul>	√			
<ul style="list-style-type: none"> <li>Keep containers of chemical/wastes that can vaporize closed unless being used. (ภาชนะบรรจุสารเคมีหรือของเสียที่ระเหยได้ เช่น น้ำมันที่ใช้แล้ว ของเสียเป็นเบ็นโซลีน จะต้องปิดมิดชิดอยู่เสมอหากไม่ได้อยู่ระหว่างการใช้งาน)</li> <li>Dispensed containers must be appropriate according to chemical types, e.g. use closed top metal drum for oil/thinner; use plastic bottle and metal box as inner and outer packages for elemental mercury, respectively. (ภาชนะแบ่งจ่ายสารเคมีเหมาะสมกับประเภทของสารเคมีที่บรรจุ เช่น ใช้ถังเหล็กสำหรับน้ำมันหรือที่ปิดฝาปิดมิดชิด ใช้ขวดพลาสติกและกล่องเหล็กเป็นบรรจุภัณฑ์ภายในและด้านนอกสำหรับสารปรอท ฯลฯ)</li> <li>Waste containers must be appropriate according to waste types, e.g. use metal drum (200L) for used oil/thinner or oily rags; use metal box for used fluorescent lamp ; use plastic UN drum closed top for mercury contaminated material. (ภาชนะบรรจุของเสียเหมาะสมกับประเภทของของเสียที่บรรจุ เช่น ใช้ถังเหล็กสำหรับน้ำมัน, ถังเบ็นโซลีนสำหรับใช้ปิดฝาปิดมิดชิดหรือสำหรับเบ็นโซลีน น้ำมัน ใช้กล่องเหล็กสำหรับหลอดไฟที่ใช้แล้ว ใช้ถังพลาสติกสำหรับสาร UN กับวัสดุเป็นเบ็นโซลีนปรอท)</li> </ul>	√			
<b>4. Labeling (การติดฉลากสารเคมี/ของเสีย)</b>				
<ul style="list-style-type: none"> <li>Chemical/Waste containers have the Chevron standard labels attached for each chemical/waste and remove all other labels if recycle drum was used. The label should also be in good condition, not faded or torn, and easy to read. These also apply to all dispensed containers used to take chemical from original container or drum. (ภาชนะบรรจุสารเคมีหรือของเสียมีฉลากตามมาตรฐานของหน่วยงานติดอยู่บนภาชนะบรรจุโดยฉลากต้องอยู่ในสภาพที่ดี ไม่จาง ไม่มีขาด และสามารถอ่านได้ชัดเจนหากมีการภาชนะบรรจุมาใช้อีกต้องฉลากที่ถูกต้องออก ทั้งนี้รวมทั้งภาชนะแบ่งจ่ายสารเคมีด้วย)</li> </ul>	√			
<b>5. Chemical and Waste Storage and Handling (การจัดเก็บสารเคมีและของเสีย)</b>				
<ul style="list-style-type: none"> <li>Chemical storage area is dry, cool (not extreme temperature), and well ventilated. (สถานที่เก็บสารเคมีต้องแห้ง, ไม่ร้อนจัด และมีการระบายอากาศที่ดี)</li> <li>Not keeping the expired or not used chemical at offshore and need to send out the expired chemical to dispose at onshore. (ไม่เก็บสารเคมีที่หมดอายุหรือไม่มีการใช้แล้วไว้ที่ Offshore และต้องดำเนินการส่งสารเคมีที่หมดอายุไปกำจัดบนฝั่ง)</li> <li>Flammable chemicals are stored in flammable cabinets and labeled properly. These also apply to all dispensed containers used to take chemical from original container or drum. (สารเคมีไวไฟต้องเก็บไว้ในตู้เก็บเฉพาะและต้องฉลากดีไว้อย่างถูกต้องเหมาะสม รวมทั้งภาชนะแบ่งจ่ายสารเคมีด้วย)</li> <li>Compressed gases cylinders are stored upright and properly chained at all times, including empty cylinders. (ถังบรรจุก๊าซรวมกันจะต้องตั้งตรงและมีการยึดด้วยโซ่อย่างแน่นหนาตลอดเวลารวมถึงถังเปล่าที่ใช้แล้วด้วย)</li> <li>Compressed gas cylinders capped properly, secured and not stored incompatible materials e.g. oxygen and acetylene together when not in use (ถังบรรจุก๊าซที่ปิดไว้จะต้องมีฝ้ายึดให้แน่นพร้อมและไม่ได้เก็บถังก๊าซที่ไม่เข้าพวก เช่น ก๊าซออกซิเจนและ ก๊าซอะซิไธนเข้าด้วยกัน)</li> <li>Incompatible chemical/wastes must be stored separately, e.g. corrosive and flammable or corrosive and oxidizing agents together where spills can find their way to mix with each other resulting in fire or toxic gas (ของเสียที่เข้ากันไม่ได้ต้องเก็บไว้แยกจากกัน เช่น สารกัดกร่อนกับสารไวไฟ หรือ สารกัดกร่อนกับสารออกซิไดซ์ ซึ่งถ้ามีการพบหรือรั่วไหลอาจเกิดปฏิกิริยาคายความร้อนหรือผสมกัน แล้วทำให้เกิดการไหม้หรือ ไฟไหม้ได้)</li> <li>Onsite spill response kits are available and inspected on the availability of all response kits. (มีอุปกรณ์ที่ใช้สำหรับจัดการในกรณีสารเคมีหรือของเสียหกหรือไหล และอุปกรณ์มีอยู่ครบถ้วนตามรายการ)</li> <li>Secondary containment is provided if the spill can find its way getting directly to outside environment (sea, soil, waterbody) following secondary containment screening process in TSP-33. (มีภาชนะรองรับที่กักเก็บสารเคมีตามขั้นตอนการคัดเลือกภาชนะรองรับที่กักหนไว้ใน TSP-33 สารเคมีดังกล่าวมีความเสี่ยงที่จะเกิดการรั่วไหลออกไปยังสภาพแวดล้อมได้โดยตรง เช่น ลงสู่ทะเล ดิน หรือ แหล่งน้ำ)</li> <li>Emergency eye wash/shower station are available and functioning e.g. water pressure, water cleanliness (ที่ล้างตาฉุกเฉินและฉีดพ่นฉุกเฉินสามารถใช้งานได้ เช่น แรตดื่ม น้ำ ความสะอาดของน้ำ เป็นต้น)</li> <li>Waste must be segregated in appropriate containers according to their types, e.g. recyclable waste (glass, paper, aluminium can, plastic bottles, etc); hazardous wastes (used oil, Hg contaminated sludge, paint cans, used filter, fluorescent lamp, used PPE, contaminated material, infectious waste, etc.) (ของเสียจะต้องถูกคัดแยกไว้ในภาชนะที่เหมาะสมตามประเภทของเสีย เช่น วัสดุรีไซเคิล (แก้ว กระดาษ ภาชนะบรรจุสิ่งปนเปื้อน ขวดพลาสติก เป็นต้น), ของเสียอันตราย (น้ำมันใช้แล้ว ภาชนะปนเปื้อนเบ็นโซลีน ปรอทสังกะสี ตัวกรองที่ใช้งานแล้ว หลอดไฟฟลูออโรเซนเนส PPE ที่ใช้งานแล้ว วัสดุเป็นเบ็น ซะติสเชื้อ เป็นต้น)</li> <li>All chemical/waste shall be stored in an orderly manner according to good housekeeping practices, with no undesirable odor, leachate, or pests. (พื้นที่จัดเก็บสารเคมีหรือของเสียต้องสะอาด ปราศจากกลิ่น และแมลงรบกวน)</li> </ul>	√			

Application : Conduct plant inspection by using this checklist at least on monthly basis  
: HESS to support for this inspection. However, it is a good tool for other sectors to conduct inspection by using this checklist as well

## Offshore Laboratory Inspection Checksheet

**Date** 2-Oct-22

**Location :**

**Benchamas Lab**

**Inspected By : Kamolphoo Iamsaard**

Please check Yes, No or N/A (Not applicable) for each item and comment findings. If answer is "No" put comment for corrective action. Inform supervisor or HES if required further support.

1	House Keeping	Yes	No	N/A	Note
1.1	Laboratory surfaces are clean and tidy, free from slip, trip fall/drop hazards i.e. floor, work bench and shelves.	✓			
1.2	Laboratory and storage areas uncluttered and orderly 1.2.1 hand tool, sampling equipment & cylinders and spare parts storage 1.2.2 lab. glassware	✓ ✓			
1.3	Unused chemicals, samples, and equipment periodically removed and properly disposed.	✓			
1.4	Equipment are in good condition, clean and electrically grounded. i.e. vacuum pump, water bath, Centrifuge, TPH analyser, Hg analyser, Balance, pH meter etc.	✓			
1.5	Sink is clean and no excess of the glassware	✓			
1.6	Glassware is free from cracks, chips, sharp edges and other defects.	✓			
2	Personal Protective Equipment and Ventilation System	Yes	No	N/A	Note
2.1	Eye protection is available and in use. 2.1.1 Face shield	✓			
2.2	Protective gloves are available and matched to hazards involved. 2.2.1 Nitrile gloves 2.2.2 Heat and chemical resistant gloves	✓ ✓			
2.3	Respirators are provided when necessary, and selected on the basis of hazard present. 2.3.1 3M6003 for H <sub>2</sub> S and HC 2.3.2 3M6096 for Hg and HC	✓ ✓			
2.4	All PPEs are used and stored properly. Respirators are cleaned after each use and kept in sanitary area.	✓			
2.5	Fume Hoods are clean and orderly. No chemicals, waste or equipment stored to block the baffles and obstruct air flow	✓			
2.6	Fume Hoods work properly. Sash can move freely. No smell or fume detected outside the hoods or in laboratory.	✓			

3	Hazard Communication	Yes	No	N/A	Note
3.1	Primary & secondary chemical containers are labeled with identity, MSDS, and expiration dates.	√			
3.2	Signs on storage cabinet are consistent with hazards within.	√			
3.3	MSDS binders are available for chemicals used and stored in area and workers know its location.	√			
4	Chemicals and Flammable Liquid Storage	Yes	No	N/A	Note
4.1	Incompatible materials/chemicals are segregated (e.g. flammables and Oxydizer, flammable and acids, acids and bases, water-reactives and water bath, etc.)	√			
4.2	Corrosives and flammables are not stored above eye level.	√			
4.3	No expired chemicals left in shelves	√			
4.4	No spill and leak present	√			
4.5	Hazardous chemicals used/stored in the laboratory are limited to small quantities.	√			
4.6	Flammable liquids are stored and used away from ignition sources.	√			
4.7	Bulk quantities of flammable liquids are stored in secured storage cabinets.	√			
5	Waste Handling	Yes	No	N/A	Note
5.1	Wastes are separated as necessary: ex. Solid vs. liquid, hazardous vs. non-hazardous, halogenated vs non-halogenated, etc.. 5.1.1 tetrachloroethylene waste (inventory and disposal record) 5.1.2 Mercury waste (properly contained and stored,no spill) 5.1.3 Lab.trash bin (properly contained and handling)	√ √ √			
5.2	Hazardous waste containers are labeled properly (WMG No.)	√			
5.3	Waste material is not allowed to accumulate on the floors, in corners or under shelves/tables in laboratories.	√			
5.4	Waste containers are fully enclosed,no spill	√			
6	Emergency Preparedness	Yes	No	N/A	Note
6.1	Exits are clearly marked and free from obstruction	√			
6.2	All fire doors are self-closing and kept closed.	√			
6.3	Fire alarms are provided. And the gas/smoke detectors not missing or broken	√			

6.4	Fire alarms and the gas/smoke detectors are maintained in good working condition	√			
6.5	Emergency responding tools/ equipment (e.g. manual pull station, fire extinguisher, etc.) are not blocked	√			
6.6	Emergency evacuation routes are clearly posted in common hallways.	√			
6.7	Emergency exit lights are working and clear of obstruction.	√			
6.8	Telephones labeled with emergency number/ Paging (PA system) are provided.	√			
6.9	Type of fire extinguisher is proper and checked regularly.	√			
6.10	Spill control kit location is clearly identified and readily accessible.	√			
6.11	Spill control kit is in the good condition and ready to be used				
	6.11.1 Acid spill kit.	√			
	6.11.2 Solvent spill kit or adsorbent/pad.	√			
	6.11.3 Mercury spill kit/absorber.	√			
6.12	Eye wash and safety shower provided and they function properly. (Station of eye washing liquid and faucet are acceptable)	√			
<b>7 Compressed Gas Cylinder</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Note</b>
7.1	Gas cylinders are properly chained/secured.	√			
7.2	Cylinder caps are in place when cylinders are not in use or being moved.	√			
7.3	Gas cylinders are stored away from excessive heat.	√			
7.4	Gas cylinders are in good condition and properly marked as to their contents.	√			
7.5	Empty gas cylinders are labeled "EMPTY".	√			
7.6	Gas lines, piping, manifold, etc. are labeled with the identity of their contents.	√			
7.7	Hoses, tubing and regulators are in good working condition.	√			
<b>8 General Safety</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Note</b>
8.1	All rotating/moving parts and pinch point are properly identified and guarded (if necessary)	√			
8.2	Special hazards has warning sign posted (e.g., corrosive, hot surface, etc.)	√			
8.3	Lab benches, chairs and stools are in the good condition	√			
8.4	Electrical cords are in good condition and not run through windows, doors or holes in walls, floors/walkways, sinks or ceilings.	√			
<b>Additional Note</b>					



# Offshore Laboratory Inspection Checksheet

Date 4-Nov-22

Location :

Benchamas Lab

Inspected By : Nuttawut Sutham

Please check Yes, No or N/A (Not applicable) for each item and comment findings. If answer is "No" put comment for corrective action. Inform supervisor or HES if required further support.

1	House Keeping	Yes	No	N/A	Note
1.1	Laboratory surfaces are clean and tidy, free from slip, trip fall/drop hazards i.e. floor, work bench and shelves.	√			
1.2	Laboratory and storage areas uncluttered and orderly 1.2.1 hand tool, sampling equipment & cylinders and spare parts storage 1.2.2 lab. glassware	√ √			
1.3	Unused chemicals, samples, and equipment periodically removed and properly disposed.	√			
1.4	Equipment are in good condition, clean and electrically grounded. i.e. vacuum pump, water bath, Centrifuge, TPH analyser, Hg analyser, Balance, pH meter etc.	√			
1.5	Sink is clean and no excess of the glassware	√			
1.6	Glassware is free from cracks, chips, sharp edges and other defects.	√			
2	Personal Protective Equipment and Ventilation System	Yes	No	N/A	Note
2.1	Eye protection is available and in use. 2.1.1 Face shield	√			
2.2	Protective gloves are available and matched to hazards involved. 2.2.1 Nitrile gloves 2.2.2 Heat and chemical resistant gloves	√ √			
2.3	Respirators are provided when necessary, and selected on the basis of hazard present. 2.3.1 3M6003 for H <sub>2</sub> S and HC 2.3.2 3M6096 for Hg and HC	√ √			
2.4	All PPEs are used and stored properly. Respirators are cleaned after each use and kept in sanitary area.	√			
2.5	Fume Hoods are clean and orderly. No chemicals, waste or equipment stored to block the baffles and obstruct air flow	√			
2.6	Fume Hoods work properly. Sash can move freely. No smell or fume detected outside the hoods or in laboratory.	√			

3	Hazard Communication	Yes	No	N/A	Note
3.1	Primary & secondary chemical containers are labeled with identity, MSDS, and expiration dates.	√			
3.2	Signs on storage cabinet are consistent with hazards within.	√			
3.3	MSDS binders are available for chemicals used and stored in area and workers know its location.	√			
4	Chemicals and Flammable Liquid Storage	Yes	No	N/A	Note
4.1	Incompatible materials/chemicals are segregated (e.g. flammables and Oxydizer, flammable and acids, acids and bases, water-reactives and water bath, etc.)	√			
4.2	Corrosives and flammables are not stored above eye level.	√			
4.3	No expired chemicals left in shelves	√			
4.4	No spill and leak present	√			
4.5	Hazardous chemicals used/stored in the laboratory are limited to small quantities.	√			
4.6	Flammable liquids are stored and used away from ignition sources.	√			
4.7	Bulk quantities of flammable liquids are stored in secured storage cabinets.	√			
5	Waste Handling	Yes	No	N/A	Note
5.1	Wastes are separated as necessary: ex. Solid vs. liquid, hazardous vs. non-hazardous, halogenated vs non-halogenated, etc.. 5.1.1 tetrachloroethylene waste (inventory and disposal record) 5.1.2 Mercury waste (properly contained and stored,no spill) 5.1.3 Lab.trash bin (properly contained and handling)	√ √ √			
5.2	Hazardous waste containers are labeled properly (WMG No.)	√			
5.3	Waste material is not allowed to accumulate on the floors, in corners or under shelves/tables in laboratories.	√			
5.4	Waste containers are fully enclosed,no spill	√			
6	Emergency Preparedness	Yes	No	N/A	Note
6.1	Exits are clearly marked and free from obstruction	√			
6.2	All fire doors are self-closing and kept closed.	√			
6.3	Fire alarms are provided. And the gas/smoke detectors not missing or broken	√			

6.4	Fire alarms and the gas/smoke detectors are maintained in good working condition	√			
6.5	Emergency responding tools/ equipment (e.g. manual pull station, fire extinguisher, etc.) are not blocked	√			
6.6	Emergency evacuation routes are clearly posted in common hallways.	√			
6.7	Emergency exit lights are working and clear of obstruction.	√			
6.8	Telephones labeled with emergency number/ Paging (PA system) are provided.	√			
6.9	Type of fire extinguisher is proper and checked regularly.	√			
6.10	Spill control kit location is clearly identified and readily accessible.	√			
6.11	Spill control kit is in the good condition and ready to be used	√			
	6.11.1 Acid spill kit.	√			
	6.11.2 Solvent spill kit or adsorbent/pad.	√			
6.12	6.11.3 Mercury spill kit/absorber.	√			
6.12	Eye wash and safety shower provided and they function properly. (Station of eye washing liquid and faucet are acceptable)	√			
<b>7 Compressed Gas Cylinder</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Note</b>
7.1	Gas cylinders are properly chained/secured.	√			
7.2	Cylinder caps are in place when cylinders are not in use or being moved.	√			
7.3	Gas cylinders are stored away from excessive heat.	√			
7.4	Gas cylinders are in good condition and properly marked as to their contents.	√			
7.5	Empty gas cylinders are labeled "EMPTY".	√			
7.6	Gas lines, piping, manifold, etc. are labeled with the identity of their contents.	√			
7.7	Hoses, tubing and regulators are in good working condition.	√			
<b>8 General Safety</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Note</b>
8.1	All rotating/moving parts and pinch point are properly identified and guarded (if necessary)	√			
8.2	Special hazards has warning sign posted (e.g., corrosive, hot surface, etc.)	√			
8.3	Lab benches, chairs and stools are in the good condition	√			
8.4	Electrical cords are in good condition and not run through windows, doors or holes in walls, floors/walkways, sinks or ceilings.	√			
<b>Additional Note</b>					

## Offshore Laboratory Inspection Checksheet

**Date** 5-Dec-22

**Location :**

**Benchamas Lab**

**Inspected By : Nuttawut Sutham**

Please check Yes, No or N/A (Not applicable) for each item and comment findings. If answer is "No" put comment for corrective action. Inform supervisor or HES if required further support.

1	House Keeping	Yes	No	N/A	Note
1.1	Laboratory surfaces are clean and tidy, free from slip, trip fall/drop hazards i.e. floor, work bench and shelves.	√			
1.2	Laboratory and storage areas uncluttered and orderly 1.2.1 hand tool, sampling equipment & cylinders and spare parts storage 1.2.2 lab. glassware	√ √			
1.3	Unused chemicals, samples, and equipment periodically removed and properly disposed.	√			
1.4	Equipment are in good condition, clean and electrically grounded. i.e. vacuum pump, water bath, Centrifuge, TPH analyser, Hg analyser, Balance, pH meter etc.	√			
1.5	Sink is clean and no excess of the glassware	√			
1.6	Glassware is free from cracks, chips, sharp edges and other defects.	√			
2	Personal Protective Equipment and Ventilation System	Yes	No	N/A	Note
2.1	Eye protection is available and in use. 2.1.1 Face shield	√			
2.2	Protective gloves are available and matched to hazards involved. 2.2.1 Nitrile gloves 2.2.2 Heat and chemical resistant gloves	√ √			
2.3	Respirators are provided when necessary, and selected on the basis of hazard present. 2.3.1 3M6003 for H <sub>2</sub> S and HC 2.3.2 3M6096 for Hg and HC	√ √			
2.4	All PPEs are used and stored properly. Respirators are cleaned after each use and kept in sanitary area.	√			
2.5	Fume Hoods are clean and orderly. No chemicals, waste or equipment stored to block the baffles and obstruct air flow	√			
2.6	Fume Hoods work properly. Sash can move freely. No smell or fume detected outside the hoods or in laboratory.	√			

3	Hazard Communication	Yes	No	N/A	Note
3.1	Primary & secondary chemical containers are labeled with identity, MSDS, and expiration dates.	√			
3.2	Signs on storage cabinet are consistent with hazards within.	√			
3.3	MSDS binders are available for chemicals used and stored in area and workers know its location.	√			
4	Chemicals and Flammable Liquid Storage	Yes	No	N/A	Note
4.1	Incompatible materials/chemicals are segregated (e.g. flammables and Oxydizer, flammable and acids, acids and bases, water-reactives and water bath, etc.)	√			
4.2	Corrosives and flammables are not stored above eye level.	√			
4.3	No expired chemicals left in shelves	√			
4.4	No spill and leak present	√			
4.5	Hazardous chemicals used/stored in the laboratory are limited to small quantities.	√			
4.6	Flammable liquids are stored and used away from ignition sources.	√			
4.7	Bulk quantities of flammable liquids are stored in secured storage cabinets.	√			
5	Waste Handling	Yes	No	N/A	Note
5.1	Wastes are separated as necessary: ex. Solid vs. liquid, hazardous vs. non-hazardous, halogenated vs non-halogenated, etc..				
	5.1.1 tetrachloroethylene waste (inventory and disposal record)	√			
	5.1.2 Mercury waste (properly contained and stored,no spill)	√			
	5.1.3 Lab.trash bin (properly contained and handling)	√			
5.2	Hazardous waste containers are labeled properly (WMG No.)	√			
5.3	Waste material is not allowed to accumulate on the floors, in corners or under shelves/tables in laboratories.	√			
5.4	Waste containers are fully enclosed,no spill	√			
6	Emergency Preparedness	Yes	No	N/A	Note
6.1	Exits are clearly marked and free from obstruction	√			
6.2	All fire doors are self-closing and kept closed.	√			
6.3	Fire alarms are provided. And the gas/smoke detectors not missing or broken	√			

6.4	Fire alarms and the gas/smoke detectors are maintained in good working condition	√			
6.5	Emergency responding tools/ equipment (e.g. manual pull station, fire extinguisher, etc.) are not blocked	√			
6.6	Emergency evacuation routes are clearly posted in common hallways.	√			
6.7	Emergency exit lights are working and clear of obstruction.	√			
6.8	Telephones labeled with emergency number/ Paging (PA system) are provided.	√			
6.9	Type of fire extinguisher is proper and checked regularly.	√			
6.10	Spill control kit location is clearly identified and readily accessible.	√			
6.11	Spill control kit is in the good condition and ready to be used	√			
	6.11.1 Acid spill kit.	√			
	6.11.2 Solvent spill kit or adsorbent/pad.	√			
6.12	6.11.3 Mercury spill kit/absorber.	√			
6.12	Eye wash and safety shower provided and they function properly. (Station of eye washing liquid and faucet are acceptable)	√			
<b>7 Compressed Gas Cylinder</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Note</b>
7.1	Gas cylinders are properly chained/secured.	√			
7.2	Cylinder caps are in place when cylinders are not in use or being moved.	√			
7.3	Gas cylinders are stored away from excessive heat.	√			
7.4	Gas cylinders are in good condition and properly marked as to their contents.	√			
7.5	Empty gas cylinders are labeled "EMPTY".	√			
7.6	Gas lines, piping, manifold, etc. are labeled with the identity of their contents.	√			
7.7	Hoses, tubing and regulators are in good working condition.	√			
<b>8 General Safety</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Note</b>
8.1	All rotating/moving parts and pinch point are properly identified and guarded (if necessary)	√			
8.2	Special hazards has warning sign posted (e.g., corrosive, hot surface, etc.)	√			
8.3	Lab benches, chairs and stools are in the good condition	√			
8.4	Electrical cords are in good condition and not run through windows, doors or holes in walls, floors/walkways, sinks or ceilings.	√			
<b>Additional Note</b>					



**ภาคผนวก 21**

**คู่มือปฏิบัติงาน *Fixed Lifting Equipment Operating Practices***



# **Chevron Thailand – Fixed Lifting Equipment Operating Practices**

**Approved 1 July 2016  
Version 1.3**

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## 1.0 Purpose, Objective and Scope

### Purpose

The purpose of this procedure is to state Company policy regarding safe lifting equipment operation and usage on Chevron property throughout the Chevron Thailand Profit Center.

The contents are not intended to replace manufacturers or regulatory resources (API RP 2D, etc.), but are designed to highlight some of the key requirements of regulatory enforcement agencies and manufacturer's recommendations which should be considered during all crane operations and activities.

The contents are intended to provide guidance on safe operational practices for cranes and compliance with national and international laws, rules and regulations and Company practices.

### Objectives

The objectives of this process are to:

1. Provide personnel with an understanding of Company policy regarding basic crane and fixed lifting equipment operations.
2. Establish minimum guidelines for safe operation, maintenance, and inspection of cranes and fixed lifting equipment.
3. Promote compliance with good safety practices and commitment to attaining zero accidents.

**NOTE:** There may be certain circumstances not specifically covered in this procedure and associated documents where further clarification may be required.

### Scope

This document covers crane operator and rigger training standards, and includes operator inspection of permanent and temporary cranes and fixed lifting equipment throughout the Chevron Thailand operations.

This standard applies to mechanical lifting activities where lifting methods and rigging shall meet these minimum requirements.

This standard does not address activities where forklift, mobile elevated work platform (MEWP), manlift or other similar equipment might be used for lifting activities.

Other aspects of Chevron policy regarding crane operations and lifting equipment are found in:

#### **Portable Lifting Equipment Operating Practices**

[Appendix 1: Management and inspection of portable lifting equipment \(PLE\)](#)

[Appendix 2: Guide for examination and testing of containers](#)

[Appendix 3: Chevron Thailand Banned and Recommended Lifting /Rigging Practices](#)

#### **Fixed Lifting Equipment Operating Practices**

[Appendix 1: Management and inspection of fixed lifting equipment](#)



This document does not cover contract export tankers which operate in the field and are contracted under their 'flag' country regulations. Their crane and crane operator certification are checked when they are hired as complying with that flag country's rules, and therefore these vessels are excluded from the scope of this document.

**Contract Owners/Managers contracting other temporary services should consider this procedure in their contract pre-qualifications and ensure that contractors meet or exceed these requirements.**

### **National Regulations**

The Thai Regulation of MOE, B.E. 2555 (2012) Re: Prescription Criteria and Method for Exploration Production and Conservation of Petroleum does not specify any requirements with respect to regular inspection and re-certification of lifting equipment.

In such a context, it is the duty of the operator to define and implement an inspection policy in line with the recognized practices and standards.

In Chevron, this policy will be based on the Thai regulation and the I.L.O. (International Labor Organization) conventions, complemented with requirements from recognized national or international standards. This applies whether the equipment is owned by Chevron or Contractor.

Accordingly, the present document specifies the procedure to be used on all premises operated by Chevron in order to ensure that all requirements of the above regulations and recognized standards are covered, and that lifting and hoisting equipment is properly maintained and certified.

### **Measurement and Verification**

Data collection that shows a reduction in the number of reported crane defects (JDE 8.11 EAM history)

Data collection that shows a reduction in the number of reported crane related incidents

---

## **2.0 Requirements**

Hazards associated with Lifting and Rigging shall be identified and mitigated prior to beginning work.

Competent personnel must complete (i.e., develop lift plan as required) the steps needed to properly and safely prepare the job site and equipment for the start of work.

Lifting and rigging equipment must be engineered and certified for current use and in good working order as verified through Pre/Post Operation inspections.

*Note: The use of non-certified locally fabricated or modified lifting and rigging equipment is prohibited.*

Lifting and rigging equipment shall be used in accordance with the intended design purposes and specified limits of the manufacturer and recognized and accepted good industry practices and company standards.

Confirm weight of the object and establish the load's center of gravity prior to beginning the lift.

Establish clear pick-up and lay-down areas that are within the crane's load lifting radius.

Ensure the load path from the beginning of the lift to the lay-down area is clear of obstructions.

Rig loads appropriately and ensure loads are free of possible restraints (ice, sea fastenings, hold-down bolts, etc.).

Place load in designated lay-down area and remove rigging equipment after load is securely in place and free of support from the crane.

### 3.0 Resources, Roles and Responsibilities

**Table 1: Key Roles**

Role	Name	Title	Signature (Optional)
Process Sponsor	Baker, Jackson	GM, Operations	
Process Advisor	Woraman Chalermwat	MSW Process Advisor	
Originator	Uthit Kokphim	HES Specialist	

The following table outlines the roles and responsibilities associated with this procedure.

**Table 2: Responsibilities**

Role	Responsibilities
Process Sponsor	<ul style="list-style-type: none"> <li>• Serve as an advocate of the process to ensure that it is understood and used as designed within the SBUs</li> <li>• Approve relevant procedure that he/she is a sponsor</li> <li>• Conduct an annual review of process/procedure effectiveness and efficiency within SBU</li> </ul>
Process Advisor	<ul style="list-style-type: none"> <li>• Serve as an advocate of the process with the SBU and asset management to ensure that it is accorded the appropriate priority and receives funding, personnel and other resources</li> <li>• Ensure that process effectiveness and efficiency are measured and verified at least annually</li> <li>• Allocate resources to operate and improve the process/procedure</li> </ul>
Asset Manager	<ul style="list-style-type: none"> <li>• Act as sponsor of the process and ensure that this procedure is in place, is regularly reviewed, and is complied with.</li> </ul>
Person in Charge (PIC)	<ul style="list-style-type: none"> <li>• Ensure that personnel within their area who are involved in crane maintenance and inspection operations receive the correct training and certification for their task.</li> <li>• Ensure that personnel do not carry out tasks for which they are not trained.</li> <li>• Ensure that all personnel are aware of and comply with the contents of this guideline and consistently implement Best Practices.</li> </ul>
Offshore Installation Manager	<ul style="list-style-type: none"> <li>• Ensure that this procedure is in place, personnel are trained and competent, and the process is complied with.</li> </ul>
Maintenance Superintendent	<ul style="list-style-type: none"> <li>• Review the procedure on a regular basis and incorporate agreed changes.</li> <li>• The Maintenance Superintendent is responsible for the coordination of the Lift Team consisting of all key personnel involved in the planning and execution of a lift operation. The Lift Team will typically include a qualified Crane Operator, one or more Deck Crew, and the Vessel</li> </ul>

Role	Responsibilities
	<p>Captain. Depending on the scope of the lift operation, the Lift Team may also include the following: Facilities Engineer, Facilities Representative, Drilling Representative, Work-over Representative, and Production Operator.</p> <ul style="list-style-type: none"> <li>• Key responsibilities of the Lift Team are outlined below. Specific responsibilities of key Lift Team members are provided in later sections</li> </ul> <p><b>Pre-Operation</b></p> <p>Before the operation, members of the Lift Team have these responsibilities:</p> <ul style="list-style-type: none"> <li>• Conduct pre-lift meeting to review scope of work and execution plan.</li> <li>• Review Crane Pre-Lift Checklist with all members of Lift Team.</li> <li>• Prepare written JSA/JHA/JHA for all heavy lifts and non-routine lifts.</li> <li>• Evaluate the lift operations to determine if additional qualified riggers are needed to assist in loading or offloading operations.</li> <li>• Ensure that a clear method of communication is established.</li> <li>• Assess site conditions to ensure that the lift operation can be conducted safely (sea state, currents, wind speed and direction, weather, size of vessel, position of cargo, adequate lighting).</li> <li>• Review lift path and weight of loads to determine if specific Simultaneous Operations procedures are required to protect production equipment from falling loads.</li> </ul> <p><b>During Operation</b></p> <p>During the operation, members of the Lift Team have these responsibilities:</p> <ul style="list-style-type: none"> <li>• Maintain constant communication between all Lift Team members.</li> <li>• If site conditions change or if the lift operations change from the original plan, stop work and conduct another pre-lift meeting.</li> <li>• Complete a Crane Pre-Lift Checklist and JSA/JHA/JHA, as required, before continuing with the lifts.</li> </ul>
Maintenance Supervisor	<ul style="list-style-type: none"> <li>• Ensure that this procedure is in place, personnel are trained and competent, and the process is complied with.</li> </ul>
Qualified Crane Inspector (Mechanic with engineering license)	<ul style="list-style-type: none"> <li>• Ensure that the cranes and their accessories are periodically inspected in accordance with this procedure and good engineering practice.</li> <li>• Check and sign all crane inspection reports on a quarterly basis</li> <li>• Complete all crane inspection reports</li> <li>• Knows the scope of work and procedures to be followed</li> <li>• Documents scheduled Crane Inspection</li> <li>• Verifies proper crane setup</li> <li>• Prevents equipment malfunction by identifying and assessing possible failure points</li> </ul>

Role	Responsibilities
	<ul style="list-style-type: none"> <li>• Communicates needed changes in work scope or changes in conditions to supervisor immediately</li> <li>• Verifies that appropriate equipment is being used</li> </ul>
Qualified Crane Operator	<p>All personnel who operate any cranes on Chevron facilities will be qualified Crane Operators, as per API RP 2D, and will be able to provide documentation indicating that they have successfully completed a Crane Operator Training Course that meets the requirements of API RP 2D.</p> <p>All Crane Operators driving Company cranes will also be certified as Class "A T/C", "A", "B+", "B", "C" or "O".</p> <p>A Qualified Crane Operator must be re-certified every two years. A Qualified Crane Operator must also meet the requirements of a Qualified Rigger. A Qualified Crane Operator is not allowed to make repairs to critical components. (See API Spec 2C, Appendix A.) All non-routine lifting operations will be planned and carried out only by a certified class "A" (for offshore crane) and class "o" (for onshore crane) crane operator"</p> <p>The Crane Operator will always be the leader of the Lift Team. In addition to the Lift Team responsibilities listed above, the Crane Operator's responsibilities also include those listed below.</p> <p><b>Pre-Operation</b></p> <p>Before the operation, the Crane Operator has these responsibilities:</p> <ul style="list-style-type: none"> <li>• Participate in pre-lift meeting as discussed in Lift Team Responsibilities above.</li> <li>• Ensure that all required paper work (PTW, HA, PPHA, crane pre-post, pre-lift check list, Lifting plan and etc.) are established</li> <li>• Complete "Crane pre/post operation checklist as well as Crane pre-lift check list before beginning crane operations.</li> <li>• Ensure the new crew to comply with Chevron SSE program</li> <li>• Verify that all personnel involved in executing the lift operation have the proper qualifications as Crane Operator or Rigger.</li> <li>• Designate a Qualified Rigger as a signal person any time the Qualified Crane Operator is unable to see a load.</li> <li>• Ensure that only Qualified Riggers and essential personnel are allowed in the work area during lift operations.</li> <li>• Verify load weights by markings on the load and documentation on the shipping manifest.</li> <li>• Verify that the appropriate load-rating chart is in place and that the reeving is properly configured to accommodate the planned loads.</li> <li>• Ensure that the proper rigging equipment is selected and inspected by a Qualified Rigger before the lift.</li> <li>• Prior to the use of a mobile crane the ground condition must be know and suitable for the intended lifting operation. The location of underground services must also be verified.</li> </ul>

Role	Responsibilities
	<p><b>During Operation</b></p> <p>During the operation, the Crane Operator has these responsibilities:</p> <ul style="list-style-type: none"> <li>• Assume ultimate responsibility for safe operation of the crane.</li> <li>• Never start machine movement unless the load or signal person is within range of vision. Appropriate signals (audible or visual) must be given.</li> <li>• Respond to signals only from the appointed signal person, and emergency stop signals from anyone at any time.</li> <li>• Ensure that crane capacity, as shown in the load chart, is not exceeded during crane operations.</li> <li>• Be aware of helicopter traffic and follow Aviation procedures.</li> <li>• When cranes are operated at night, ensure that there is sufficient lighting for safe operation. The load and landing area should be illuminated.</li> <li>• Wear proper work clothes and Personal Protective Equipment in accordance with Chevron PPE requirements.</li> <li>• Stop any lift operation deemed unsafe (exercise Stop Work Authority).</li> <li>• Evaluate crane operations during bad weather or when ability to communicate with the signal person is impaired.</li> </ul> <p><b>Post-Operation</b></p> <p>After the operation, the Crane Operator has these responsibilities:</p> <ul style="list-style-type: none"> <li>• Ensure that the crane is properly secured and controls are turned off or to the neutral (hydraulic cranes) position before leaving the crane.</li> <li>• Do not leave crane unattended with a load in the air. Always lower the load to the deck before leaving the crane. (See Unattended Control Stations for exceptions during wireline operations.)</li> </ul>
Qualified Rigger	<p>The Qualified Rigger is an integral part of crane operations, shipping, material movement, and rigging. Qualified Riggers have certain responsibilities and duties that are critical to the safe load lifting and attaching activities.</p> <p>The Crane Operator and Rigger(s) must work as a team.</p> <p>All personnel who participate in rigging operations on Chevron facilities will be Qualified Riggers, as per API RP 2D, and will be able to provide documentation indicating that they have successfully completed a Rigger Training Course that meets the requirements of API RP 2D. Rigging operations will include, at minimum, attaching and/or detaching lifting equipment to loads and providing signals to Crane Operators.</p> <p>Communication among the Lift Team is one of the most important responsibilities. Along with the Crane Operator, the Rigger will always be a key member of the Lift Team.</p>



Role	Responsibilities
	<p>In addition to the Lift Team responsibilities listed previously, the Rigger's responsibilities also include those listed below.</p> <p><b>Pre-Operation</b></p> <p>Before the operation, the Rigger has these responsibilities:</p> <ul style="list-style-type: none"> <li>• Participate in pre-lift meeting as per Lift Team Responsibilities (see above).</li> <li>• Ensure that only Qualified Riggers and essential personnel are allowed in the work area during lift operations.</li> <li>• Verify load weights by markings on the load and documentation on the shipping manifest.</li> <li>• Select the proper rigging equipment and/or cargo container for the lift.</li> <li>• Verify the safe working loads of the equipment being used and never exceed this limit.</li> <li>• Inspect all hardware, equipment and slings before use. Destroy or render unusable any defective components.</li> <li>• Verify that all slings have proper certification tags. If the identification tag is missing, the sling will not be used. If a replacement tag cannot be obtained, the sling must be destroyed.</li> <li>• Inspect all loads or cargo containers, including permanent slings. Evaluate load stability and potential for spill or release of fluids.</li> <li>• Ensure that a designated signal person is identified and communication methods are agreed upon.</li> <li>• Barricade lifting and loading area.</li> </ul> <p><b>During Operation</b></p> <p>During the operation, the Rigger has these responsibilities:</p> <ul style="list-style-type: none"> <li>• Assume responsibility for the safety of all personnel around the crane operations and crane operating area, including personal safety.</li> <li>• When designated, act as a signal person during the lift operation.</li> <li>• Look for potentially unsafe situations and provide a warning to the Crane Operator and others in the crane operations and crane operating area.</li> <li>• Do not stand between the load and another stationary object or boat railing (pinch zone). The Rigger should be facing the crane at a safe distance and never directly beneath the load.</li> <li>• Wear proper work clothes and Personal Protective Equipment in accordance with Chevron PPE requirements.</li> <li>• Stop any lift operation deemed as unsafe (exercise Stop Work Authority).</li> </ul> <p><b>Post-Operation</b></p> <p>After the operation, the Rigger has these responsibilities:</p>

Role	Responsibilities
	<ul style="list-style-type: none"> <li>• Properly secure loads on vessels, using equipment furnished by the vessel company.</li> <li>• Properly store and maintain rigging equipment.</li> </ul>
Qualified Rigging and Lifting Inspector/ PLE inspector	<p>An Inspector shall be either a Class Surveyor / 3rd Party Inspector authorized to issue lifting equipment inspection certificates, or a Chevron trained employee who has documentation indicating that he has successfully completed a 'Portable Lifting Equipment Inspector' training course that meets the requirements of API RP 2D and has a current valid certificate.</p> <ul style="list-style-type: none"> <li>• Ensure each piece of equipment has an identification tag labeled with manufacturer's name, certification number, rated capacity and the owner's name.</li> <li>• Perform a thorough examination of all Portable Lifting Equipment (PLE).</li> <li>• Remove from service and quarantine any equipment that is not fit for use.</li> <li>• Color code each piece of equipment with the new current color code. Complete certification documentation.</li> </ul>
Qualified non-crane equipment operator	<ul style="list-style-type: none"> <li>• The Qualified non-crane equipment operator is an integral part of Qualified Crane operations and / or Qualified Rigger to operate, shipment, material movement by using non-crane equipment such as Chain hoist, Come along, Lever Winch, Air tugger and Powered winch etc.</li> <li>• The Qualified non-crane equipment operator has certain responsibilities and duties that are critical to the safe load lifting and attaching activities</li> </ul>
Signalman (Dogman or Banksman)	<ul style="list-style-type: none"> <li>• The PIC will assign one of the Qualified Riggers to be the designated Banksman (signalman).</li> <li>• The Banksman (signalman) should wear either a high-visibility vest, hard hat cover or arm band for identification of his position.</li> <li>• The Crane Operator shall only follow signals from the designated Banksman (signalman) with the exception of the emergency stop signal which can be given by anyone.</li> <li>• Reporting to the Crane Operator, he is responsible and accountable for: <ul style="list-style-type: none"> <li>➢ The safety of the lifting operation</li> <li>➢ Safe operation of the lifting equipment assigned and in use</li> <li>➢ The careful and safe handling of all materials</li> <li>➢ Reporting defects in equipment or processes to the crane driver and/or their area supervision</li> <li>➢ Not using defective equipment</li> </ul> </li> <li>• Ensuring that others do not use defective equipment</li> </ul>
Reliability Group Manager	Be responsible and accountable for coordinating with the Maintenance Superintendents / Supervisors on all phases of crane PM's, maintenance and repair work to ensure the cranes are kept in good working order at all times.
Vessel Master	Vessel stability will be the primary concern when loading a vessel. The cargo will be positioned on the deck of the vessel to facilitate ease of rigging during offloading operations.

Role	Responsibilities
	<p>For any lift operations that involves loading to a vessel, the Master will always be a key member of the Lift Team. In addition to the Lift Team responsibilities listed in a previous section, the Vessel Master responsibilities also include the following:</p> <ul style="list-style-type: none"> <li>• Participate in pre-lift meeting, by radio, as per Lift Team Responsibilities above.</li> <li>• Participate, by radio, in preparation of written JSA/JHA's as required.</li> <li>• Ensure the vessel's stability for all cargo placed upon its deck.</li> <li>• Ensure that lashing equipment that is part of the vessel inventory is maintained in good condition. Proper fastening equipment for securing the cargo is onboard (in good working condition).</li> <li>• Ensure that cargo is properly positioned and secured before leaving the dock or offshore facility.</li> <li>• Ensure that all deck crew participating in handling the cargo on the vessel wear proper work clothes and Personal Protective Equipment in accordance with Chevron PPE requirements.</li> <li>• Ensure that all tag lines attached to cargo are properly positioned, are kept clear, and do not become trapped beneath other cargo.</li> <li>• Stop any lift operation to or from the vessel which is deemed unsafe (exercise Stop Work Authority).</li> <li>• Ensure that the vessel is maneuvered away from the load during the lift operation (crane should also swing away from the boat).</li> <li>• Maintain communication with the Lift Team during lift operations (hand signals and radio).</li> <li>• Ensure that all cargo loaded onto vessel is properly documented on the shipping manifest, with weights recorded.</li> <li>• Check that the manifest is correct and make an immediate report if it is not.</li> </ul>
Contract 3 <sup>rd</sup> Party Inspector	<ul style="list-style-type: none"> <li>• Ensure that the cranes and their accessories are periodically inspected in accordance with this procedure and good engineering practice.</li> <li>• Check and sign all crane inspection reports on a quarterly basis</li> <li>• Complete all crane inspection reports in compliance with Thai Law</li> </ul>
Site Personnel	<ul style="list-style-type: none"> <li>• Report defective lifting equipment to the Chevron Maintenance Supervisor, Site Manager or the Base Manager.</li> </ul>

## 4.0 Procedures

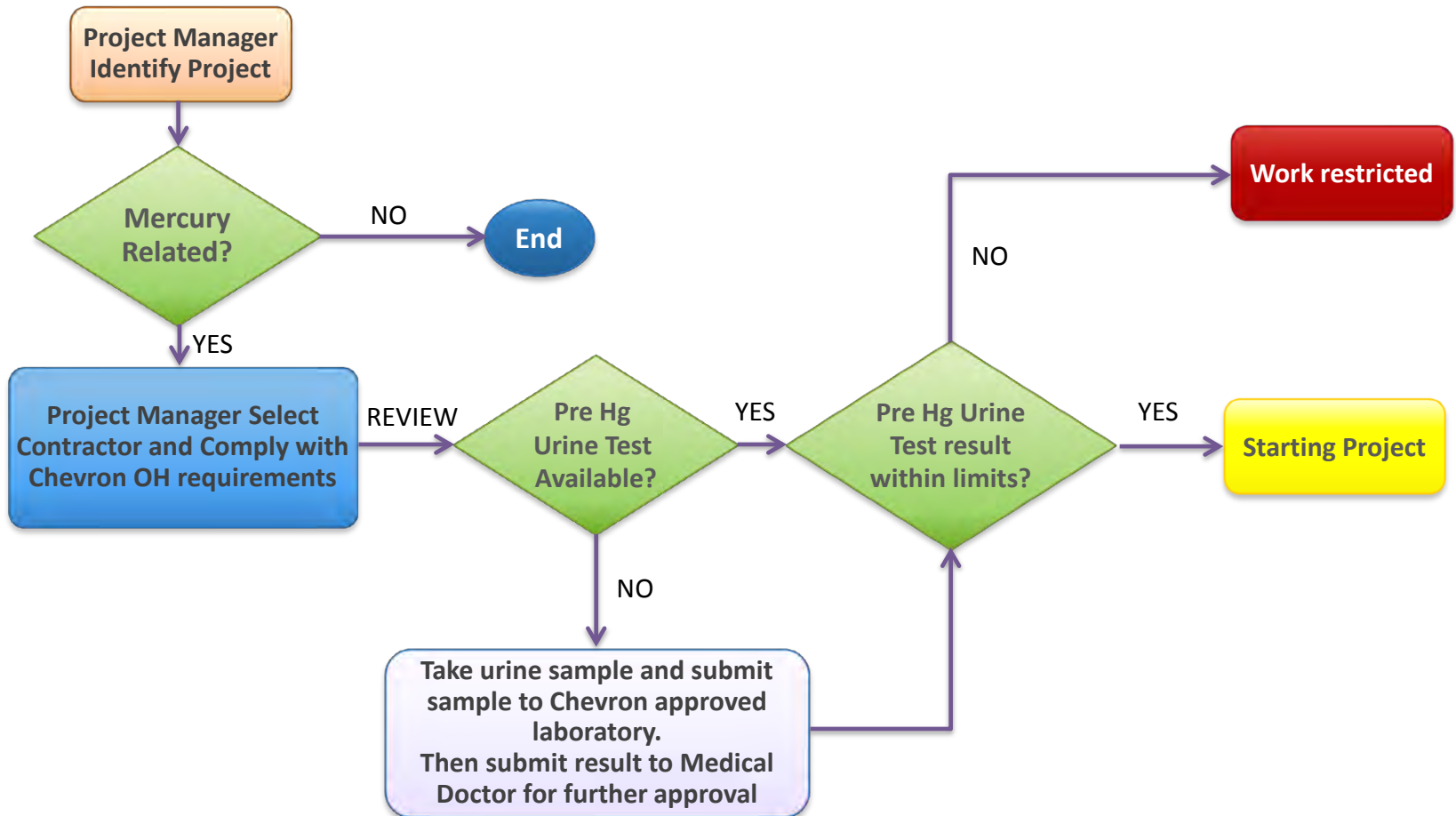
### 4.1 Crane Requirements

All cranes working on the property of Chevron will be designed, installed, operated, inspected, maintained, and repaired in accordance with the regulations listed in the table below.

For Contractor-owned cranes (i.e., rental cranes, lift-boats, and wire-line), each Contractor will be responsible for compliance with these requirements.

**ภาคผนวก 22**

***Mercury Related Project Screening Flowchart***



# Chevron Thailand – Mercury Management



Surapat Rungruang, HES Special Project  
OE/HES Department  
Chevron Thailand Exploration and Production Ltd.



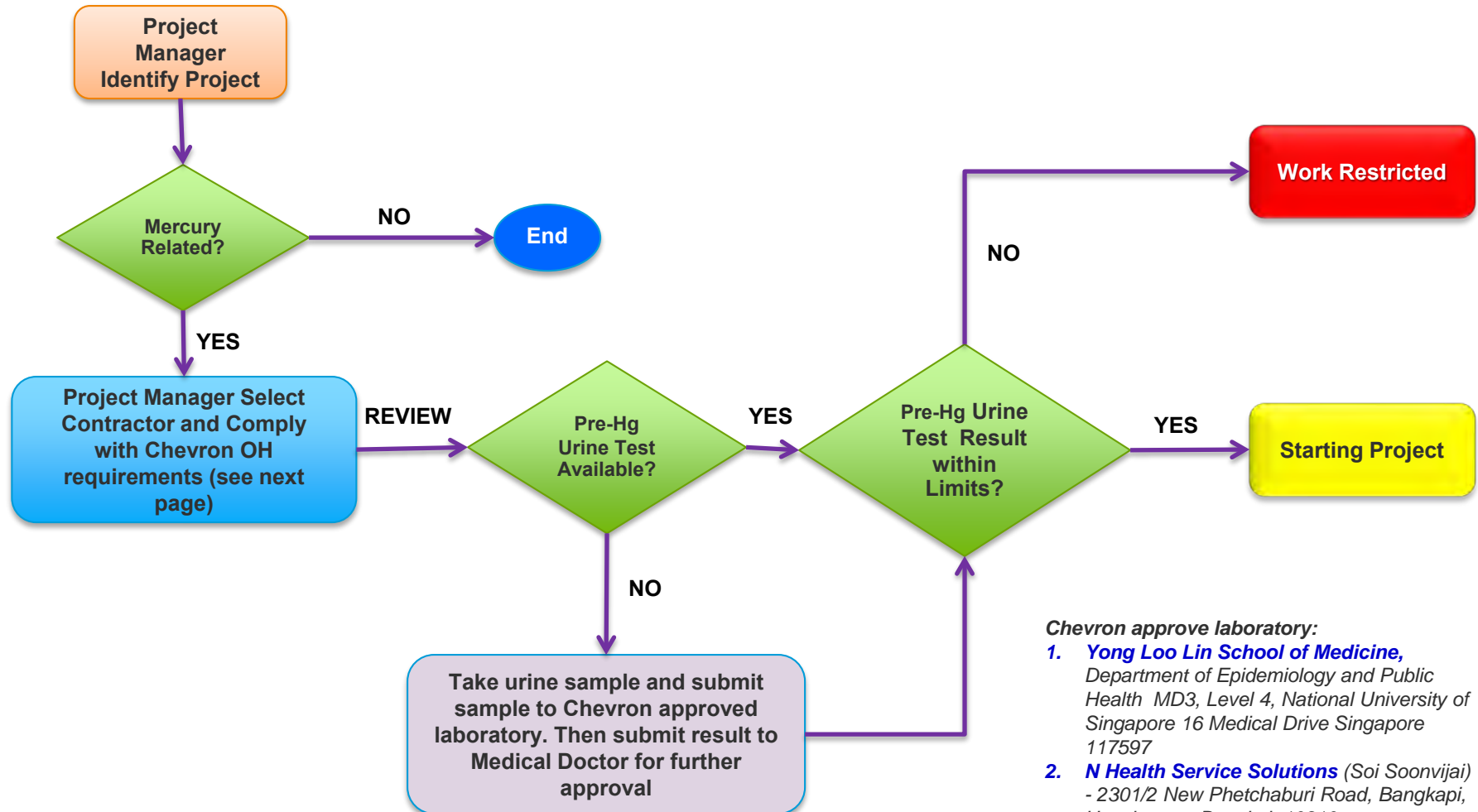
# Presentation Scope



- HOS - Mercury Related Project Screening Flowchart
- Occupational Hygiene Requirements for Mercury Related Activities
- Mercury Contaminated Material Handling and Decontamination
- PPE Preparation for Mercury Related Project
- Decontamination Zoning



# HOS - Mercury Related Project Screening Flowchart



**Chevron approve laboratory:**

1. **Yong Loo Lin School of Medicine**,  
Department of Epidemiology and Public Health MD3, Level 4, National University of Singapore 16 Medical Drive Singapore 117597
2. **N Health Service Solutions** (Soi Soonvijai)  
- 2301/2 New Phetchaburi Road, Bangkok, Huaykwang, Bangkok 10310

# Occupational Hygiene Requirements for Mercury Related Activities



## Pre Job Planning by Contractor

- \* Submit Pre Urine Test Result prior to get approval from Medical Doctor or Erawan Medic
- Submit "Respiratory Fit Test" document (annually required)
- Provide HAZMAT, HAZCOM and Mercury Awareness Training evidences



## Work In Progress at Chevron Facility

- Verify contractor related document by HESS
- Check PPE to ensure all meet Chevron Standards
- Conduct OH Monitoring (Workplace Exposure Monitoring) by medic on location



## Post Job by Chevron at Chevron Facility

- \*\* Collect Post Urine Test - by Chevron at Working Site
- Notify Project Manager if test result exceeding standard limit

\* Urine Hg result is valid within 3 months prior to work (must not perform activity related to mercury exposure)

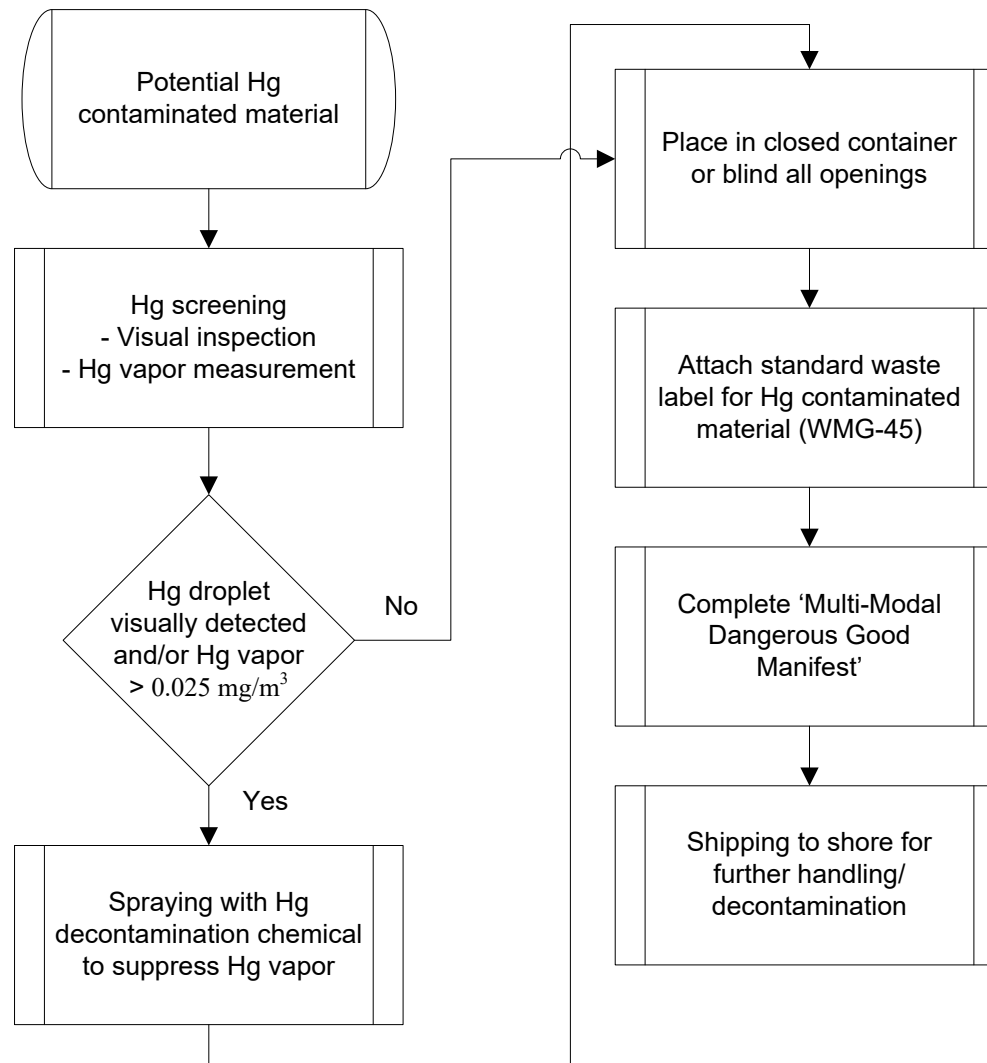
\*\* Post urine mercury can be used for Pre test for other project when getting the result from laboratory

# Mercury Contaminated Material Handling and Decontamination

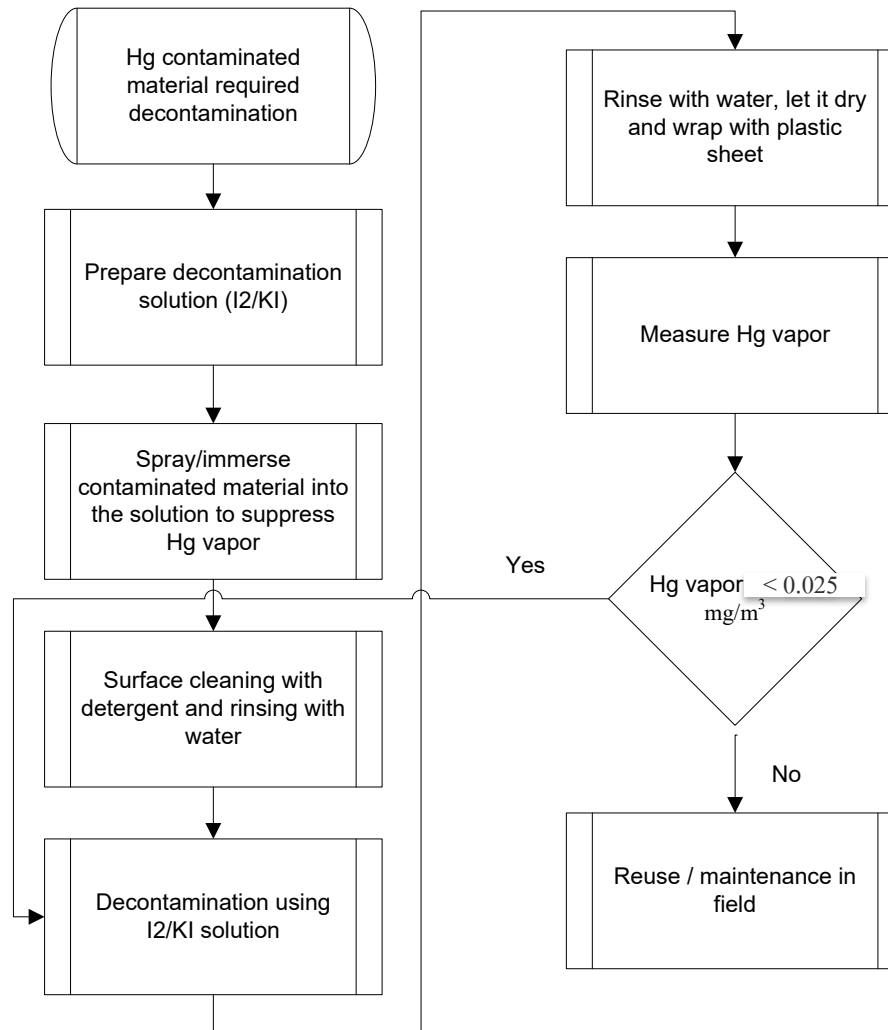


- **Material Pre-cleaning:** clean material by rinsing with water and detergent and then rinsing with water again.
- **Mercury Decontamination:**
  - Apply the chemical on material surface or into enclosed units. Isolation of decontamination unit or section might be required. Allow 20-30 minutes contact or retention time.
  - Rinse the unit/material with water and allow them to air dry.
  - Repeat the decontamination cycle until the required mercury level as specified
  - Other recommended method for isolated equipment part, material, piping spool or valves is to immerse the equipment and part into decontamination solution and allow the reaction to happen for 20-30 minutes.

# Mercury Contaminated Material Handling Flowchart



# Mercury Contaminated Material Decontamination Flowchart



# Mercury Contaminated Material - Storage Container and Packing Requirements



- Mercury contaminated materials, when possible, should be placed into plastic bag that is strong, leaked-proof and punctured-resistant.
- The bag must be impervious to the elemental mercury and completely surrounds/seals the contents of materials.
- Plastic bag is then placed into UN standard plastic drum or other suitable container.
- The plastic drum/container should be equipped with 100% top cover and securely closed before moving or shipping.
- For materials that cannot be contained in closed containers e.g. pipes, valves, PSV, tube bundles, etc, these materials shall be wrapped with plastic sheet and all openings shall be blinded and sealed to the extent that is practically feasible.
- Using metal drums/containers are not recommended due to possible deterioration over the extended storage period and amalgamation property of mercury.

## Example of Proper Packing



- If mercury is detected either by visual inspection or by mercury vapor measurement (measured mercury vapor level exceeds  $25 \mu\text{g}/\text{m}^3$ , the equipment/material shall be wrapped with plastic sheet and all openings shall be blinded and sealed to prevent potential exposure to mercury vapor.



Ball Valve



Heat Exchanger



# Labeling Requirements for Mercury Contaminated Materials



Standard waste label “WMG-008” for mercury contaminated materials, including all required information, hazard warning signs and “UN Number 2025”, should be attached to the external side of the container or the packaging material at an easily observed location.

HAZARDOUS WASTE ของเสียอันตราย WMG-008 Waste Mercury Contaminated Parts and Equipment			Chevron
DMF Waste Code: 14 01 DIW Waste Code: 17 09 01	UN 2025 PG I		
  	<b>Health Risk</b> <ul style="list-style-type: none"> <li>Danger of cumulative effects.</li> <li>Harmful: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin.</li> <li>Very toxic by inhalation, and in contact with skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.</li> </ul> <b>Safety Info</b> <ul style="list-style-type: none"> <li>Keep locked up.</li> <li>Do not breath gas/ fumes/ vapour/ spray.</li> <li>In case of insufficient ventilation wear suitable respiratory equipment.</li> <li>Use only in well ventilated areas.</li> </ul> <b>Spill and Disposal</b> Prevent from entering drains. Contain spillage by any means. Absorb with dry agent. Stop leak if safe to do so. Take off immediately all contaminated clothing. This material and its container must be disposed of in a safe way. To clean the floor and all objects contaminated by this material, use water and detergent.	<b>ผลกระทบต่อสุขภาพ</b> <ul style="list-style-type: none"> <li>อันตรายจากผลกระทบที่เกิดจากการสะสมในร่างกาย</li> <li>เป็นอันตรายร้ายแรงถึงชีวิตถ้าสูดดม การสัมผัสทางผิวหนัง - 42 ทำลายสุขภาพเมื่อสูดดมหรือสัมผัส</li> <li>เป็นพิษมากถ้าสูดดมและสัมผัสกับผิวหนัง</li> <li>เป็นพิษมากต่อสิ่งมีชีวิตที่อยู่ในน้ำ อาจมีผลกระทบระยะยาวต่อสภาพแวดล้อมทางธรรมชาติในน้ำ</li> </ul> <b>ข้อมูลความปลอดภัย</b> <ul style="list-style-type: none"> <li>หลีกเลี่ยงการสูดดม</li> <li>ห้ามสูดดมไอระเหย/ควัน/แก๊ส/ละออง/ฝอย</li> <li>หากมีอาการอย่างหนึ่งหรือมากกว่านี้ให้รีบปรึกษาแพทย์</li> <li>ใช้ถุงมือและเสื้อผ้าที่ป้องกันได้</li> </ul> <b>การทำความสะอาด</b> ป้องกันมิให้สารปนเปื้อนซึมลงท่อระบายน้ำ เก็บสิ่งปนเปื้อนที่หกไว้และดูดซับด้วยวัสดุดูดซับที่เหมาะสม ทำความสะอาดอย่างระมัดระวังและเก็บของปนเปื้อนที่ดูดซับไว้ให้ถูกวิธี ห้ามทิ้งของปนเปื้อนลงในถังขยะทั่วไป ห้ามสูดดมไอระเหยหรือสัมผัสโดยตรง ห้ามสูดดมไอระเหยหรือสัมผัสโดยตรง ห้ามสูดดมไอระเหยหรือสัมผัสโดยตรง ห้ามสูดดมไอระเหยหรือสัมผัสโดยตรง	   
Outer Packing: Basket or 20 feet-container or Plastic drum (X class)	Stowage and Segregation: Category A	Transit Storage (please select): <input type="checkbox"/> STS, Songkhla <input type="checkbox"/> ESBE, Chonburi	
Loading Date (DD/MM/YY):	Quantity (ton) or Volume of Waste (litre):	Waste Generator:	
Chevron Emergency Contact (แจ้งเหตุฉุกเฉิน) : Bangkok (กรุงเทพฯ) 0-2545-6222, Songkhla (สงขลา) 0-7430-3333			

# PPE Preparation for Mercury Related Project



## Protective Clothing

A chemical suit (Tyvek Coverall) suitable for mercury handling must be worn when stipulated by the Work permit or Work Plan. These are specifically designed without pockets and without access to avoid transferring mercury contamination to the body or underclothing. When wearing coveralls, it is essential that the pant legs overlap boots.

Heat stress is a significant concern while wearing this type of suit.



# PPE Preparation for Mercury Related Project



## Boots

High top rubber or plastic boots must be worn to extend above the ankles so pant legs can overlap the boot tops to ensure mercury cannot enter the inside of the boots and prevent contamination of the socks.



## Gloves

Correctly selected rubber gloves must be worn. Gloves must not be re-used once removed unless washed and decontaminated to avoid mercury on the hand. Care must always be exercised to prevent the hands from contaminating other parts of the body, especially the face, eyes and hair. Clean flushing water at a decontamination station/skid must be used for cleaning the nose, face, hands, gloves, etc. and then allowed to air dry.



# PPE Preparation for Mercury Related Project



## Eye Protection

A face shield, goggles or full face respirator shall be worn whenever there is a possibility to be splashed with mercury or mercury contaminated materials.



## Respirators

Correctly selected mercury canister respirators must be worn when stipulated by the work procedure or work permit, for work with a possible mercury exposure.

Inspect respirators properly before each use.



# Respiratory Selection Guide

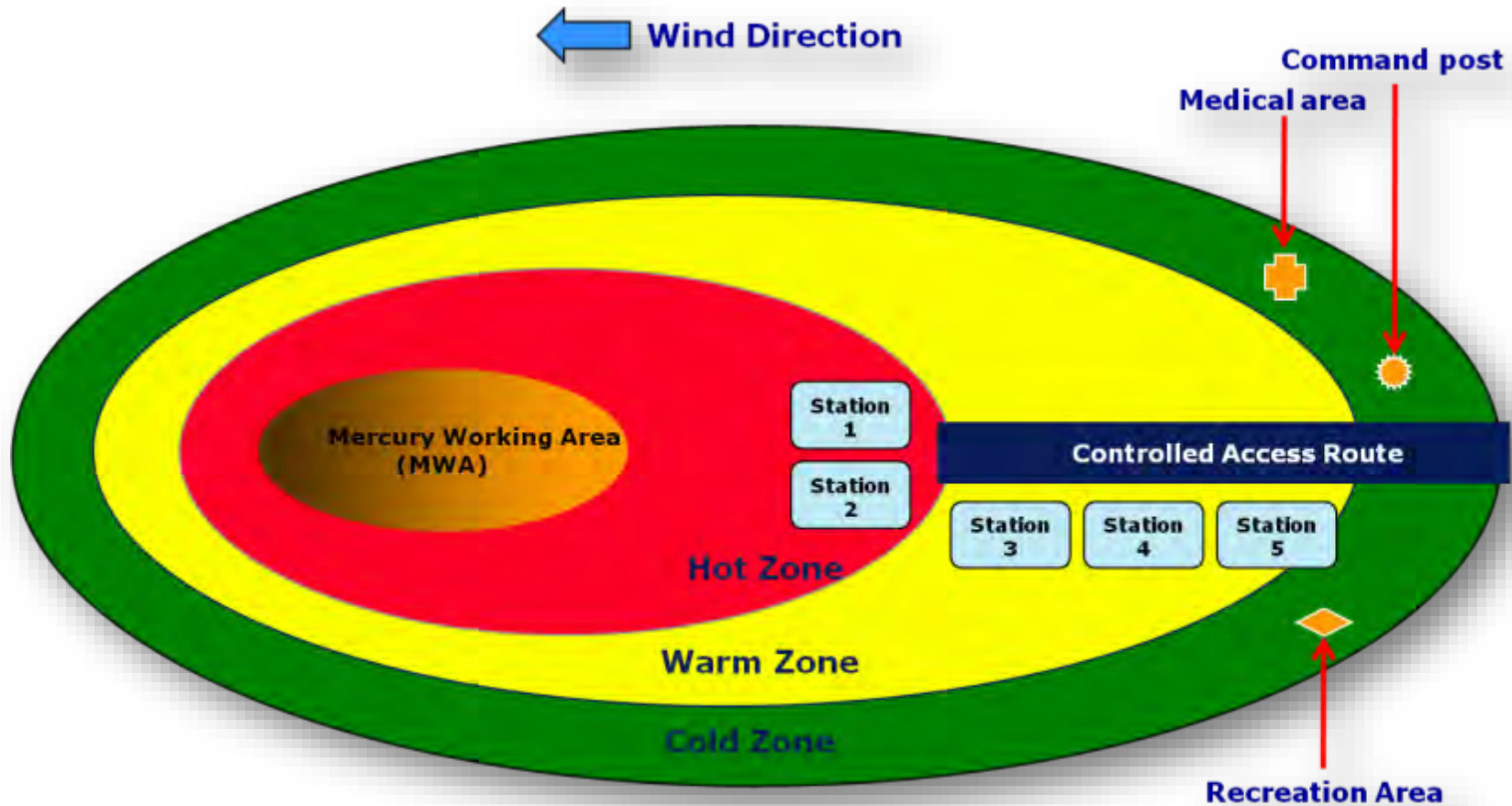


Respiratory Type	Protection Factor	Selection Criteria for each Toxic Gases			Oxygen % vol. in air	% LEL
		Benzene (PPM)	Mercury (mg/m <sup>3</sup> )	H <sub>2</sub> S (PPM)		
• Half Mask with Cartridges	10	<10	<0.25	>5.0 * Escape Set	19.5-23.5 %	<10
• Full-Face Mask with Cartridges	50	10≤ <b>B</b> <50	0.25≤ <b>H</b> <1.25	>5.0 * Escape Set	19.5-23.5 %	<10
• Full-Face Mask with Air Supplied or SCBA	1000	50≤ <b>B</b> <500	1.25≤ <b>H</b> <10.0	>5.0 * Escape Set	19.5-23.5 %	<10
No entry allow (IDLH) – Escape only		<b>500 (IDLH)</b>	<b>10 (IDLH)</b>	<b>100 (IDLH)</b>		

Benzene (PEL) = 1.0 PPM, Mercury (TLV) = 0.025 mg/m<sup>3</sup>, Hydrogen Sulfide (H<sub>2</sub>S) = 5.0 PPM

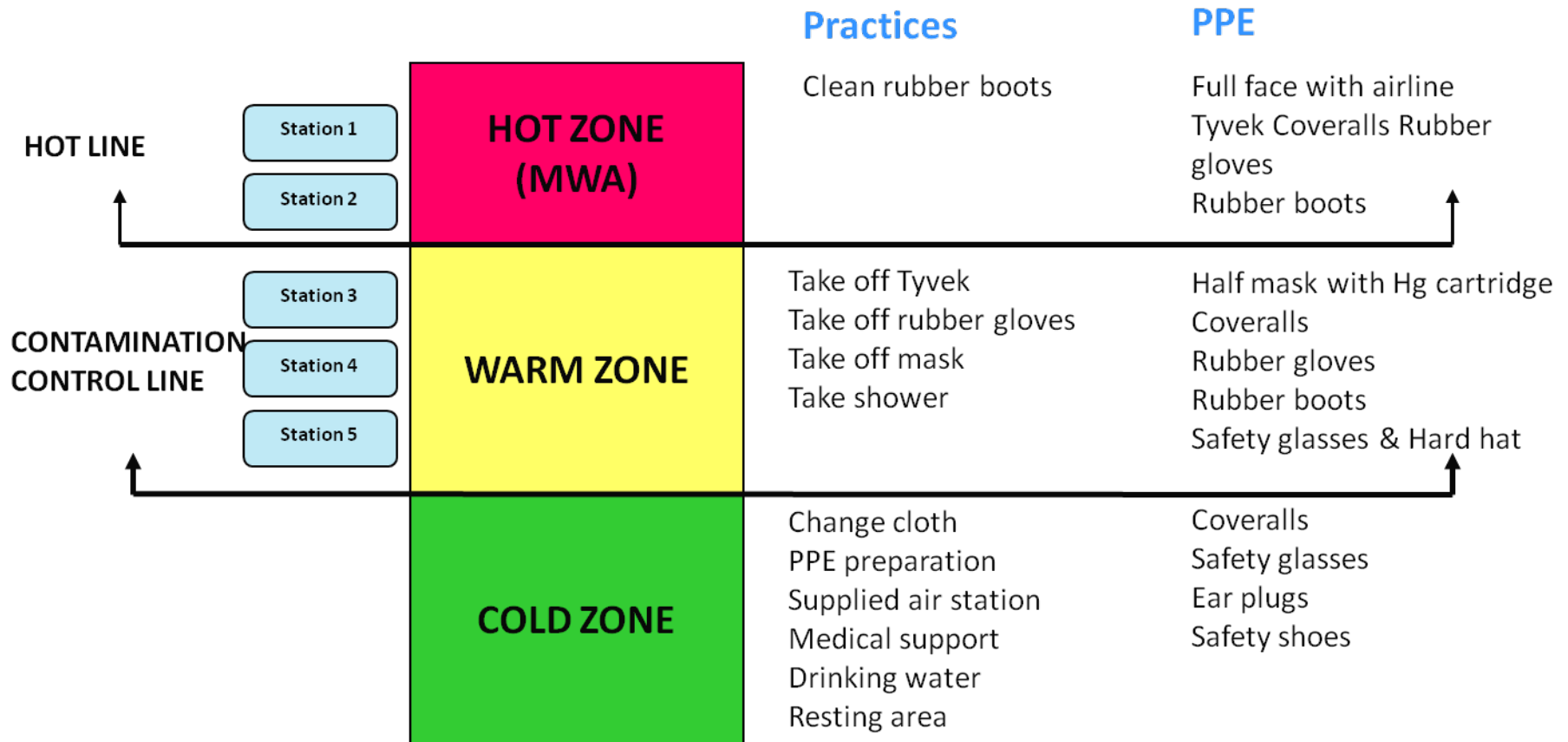
\* No cartridges for H<sub>2</sub>S protection, escape set required to leave the area if H<sub>2</sub>S level exceeding 5.0 PPM

# Decontamination Zoning





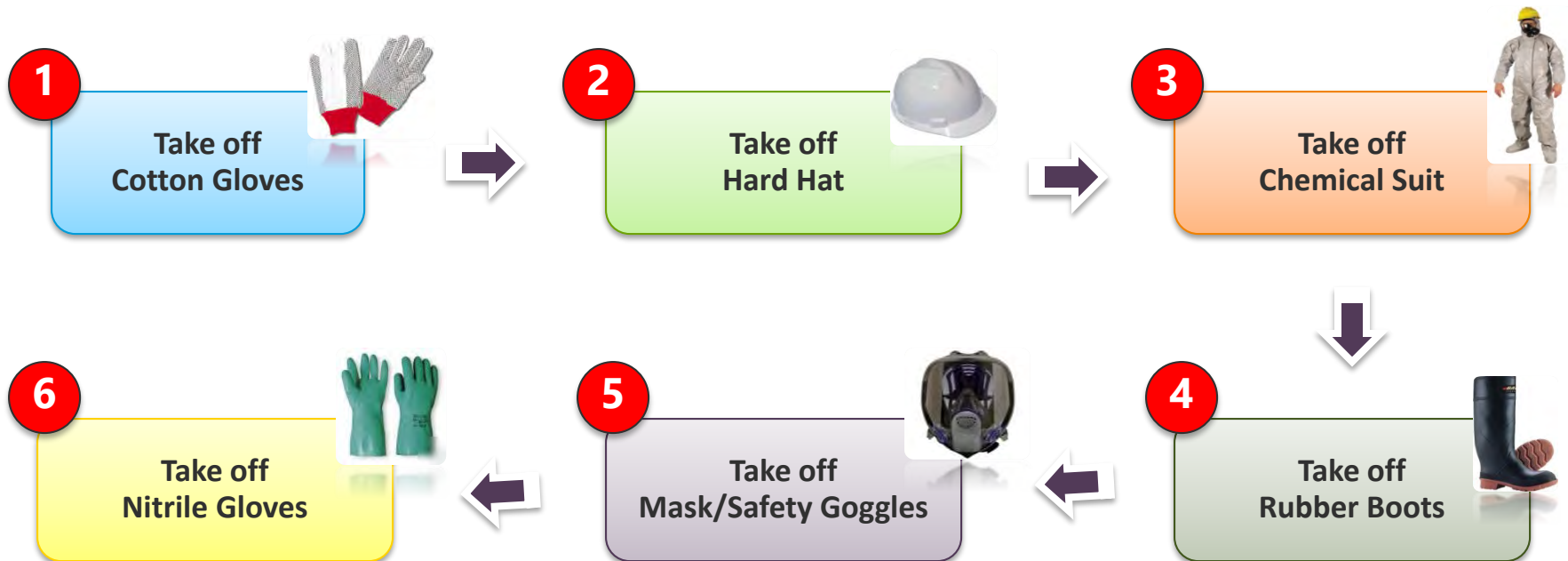
# Mercury (Hg) Exposure Improvement Processes to Achieve Zero Case of HOS Groups.



MWA = Mercury Working Area



# PPE – Take Out Steps (develop from over exposure lesson learn)





ภาคผนวก 23

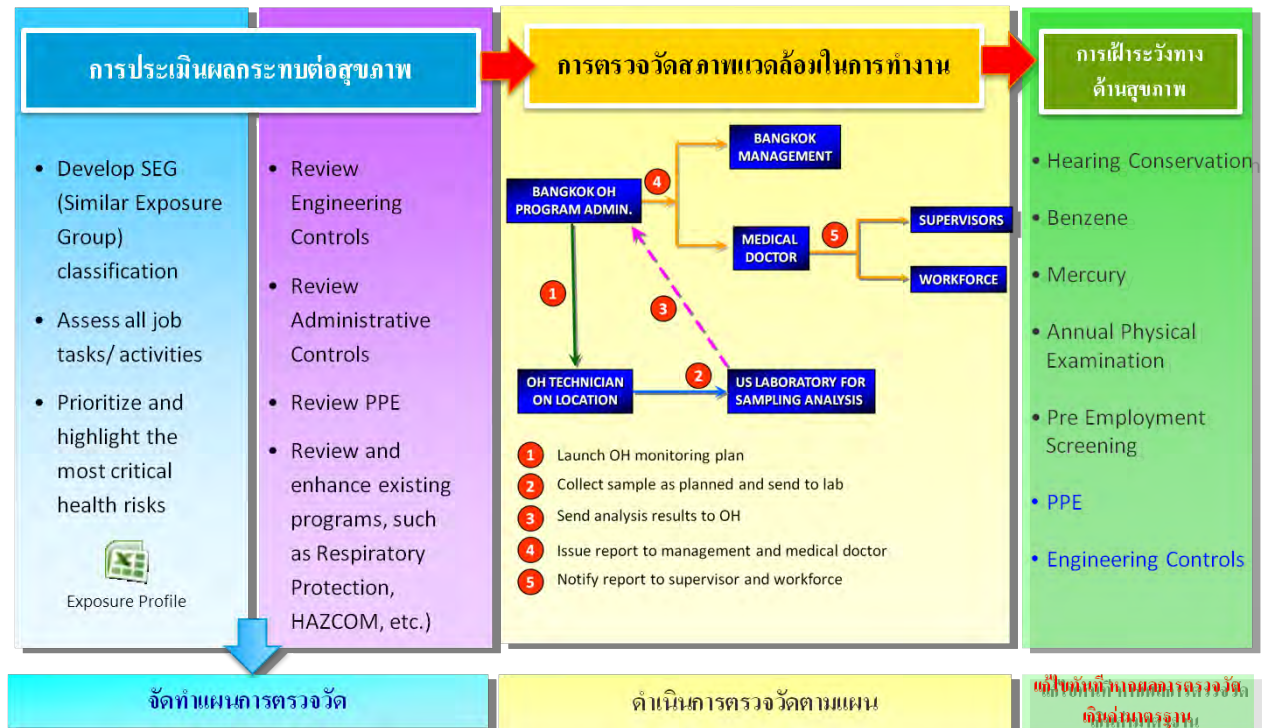
รายงานการตรวจวัดทางสุขศาสตร์อุตสาหกรรม (*Occupational Hygiene Monitoring*)

# การตรวจวัดสภาพแวดล้อมการทำงานด้านการสัมผัสสารเคมีของแหล่งเบญจมาศ

## การควบคุมอันตรายจากสภาพแวดล้อมในการทำงานและสารเคมี

### หลักการตรวจวัดทางด้านสุขศาสตร์อุตสาหกรรม

หลักการและแนวทางปฏิบัติของการดำเนินการทางด้านสุขศาสตร์อุตสาหกรรมของบริษัทเซฟรอน สามารถแสดงให้เห็นได้ตามกระบวนการดังต่อไปนี้



## ผลการตรวจวัดทางสุขศาสตร์อุตสาหกรรม

ผลการตรวจวัดสารเคมี (แหล่งเบญจมาศ) ปี พ.ศ. 2565

Job Title	Task Monitored	Agent Monitored	Monitoring Results
Mechanic	PM and CM processing equipment and troubleshooting	Benzene Total Hydrocarbons Mercury	Within Acceptable Limits Within Acceptable Limits Within Acceptable Limits
MOT (Maintenance and Operation Team)	PM process pumps and equipment at remote platform	Benzene Total Hydrocarbons Mercury	Within Acceptable Limits Within Acceptable Limits Within Acceptable Limits
	Pig receiving at remote platform or CPPs	Benzene Total Hydrocarbons Mercury	Within Acceptable Limits Within Acceptable Limits Within Acceptable Limits
Painter	De-scaling, rust removal and sandblasting	Total Nuisance Dust	Within Acceptable Limits
	Painting (spray or brush), paint mixing, and part clean up	Toluene Total Hydrocarbons	Within Acceptable Limits Within Acceptable Limits
Welder	Sandblasting using garnet	Total Dust	Within Acceptable Limits
	Welding and cutting activities	Welding Fumes Metal Fumes	Within Acceptable Limits Within Acceptable Limits

ภาคผนวก 24

สรุปผลตรวจสุขภาพของพนักงาน (Medical Report)



# Chevron Thailand Exploration and Production, Ltd.

## Health & Medical Report

Name : Dr.Surchet Phisitkul  
Location : Thailand  
Report for : 2022

### 1.Occupational Health Program

#### 1.1 Medical Surveillance Program

Programs	Location				Total	Result (Normal / Abnormal)
	BELQ	NPLQ	PALQ	PLFSO		
Mercury Surveillance (20 ug/gCr)	82	48	79	27	236	(236 / 0)
Vision Test	76	19	33	3	131	(122 / 9)
Respiratory Fit Test	17	17	15	20	69	(69 / 0)
Hearing Test	5	7	4	-	16	(16 / 0)

Remarks: for the vision test with abnormal result, cases pursued with further visual re-test with ophthalmologist and eyesight correction for example cut new glasses.

#### 1.2 Potable water

Programs	Year to Date
Drinking water analysis	27 Samples (all results meet Thailand drinking water quality standard )

-End-



ภาคผนวก 25

รายงานประจำเดือนที่เสนอต่อกรมเชื้อเพลิงธรรมชาติ (DMF Monthly Report)

## HSE Monthly Report

**Company Name:** บริษัท เชฟรอนประเทศไทยสำรวจและผลิต จำกัด

**Contact Name/Tel.:** 025456485

Month/Year: มกราคม 2565

[illegible]

4. Incidents Record Detail for This month				
Date (Ex.01/12/2558)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
06/01/2565	โพลินดอนเหนือ	North Pailin: NPLQ: Hand injury from preparing food	RWDC	<b>Correction/Improvement:</b> 1). Communicate to all catering crews to following the procedure strictly, the cutting resistance gloves must be worn when using knife. 2)Communicate to Campboss for consider of ready-made raw material, boneless
11/01/2565	โพลิน	South Pailin: PAWH: IP's left index finger struck against the tubing tray caused injury.	MTC	<b>Correction/Improvement:</b> <b>1) Update the step of eliminating the sharpness of the</b> tubing/tubing tray during an installation in the JSA. Identify risk from the sharp edge in the JSA for a proper control during an installation work. 2). Set up team to conduct Hazard Hunt to identify a similar risk, such as sharp objects/structures that get in the way of personnel travelling/activities) which requires immediate action to eliminate or control hazard. 3).Communicate with workforce to understand importance of wearing PPE at all time when being in the process/working area. 4) Communicate with workforce to see importance of reporting and observing abnormal condition includes latent conditions existing in our routine/simple activities. The mitigations were managed at the facility level. <b>** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated.</b>
14/01/2565	SDC	SDC_Shaker room_PMWJ: IP struck in left cheek from broken sanding disc.	FAC	The mitigations were managed at the facility level. <b>** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated.</b>
19/01/2565	Onshore and FE MPG	Settapat center, SKL: Epistaxis during HUET activity (after step-off from jumping platform) in T-BOSIET	FAC	The mitigations were managed at the facility level. <b>** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated.</b>
19/01/2565	เอราวัณ	Erawan: ERWM: Worker Fell Through Insecure Grating on Remote Platform	FAC	The mitigations were managed at the facility level. <b>** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated.</b>
23/01/2565	เอราวัณ	ERMRP: Chin Injury while Using of Drum Lifter	MTC	<b>Correction/Improvement:</b> 1) Assign all shop supervisors to communicate and monitor that the team has consistently completed and recorded the lifting plan for cargo movement by 4pm on daily basis. 2) Incorporate the following crane and rigging's safe practices into the existing program, i.e., pre-job briefing, JSA, crane shop meeting, etc, and confirm understanding of the team by crane supervisor. 3re's unclear visibility, e.g., lifting at night, at dusk or dawn. 3) Assign dedicated person or team to daily/weekly check to confirm adequate numbers of radios are provided, accessible, and functioning (may identify minimum # of the radio).
19/01/2565	เอราวัณ	Erawan: ERWM: Worker Fell Through Insecure Grating on Remote Platform	HPI	<b>Correction / Improvement: (actual FAC)</b> 1) Develop or revise the existing document guideline to include the standard of "grating installation and attachment method". 2) Develop or revised current grating inspection guidance (bi-lingual) which include industry standard grating installation and attachment method. 3) Roll out the revised guidance and implement with identified position (FE, MOT, Wells) required conducting inspection of grating. 4) Assess the effectiveness of current grating securing clip being used in offshore whether is fitted for operation. The mitigations were managed at the facility level. <b>** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated.</b>
12/01/2565	AR Rigs	Scepter: Bolts dropped from 4" Drill pipe elevator while cutting 13-3/8" casing.	Near Miss	The mitigations were managed at the facility level. <b>** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated.</b>
23/01/2565	ปลาทอง	On 23 January 2020 approx. 14:00 hrs after completed initial roughly test on trunk line of produced water and found pressure drop on produce water line from PMWB to PMWG and CBWA. It was suspected that there were leak on produce water injection pipeline. After confirmation with Operator onboard PMWB, PMWG and CBWA , there was no leak on platform and no oil sheen observed on the sea surface. On 24 Jan it confirmed the leak at PMWB PMWG and CBWA sub-sea pipeline. However, crew boat and 2 of helicopter confirmed there was no oil sheen observed around suspected area. (10,900 bbl)	Spill	N/A

## HSE Monthly Report

Company Name:	บริษัท เซฟรอนประเทศไทยสำรวจและผลิต จำกัด		
Contact Name/Tel.:	025456485		
Month/Year:	กุมภาพันธ์	2565	

[illegible]

4. Incidents Record Detail for This month				
Date (Ex.01/12/2558)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
06/02/2565 สดูล		Fire sparked from laboratory water bath.	Fire	The mitigations were managed at the facility level. ** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated.
10/02/2565 เหววว		Minor burn right hand	FAC	The mitigations were managed at the facility level. ** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated.
26/02/2565 Completions		IP was injured on ankle legs during re-secure the ladder.	LWDC	<b>(Under investigation process - current status: root cause analysis)</b> Immediate corrective actions: <ul style="list-style-type: none"> <li>• IP was treated and monitored at vessel sickbay by Medic.</li> <li>• An announcement was made that all outside work is not allowed, and personnel are not allowed on the back deck.</li> <li>• The Vessel deck access area was secured with barrier tape and a warning sign.</li> <li>• Watertight doors were closed and posted with warning signs.</li> </ul>

Company Name: บริษัท เซฟรอนประเทศไทยสำรวจและผลิต จำกัด  
Contact Name/Tel.: 025456485  
Month/Year: ธันวาคม 2565

[illegible]

4. Incidents Record Detail for This month				
Date (Ex.01/12/2558)	Asset/Field/Block No	Detail	Type	Correction / Improvement
06/03/2565	AR Rigs	The perforation gun was unintentional activated on :	FAT	<p><b>(Under investigation process - waiting for approval for a formal communication)</b></p> <p>1. Within 15 minutes the response team arrived however IP injuries were confirmed fatal.</p> <p>2. Expro notified. Police notified. No Police investigation is being pursued (workplace accident)</p> <p>4. CTEP Wells function held a fleet wide safety stand down to share news of the incident and reflect on operating practices Slick line perforating ceased</p>
07/03/2565	พูน	Dropped sight glass support of foam tank on helideck	Near Miss	<p><b>Correction / Improvement:</b></p> <p>1. Mech Specialist to remove the Sight gauge tube with angle bar support of Eastern and Western Helideck foam tank. Change the practices to install the sight gauge and remove after 1Y ITPM completed.</p> <p>2. Update ITPM job card to remind the working crew to install the sight gauge temporarily and remove it after completion.</p>
08/03/2565	บรเวณ	Back injury at DAWA	FAC	<p>The mitigations were managed at the facility level.</p> <p>** Refer to Thailand Streamlining process, the Near Miss with probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore</p>



## HSE Monthly Report

**Company Name:** บริษัท เซฟรอนประเทศไทยสำรวจและผลิต จำกัด

**Contact Name/Tel.:** 025456485

Month/Year: เมษายน 2565

[illegible]

#### 4. Incidents Record Detail for This month

Date (Ex.01/12/)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
1/4/2565	Onshore and FE MPG	Rubber gasket burst while replacing and struck IP face resulting lacerations and abrasions wound on injure person's face	FAC	<b>Immediate Actions Taken:</b> <ul style="list-style-type: none"> <li>- The work was stopped and medic provided first aid treatment to IP.</li> <li>- IP medical treatment and closely monitored by onboard medic (The mitigations were managed at the facility level.)</li> </ul>
20/4/2565	Onshore and FE MPG	Diver hat dropped from hanging point to diver head.	MTC	<b>Under Investigation and Summarize Action:</b> actions will include the following <ul style="list-style-type: none"> <li>- Preventive maintenance quality</li> <li>- New/Inexperienced employee (Short-Service Employee Program)</li> <li>-Pre-use inspection/checklist quality (focus on critical element that should have been addressed and fixed on the design).</li> <li>- Dropped object prevention plan/program.</li> </ul>
21/4/2565	Onshore and FE MPG	IP got 2nd degree burn on right hand while maintaining engine's hot water hose.	FAC	<b>Immediate Actions Taken:</b> <ul style="list-style-type: none"> <li>- Marine crew immediately stop the work.</li> <li>- Informed to medic for treatment from Burn-aid cream, bandaging and Silver Sulphadiazine 1% w/w Cream 50g was given to IP.</li> </ul> (The mitigations were managed at the facility level) ** Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not significant and does not require the investigation and action tracking. Therefore this event was not investigated. **

## HSE Monthly Report

**Company Name:** บริษัท เชฟรอนประเทศไทยสำรวจและผลิต จำกัด

**Contact Name/Tel.:** สรพัฒน์ รุ่งเรือง/025455771

Month/Year: พฤษภาคม 2565

[illegible]

4. Incidents Record Detail for This month				
Date (Ex.01/12/2558)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
9/5/2565	SDK	1 tow wire parted while positioning Shelf Drilling Krathong (SDK)	Near Miss	Correction / Improvement -Survey for Main tow wire, work wire, Tugger wire both in service and spare (MIL cert, Non-destructive test and Destructive test) to check wire age and maintenance, effective inspection and test mythology record for equipping AHTS in the fleet -Review vessel acceptance for new hire and core fleet as per MSRE process (checklist, inspection questionnaire) to ensure critical equipment passes a required inspection and maintenance before charter. -Reinforce marine contractors to develop and follow wires inspection and maintenance program including V&V process in place for Pre-Post use checklist in towing operations, and other high-risk marine operations.
27/05/2565	โพลีน	5T Chain Block Slipped During Load Transfer (2-ton Barred Tee piping spool)	Near Miss	Correction / Improvement -ทำการปรับปรุงขั้นตอนการทำงานเกี่ยวกับการใช้รอกโซ่ และสื่อสารให้พนักงานรับทราบ เช่น เอกสารแสดงขั้นตอน หรือ VIDEO สาธิตวิธีการตรวจสอบ -ปรับปรุง JSA เมื่อมีการทำงานที่เกี่ยวข้องการใช้รอกโซ่ ต้องมีการทดสอบระบบเบรค ของตัวอุปกรณ์ก่อนเสมอตามข้อกำหนดใน Lifting and Rigging Procedure (FE/Mech) – 30 June -ตรวจสอบใบรับรองการทำ Load test ของรอกทุกตัว หากพบว่าไม่มีใบรับการทำ Load test ให้หยุดใช้งาน (FE/Mech) - ห้ามใช้งานรอก 5 ตันของ Mechanic เนื่องจากไม่มีการทำ load test (Mech) -ติดตั้ง Pad eye สำหรับการทำให้ Load test รอก 5 ตัน (Mech)
30/05/2565	Major Project	IP sustain burn from hot water drop to right foot	FAC	Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.

#### 4. Incidents Record Detail for This month

Date (Ex.01/12/2558)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
16/6/2022	Major Project	The metal U clamp (15 kgs) which is placed with distance about 80 centimeters fell down and hit on the safety shoe [the dorsum of left foot]	FAC	Utilized Chevron Corporate Tool to conduct an investigation by gathering learning from the team and focus on failures on safeguards. <b>Corrections:</b> 1. Clearly identify dedicated material parking area (warehouse) to not obstruct the walkway/traffic includes the access to FE welding shop. 2.Re-arrange working layout in FE welding shop and manage working space to be more safer i.e., separate storage area from working area, safe area to access storage shelf
16/6/2022	โพลีเอทิลีน	IP immediately turned his body resulted in back pain.	FAC	Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>
29/6/2022	เบญจมาศ	The pressure gauge became loose, which caused the IP to lose the body control. IP's left eyebrow was struck by the needle valve.	FAC	Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>
19/6/2023	เบญจมาศ	FE reported CCR that he observed a smoldering point on the flowline of upstream slug valve HV-9170 (BEWI/BEWI receiver drain line)	Fire	<b>Under Investigation</b> Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - minor fire

## HSE Monthly Report

Company Name: บริษัท เขฟรอนประเทศไทยสำรวจและผลิต จำกัด  
Contact Name/Tel.: สุรพัฒน์ รุ่งเรือง/025455771  
Month/Year: มิถุนายน 2565

[illegible]

## HSE Monthly Report

Company Name: บริษัท เขฟรอนประเทศไทยสำรวจและผลิต จำกัด  
Contact Name/Tel.: สุวัฒน์ รุ่งเรือง/025455771  
Month/Year: กรกฎาคม 2565

[illegible]



4. Incidents Record Detail for This month				
Date (Ex.01/12/255)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
03/07/2565	Logistic Marine	Finger of the injured person was cut during food preparation in the kitchen	MTC	1. Promote safeguard verification program and safety awareness and commitment on “Hand & Finger Injury prevention”, “Stop Work authority” and “JSA and Risk assessment. 2.Refresh PPE training focuses on Cut resistance glove during briefing / pre-job briefing. 3.UWO to share the learnings from this incident to its fleet vessels
19/07/2565	เบญจมาศ	Gas released from regulator and accumulated in platform gas generator enclosure.	Near Miss	Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>
18/07/2565	เบญจมาศ	High Urine Mercury after finishing vessel entry jobs	Near Miss	Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>
28/07/2565	เบญจมาศ	Hydrocarbon liquid overflow from knock out scrubber to flare and overboard to sea. (0.008 bbl)	Over Board	Under Investigation. <b>Immediate Actions Taken:</b> <ul style="list-style-type: none"> <li>• IOCC remotely commanded ESD and verified platform safe state.</li> <li>• IERT is activated to manage the situation.</li> <li>• OSRT is activated to recover the spill</li> <li>• WUU technician and MOT are verified the knock out scrubber and clear all residual liquid in system.</li> </ul>

## HSE Monthly Report

Company Name:	บริษัท เชฟรอนประเทศไทยสำรวจและผลิต จำกัด
Contact Name/Tel.:	สรพจน์ รุ่งเรือง/025455771
Month/Year:	สิงหาคม 2565

Parameter	Unit	Production							Drilling			Other						
		มูงทอง	โพลิน	โพลินตอนเหนือ	เบญจมาศ	ขนา	มะละและอีสต์ดราต	PFSO	SDC	Krathong	AR Rigs/Rigless	Completions	Logistics	Onshore Operations	Major Project	AR Ops (BL 10-13)	Bangkok	
1. operational performance																		
Gas Production	mmscf	23.64	7,170.68	6,375.05	1,214.40	118	132.75	-										
Crude Oil Production	bbl	1,653.00			385,267.84	11,376.00	2,430.00	-										
Condensate Production	bbl		354,856.00	178,635.00			2,365	-										
2. Safety Performance																		
Worked Hours																		
Company Worked Hours	Man Hour	0	3,510	3,627	4,108	-	-	1,430	2,040	432	-	1,692	828	4,590	198	2,016	97,812	
Contractor Worked hours	Man Hour	0	39,156	28,054	37,141	1,812	-	15,431	47,904	14,652	-	26,772	101,552	77,077	-	22,008	15,642	
Total	Man Hour	0	42666	31681	41249	1812	-	16861	49944	15084	-	28464	102380	81666.5	198	24024	113454	
Accidents / Incidents																		
Fatality (FAT)	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Last Work Day Case (LWDC)	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Last Time Incident (LTI)	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Restrcted Work Day Case (RWDC)	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Medical Treatment Case (MTC)	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
First Aid Case (FAC)	case	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
Near Miss	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
High potential Incident (HPI)	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Recordable Injury (TRI)	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Last Time Injury Frequency (LTIF)	-	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	0	0	0	
Total Recordable Injury Rate (TRIR)	-	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0.00	0	0	0	0	
Oil spill	case	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Oil Spill Volume	bbl	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	
Chemical spill	case																	
Chemical Spill Volume	bbl																	
Fire	case																	
3. Environmental Performance																		
Produced water																		
Total Produced Water	bbl	95	973,679	388,239	2,408,010	12,638	26,009											
Injection	bbl	95	973,679	388,239	2,408,010	12,638	26,009											
% Injection	-	100	100	100	100	100	100	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Discharge	bbl																	
% Discharge	-	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Treatment/Boiling	bbl																	
Disposal	Ton																	
Hg Content	ppb																	
As Content	ppb																	
TPH	ppm																	
Oil & Grease	ppm																	

4. Incidents Record Detail for This month				
Date (Ex.01/12/255)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
02/08/2022	ขร Asset Retirement	Worker body contact scaffold bracing and got pain at left chest area.	FAC	Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>

## HSE Monthly Report

Company Name: บริษัท เชฟรอนประเทศไทยสำรวจและผลิต จำกัด

**Contact Name/Tel.:**

Month/Year: กันยายน 2565

[illegible]

4. Incidents Record Detail for This month				
Date (Ex.01/12/2558)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
22/09/2565	Onshore Operations	Cargos flipped over from trailer to ground during forklift operation	Near Miss	Under Investigation Immediate Action Taken: •Minor amount of hydraulic oil was observed and cleaned. •The basket was recovered, and the owner inspected equipment including CCU package. •Suspended operation and conducted safety stand down with all Jetty crew.
26/09/2565	Krathong	Estimated 4 liters (0.03 bbl.) of fuel leaked from breakaway connection to the sea	Spill	Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>
30/09/2565	เบญจมาศ	IP experienced finger injury while untightening the bolt.	FAC	Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>
29/09/2565	Onshore Operations	Hand injury during the house keeping	MTC	Actions: - consider resuming cross-department meeting - To increase competency and job familiarization for a batch-hired SSE -develop and share safe practice of keeping and coiling metal band including waste management practice.

## HSE Monthly Report

Company Name:	บริษัท เชฟรอนประเทศไทยสำรวจและผลิต จำกัด
Contact Name/Tel.:	สุวัฒน์ รุ่งเรือง/ 0-2545-5771
Month/Year:	ตุลาคม 2565

[illegible]

4. Incidents Record Detail for This month				
Date (Ex.01/12/2558)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
06/10/2565	ไพลินดอนเหนือ	Found electrical burnt at platform's solar charge controller during conduct platform preparation for monsoon season.	Fire	<p>Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</p> <p><b>(Under Investigation) ** Note - Actual First Aid case.</b>  <b>Immediate Actions Taken :</b></p> <ul style="list-style-type: none"> <li>- All offshore facilities are to conduct a removable handrail inspection by visual inspection and put a warning sign on the handrail if observe hard scale corrosion.</li> <li>- Communicate involved party to not use removable handrail as an anchorage point for scaffolding and work at a height.</li> <li>- Emphasized workers to work buddy system.</li> <li>- To verify Life-saving equipment at CPP and WHP must be in place and functioning.</li> </ul>
10/10/2565	ไพลินดอนเหนือ	Person fell overboard while preparing work at the loading area	HPI	<p><b>Note : The hi-potential incident (HPI) occurred on 10/10/2022: Man fell overboard at NPailin was also classified as FAC (injured person received first aid).</b></p>
17/10/2565	Krathong	Drops- Mini Scope Arresting Pin Dropped	Near Miss	<p>Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</p>
25/10/2565	ไพลินดอนเหนือ	Minor fire while cooking	Fire	<p>Immediate actions were taken at site to confirm no escalation of an injury and repetitive event - Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</p>
20/10/2565	Logistics	Concealed sprinkler dislodged from a position and dropped on the passenger seat in the departure hall.	Near Miss	<p><b>(Under Investigation)</b>  <b>Immediate Actions Taken:</b></p> <ul style="list-style-type: none"> <li>• Informed Chevron NST base supervisor.</li> <li>• Checked through all sprinkler lines in all areas including Chevron and TAS.</li> <li>• Barricaded all areas considered to have the potential of any dropped object.</li> <li>• Checked and verified all sprinkler closed plate and T-bar ceiling</li> </ul>



## HSE Monthly Report

Company Name:	บริษัท เชฟรอนประเทศไทยสำรวจและผลิต จำกัด
Contact Name/Tel.:	สุวัฒน์ รุ่งเรือง/ 0-2545-5771
Month/Year:	พฤศจิกายน 2565

[illegible]

4. Incidents Record Detail for This month				
Date (Ex.01/12/2558)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
05/11/2565	โพลีน	Crane engine shutdown while lifting basket from crew boat causing basket to suspend above loading area	Near Miss	Immediate actions were taken at site to confirm no escalation of the event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>
16/11/2565	โพลีน	Hydrocarbon leaked from liquid transfer pump of Remote Compressor skid at remote platform. No Spill overboard. (0.6 bbl)	Spill	Immediate actions were taken at site to confirm no escalation of the spill event - <i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i>

Immediate actions were taken at site to confirm no

## HSE Monthly Report

**Company Name:** บริษัท เชฟรอนประเทศไทยสำรวจและผลิต จำกัด

**Contact Name/Tel.:** สรพัฒน์ รุ่งเรือง/ 0-2545-5771

Month/Year: ธันวาคม 2565

[illegible]

4. Incidents Record Detail for This month				
Date (Ex.01/12/2558)	Asset/Field/Block No.	Detail	Type	Correction / Improvement
10/12/2565	โพลินดอนเหนือ	Found solar controller number 2 circuit board was damaged.	Fire	<p>Immediate actions were taken at site to confirm no escalation of the event -</p> <p><i>Refer to Thailand Streamlining process, incident/near miss has probable severity level 1 is not leading to SIF potential and does not require the investigation and action tracking. Therefore this event was not investigated.</i></p>

ภาคผนวก 26

ผลการวิเคราะห์คุณภาพสิ่งแวดล้อม (Environmental Monitoring)

**APPENDIX A**  
**ANALYTICAL LABORATORY REPORTS:**  
**SEDIMENT**

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## ANALYTICAL REPORT

Eurofins Seattle  
5755 8th Street East  
Tacoma, WA 98424  
Tel: (253)922-2310

Laboratory Job ID: 580-112739-7  
Client Project/Site: Project T423.12

**For:**

Tetra Tech, Inc.  
3697 Mt. Diablo Blvd.  
Suite 150  
Lafayette, California 94549

Attn: Ted Donn



*Authorized for release by:*  
7/7/2022 9:20:29 AM

Lilly-Anna LaCount, Analyst II  
(253)922-2310  
[Lilly-Anna.Lacount@et.eurofinsus.com](mailto:Lilly-Anna.Lacount@et.eurofinsus.com)

### LINKS

Review your project  
results through



Have a Question?



Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.





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# Case Narrative

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

**Job ID: 580-112739-7**

**Laboratory: Eurofins Seattle**

## Narrative

### Job Narrative 580-112739-7

## Comments

No additional comments.

## Receipt

The samples were received on 4/18/2022 12:35 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 12 coolers at receipt time were -29.6° C, -17.1° C, -16.2° C, -14.6° C, -9.3° C, -5.1° C, -2.6° C, -0.1° C, 1.9° C, 2.3° C, 4.2° C and 11.6° C.

## Metals

Method 1638: The matrix spike / matrix spike duplicate (MS/MSD) recoveries and precision for preparation batch 580-393469 and analytical batch 580-395356 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory sample control duplicate (LCS/LCSD) precision was within acceptance limits.

Method 1638: The method blank for preparation batch 580-393469 and analytical batch 580-395356 contained Manganese above the reporting limit (RL). Associated sample(s) were not re-extracted and/or re-analyzed because results were greater than 10X the value found in the method blank.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

## Definitions/Glossary

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

### Qualifiers

#### Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

#### General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time
H3	Sample was received and analyzed past holding time.

### Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Client Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Client Sample ID: G4/43REF-A1

Lab Sample ID: 580-112739-669

Date Collected: 03/29/22 00:17

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 50.1

## Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	17	B	2.0	0.22	ng/g	☆	06/08/22 13:04	07/01/22 18:15	20

## Method: 1638 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	5.5		0.40	0.12	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Barium	180	B	40	0.079	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Cadmium	0.061	J	0.20	0.0040	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Chromium	47	B	0.40	0.40	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Copper	13	B	0.20	0.024	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Iron	22000	B	40	7.9	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Manganese	860	B	0.20	0.020	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Nickel	27	B	0.79	0.032	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Lead	22		0.16	0.016	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1
Zinc	41		4.0	2.0	mg/Kg	☆	06/17/22 10:46	06/28/22 11:42	1

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	50	H H3	0.10	0.10	%			06/08/22 09:13	1
Percent Solids	50	H H3	0.10	0.10	%			06/08/22 09:13	1

# Client Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Client Sample ID: G4/43REF-B1

Lab Sample ID: 580-112739-670

Date Collected: 03/29/22 00:35

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 51.9

## Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	17	B	1.9	0.21	ng/g	☆	06/08/22 13:04	07/01/22 18:19	20

## Method: 1638 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	6.7		0.36	0.11	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Barium	230	B	36	0.073	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Cadmium	0.11	J	0.18	0.0036	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Chromium	63	B	0.36	0.36	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Copper	18	B	0.18	0.022	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Iron	28000	B	36	7.3	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Manganese	1200	B	0.18	0.018	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Nickel	37	B	0.73	0.029	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Lead	29		0.15	0.015	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1
Zinc	55		3.6	1.8	mg/Kg	☆	06/17/22 10:46	06/28/22 11:55	1

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	48	H H3	0.10	0.10	%			06/08/22 09:13	1
Percent Solids	52	H H3	0.10	0.10	%			06/08/22 09:13	1

# Client Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Client Sample ID: G4/43REF-C1

Lab Sample ID: 580-112739-671

Date Collected: 03/29/22 00:51

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 50.7

## Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	18	B	1.9	0.21	ng/g	☆	06/08/22 13:04	07/01/22 18:23	20

## Method: 1638 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	5.4		0.39	0.12	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Barium	170	B	39	0.079	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Cadmium	0.068	J	0.20	0.0039	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Chromium	47	B	0.39	0.39	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Copper	13	B	0.20	0.024	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Iron	22000	B	39	7.9	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Manganese	920	B	0.20	0.020	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Nickel	28	B	0.79	0.031	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Lead	23		0.16	0.016	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1
Zinc	40		3.9	2.0	mg/Kg	☆	06/17/22 10:46	06/28/22 11:59	1

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	49	H H3	0.10	0.10	%			06/08/22 09:13	1
Percent Solids	51	H H3	0.10	0.10	%			06/08/22 09:13	1

# Client Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Client Sample ID: SRWA-1B2X-A1

Lab Sample ID: 580-112739-672

Date Collected: 03/28/22 15:32

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 51.5

## Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	33	B	4.8	0.53	ng/g	☆	06/08/22 13:04	07/01/22 18:28	50

## Method: 1638 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	5.6		0.36	0.11	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Barium	13000	B	36	0.073	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Cadmium	0.097	J	0.18	0.0036	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Chromium	41	B	0.36	0.36	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Copper	13	B	0.18	0.022	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Iron	21000	B	36	7.3	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Manganese	740	B	0.18	0.018	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Nickel	25	B	0.73	0.029	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Lead	23		0.15	0.015	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1
Zinc	39		3.6	1.8	mg/Kg	☆	06/17/22 10:46	06/28/22 12:04	1

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	48	H H3	0.10	0.10	%			06/08/22 09:13	1
Percent Solids	52	H H3	0.10	0.10	%			06/08/22 09:13	1



# Client Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Client Sample ID: SRWA-2B2X-A1

Lab Sample ID: 580-112739-673

Date Collected: 03/28/22 16:07

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 55.7

## Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	21	B	1.8	0.20	ng/g	☆	06/08/22 13:04	07/01/22 18:32	20

## Method: 1638 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	10		0.32	0.096	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Barium	2200	B	32	0.064	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Cadmium	0.073	J	0.16	0.0032	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Chromium	41	B	0.32	0.32	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Copper	12	B	0.16	0.019	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Iron	27000	B	32	6.4	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Manganese	740	B	0.16	0.016	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Nickel	24	B	0.64	0.026	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Lead	23		0.13	0.013	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1
Zinc	41		3.2	1.6	mg/Kg	☆	06/17/22 10:46	06/28/22 12:08	1

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	44	H H3	0.10	0.10	%			06/08/22 09:13	1
Percent Solids	56	H H3	0.10	0.10	%			06/08/22 09:13	1

# Client Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Client Sample ID: SRWA-2B2X-A1-FD

Lab Sample ID: 580-112739-674

Date Collected: 03/28/22 16:15

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 53.1

## Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	22	B	1.9	0.20	ng/g	☆	06/08/22 13:04	07/01/22 18:36	20

## Method: 1638 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	9.0		0.33	0.099	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Barium	1400	B	33	0.066	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Cadmium	0.074	J	0.16	0.0033	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Chromium	36	B	0.33	0.33	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Copper	10	B	0.16	0.020	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Iron	23000	B	33	6.6	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Manganese	700	B	0.16	0.016	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Nickel	21	B	0.66	0.026	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Lead	20		0.13	0.013	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1
Zinc	28		3.3	1.6	mg/Kg	☆	06/17/22 10:46	06/28/22 12:13	1

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	47	H H3	0.10	0.10	%			06/08/22 09:13	1
Percent Solids	53	H H3	0.10	0.10	%			06/08/22 09:13	1

# Client Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Client Sample ID: SRWA-3B2X-A1

Lab Sample ID: 580-112739-675

Date Collected: 03/28/22 16:47

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 50.8

## Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	38	B	4.9	0.54	ng/g	☆	06/08/22 13:04	06/27/22 17:40	50

## Method: 1638 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	8.2		0.38	0.12	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Barium	8400	B	38	0.077	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Cadmium	0.095	J	0.19	0.0038	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Chromium	40	B	0.38	0.38	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Copper	13	B	0.19	0.023	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Iron	24000	B	38	7.7	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Manganese	890	B	0.19	0.019	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Nickel	24	B	0.77	0.031	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Lead	24		0.15	0.015	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1
Zinc	35		3.8	1.9	mg/Kg	☆	06/17/22 10:46	06/28/22 12:17	1

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	49	H H3	0.10	0.10	%			06/08/22 09:13	1
Percent Solids	51	H H3	0.10	0.10	%			06/08/22 09:13	1

# Client Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Client Sample ID: SRWA-4B2X-A1

Lab Sample ID: 580-112739-676

Date Collected: 03/28/22 17:26

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 50.7

## Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	23	B	2.0	0.22	ng/g	☆	06/08/22 13:04	07/01/22 18:40	20

## Method: 1638 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3.9		0.39	0.12	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Barium	1100	B	39	0.078	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Cadmium	0.096	J	0.20	0.0039	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Chromium	43	B	0.39	0.39	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Copper	14	B	0.20	0.024	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Iron	19000	B	39	7.8	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Manganese	780	B	0.20	0.020	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Nickel	26	B	0.78	0.031	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Lead	23		0.16	0.016	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1
Zinc	35		3.9	2.0	mg/Kg	☆	06/17/22 10:46	06/28/22 12:21	1

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	49	H H3	0.10	0.10	%			06/08/22 09:13	1
Percent Solids	51	H H3	0.10	0.10	%			06/08/22 09:13	1

# QC Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: MB 580-393162/1-A  
Matrix: Solid  
Analysis Batch: 395181

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 393162

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		1.0	0.11	ng/g		06/08/22 13:04	06/27/22 13:26	20

Lab Sample ID: MB 580-393162/2-A  
Matrix: Solid  
Analysis Batch: 395181

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 393162

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		1.0	0.11	ng/g		06/08/22 13:04	06/27/22 13:30	20

Lab Sample ID: MB 580-393162/3-A  
Matrix: Solid  
Analysis Batch: 395181

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 393162

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.187	J	1.0	0.11	ng/g		06/08/22 13:04	06/27/22 13:42	20

Lab Sample ID: LCS 580-393162/4-A  
Matrix: Solid  
Analysis Batch: 395181

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 393162

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	386		ng/g		96	75 - 125

Lab Sample ID: LCSD 580-393162/5-A  
Matrix: Solid  
Analysis Batch: 395181

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA  
Prep Batch: 393162

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	371		ng/g		92	75 - 125	4	24

## Method: 1638 - Metals (ICP/MS)

Lab Sample ID: MB 580-393469/1-A  
Matrix: Solid  
Analysis Batch: 395356

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 393469

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.20	0.060	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Barium	0.191	J	20	0.040	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Cadmium	ND		0.10	0.0020	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Chromium	ND		0.20	0.20	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Copper	0.0479	J	0.10	0.012	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Iron	ND		20	4.0	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Manganese	0.0504	J	0.10	0.010	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Nickel	0.0366	J	0.40	0.016	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Lead	ND		0.080	0.0080	mg/Kg		06/17/22 10:46	06/28/22 06:00	1
Zinc	ND		2.0	1.0	mg/Kg		06/17/22 10:46	06/28/22 06:00	1

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# QC Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

## Method: 1638 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 580-393469/2-A  
Matrix: Solid  
Analysis Batch: 395356

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 393469

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.20	0.060	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Barium	0.0854	J	20	0.040	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Cadmium	ND		0.10	0.0020	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Chromium	0.252		0.20	0.20	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Copper	0.0808	J	0.10	0.012	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Iron	4.90	J	20	4.0	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Manganese	0.267		0.10	0.010	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Nickel	0.0551	J	0.40	0.016	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Lead	ND		0.080	0.0080	mg/Kg		06/17/22 10:46	06/28/22 06:04	1
Zinc	ND		2.0	1.0	mg/Kg		06/17/22 10:46	06/28/22 06:04	1

Lab Sample ID: LCS 580-393469/3-A  
Matrix: Solid  
Analysis Batch: 395356

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 393469

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	100	102		mg/Kg		102	75 - 125
Barium	100	107	J	mg/Kg		107	75 - 125
Cadmium	80.0	83.1		mg/Kg		104	75 - 125
Chromium	100	102		mg/Kg		102	75 - 125
Copper	100	107		mg/Kg		107	75 - 125
Iron	2500	2590		mg/Kg		104	75 - 125
Manganese	100	102		mg/Kg		102	75 - 125
Nickel	100	107		mg/Kg		107	75 - 125
Lead	100	105		mg/Kg		105	75 - 125
Zinc	100	105		mg/Kg		105	75 - 125

Lab Sample ID: LCSD 580-393469/4-A  
Matrix: Solid  
Analysis Batch: 395356

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA  
Prep Batch: 393469

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	100	96.6		mg/Kg		97	75 - 125	5	20
Barium	100	104	J	mg/Kg		104	75 - 125	3	20
Cadmium	80.0	77.9		mg/Kg		97	75 - 125	6	20
Chromium	100	96.5		mg/Kg		97	75 - 125	6	20
Copper	100	100		mg/Kg		100	75 - 125	6	20
Iron	2500	2440		mg/Kg		98	75 - 125	6	20
Manganese	100	95.9		mg/Kg		96	75 - 125	6	20
Nickel	100	100		mg/Kg		100	75 - 125	7	20
Lead	100	98.3		mg/Kg		98	75 - 125	6	20
Zinc	100	98.4		mg/Kg		98	75 - 125	7	20

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

**Client Sample ID: G4/43REF-A1**

**Lab Sample ID: 580-112739-669**

Date Collected: 03/29/22 00:17

Matrix: Solid

Date Received: 04/18/22 12:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture - 2540		1	393115	06/08/22 09:13	D1C	FGS SEA

**Client Sample ID: G4/43REF-A1**

**Lab Sample ID: 580-112739-669**

Date Collected: 03/29/22 00:17

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 50.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631B CAR Prep			393162	06/08/22 13:04	D1C	FGS SEA
Total/NA	Analysis	1631B		20	395885	07/01/22 18:15	COW	FGS SEA
Total/NA	Prep	HF Bomb Prep			393469	06/17/22 10:46	M1R	FGS SEA
Total/NA	Analysis	1638		1	395356	06/28/22 11:42	AJR	FGS SEA

**Client Sample ID: G4/43REF-B1**

**Lab Sample ID: 580-112739-670**

Date Collected: 03/29/22 00:35

Matrix: Solid

Date Received: 04/18/22 12:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture - 2540		1	393115	06/08/22 09:13	D1C	FGS SEA

**Client Sample ID: G4/43REF-B1**

**Lab Sample ID: 580-112739-670**

Date Collected: 03/29/22 00:35

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 51.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631B CAR Prep			393162	06/08/22 13:04	D1C	FGS SEA
Total/NA	Analysis	1631B		20	395885	07/01/22 18:19	COW	FGS SEA
Total/NA	Prep	HF Bomb Prep			393469	06/17/22 10:46	M1R	FGS SEA
Total/NA	Analysis	1638		1	395356	06/28/22 11:55	AJR	FGS SEA

**Client Sample ID: G4/43REF-C1**

**Lab Sample ID: 580-112739-671**

Date Collected: 03/29/22 00:51

Matrix: Solid

Date Received: 04/18/22 12:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture - 2540		1	393115	06/08/22 09:13	D1C	FGS SEA

**Client Sample ID: G4/43REF-C1**

**Lab Sample ID: 580-112739-671**

Date Collected: 03/29/22 00:51

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 50.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631B CAR Prep			393162	06/08/22 13:04	D1C	FGS SEA
Total/NA	Analysis	1631B		20	395885	07/01/22 18:23	COW	FGS SEA
Total/NA	Prep	HF Bomb Prep			393469	06/17/22 10:46	M1R	FGS SEA
Total/NA	Analysis	1638		1	395356	06/28/22 11:59	AJR	FGS SEA

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# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

**Client Sample ID: SRWA-1B2X-A1**

**Lab Sample ID: 580-112739-672**

Date Collected: 03/28/22 15:32

Matrix: Solid

Date Received: 04/18/22 12:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture - 2540		1	393115	06/08/22 09:13	D1C	FGS SEA

**Client Sample ID: SRWA-1B2X-A1**

**Lab Sample ID: 580-112739-672**

Date Collected: 03/28/22 15:32

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 51.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631B CAR Prep			393162	06/08/22 13:04	D1C	FGS SEA
Total/NA	Analysis	1631B		50	395885	07/01/22 18:28	COW	FGS SEA
Total/NA	Prep	HF Bomb Prep			393469	06/17/22 10:46	M1R	FGS SEA
Total/NA	Analysis	1638		1	395356	06/28/22 12:04	AJR	FGS SEA

**Client Sample ID: SRWA-2B2X-A1**

**Lab Sample ID: 580-112739-673**

Date Collected: 03/28/22 16:07

Matrix: Solid

Date Received: 04/18/22 12:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture - 2540		1	393115	06/08/22 09:13	D1C	FGS SEA

**Client Sample ID: SRWA-2B2X-A1**

**Lab Sample ID: 580-112739-673**

Date Collected: 03/28/22 16:07

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 55.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631B CAR Prep			393162	06/08/22 13:04	D1C	FGS SEA
Total/NA	Analysis	1631B		20	395885	07/01/22 18:32	COW	FGS SEA
Total/NA	Prep	HF Bomb Prep			393469	06/17/22 10:46	M1R	FGS SEA
Total/NA	Analysis	1638		1	395356	06/28/22 12:08	AJR	FGS SEA

**Client Sample ID: SRWA-2B2X-A1-FD**

**Lab Sample ID: 580-112739-674**

Date Collected: 03/28/22 16:15

Matrix: Solid

Date Received: 04/18/22 12:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture - 2540		1	393115	06/08/22 09:13	D1C	FGS SEA

**Client Sample ID: SRWA-2B2X-A1-FD**

**Lab Sample ID: 580-112739-674**

Date Collected: 03/28/22 16:15

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 53.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631B CAR Prep			393162	06/08/22 13:04	D1C	FGS SEA
Total/NA	Analysis	1631B		20	395885	07/01/22 18:36	COW	FGS SEA
Total/NA	Prep	HF Bomb Prep			393469	06/17/22 10:46	M1R	FGS SEA
Total/NA	Analysis	1638		1	395356	06/28/22 12:13	AJR	FGS SEA

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

**Client Sample ID: SRWA-3B2X-A1**

**Lab Sample ID: 580-112739-675**

Date Collected: 03/28/22 16:47

Matrix: Solid

Date Received: 04/18/22 12:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture - 2540		1	393115	06/08/22 09:13	D1C	FGS SEA

**Client Sample ID: SRWA-3B2X-A1**

**Lab Sample ID: 580-112739-675**

Date Collected: 03/28/22 16:47

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 50.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631B CAR Prep			393162	06/08/22 13:04	D1C	FGS SEA
Total/NA	Analysis	1631B		50	395181	06/27/22 17:40	V1R	FGS SEA
Total/NA	Prep	HF Bomb Prep			393469	06/17/22 10:46	M1R	FGS SEA
Total/NA	Analysis	1638		1	395356	06/28/22 12:17	AJR	FGS SEA

**Client Sample ID: SRWA-4B2X-A1**

**Lab Sample ID: 580-112739-676**

Date Collected: 03/28/22 17:26

Matrix: Solid

Date Received: 04/18/22 12:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture - 2540		1	393115	06/08/22 09:13	D1C	FGS SEA

**Client Sample ID: SRWA-4B2X-A1**

**Lab Sample ID: 580-112739-676**

Date Collected: 03/28/22 17:26

Matrix: Solid

Date Received: 04/18/22 12:35

Percent Solids: 50.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631B CAR Prep			393162	06/08/22 13:04	D1C	FGS SEA
Total/NA	Analysis	1631B		20	395885	07/01/22 18:40	COW	FGS SEA
Total/NA	Prep	HF Bomb Prep			393469	06/17/22 10:46	M1R	FGS SEA
Total/NA	Analysis	1638		1	395356	06/28/22 12:21	AJR	FGS SEA

## Laboratory References:

FGS SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

## Laboratory: Eurofins Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-004	02-19-25

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids

ANAB	Dept. of Defense ELAP	L2236	01-19-25
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The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids

ANAB	Dept. of Energy	L2236	01-19-25
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The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

## Laboratory: Eurofins Seattle (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
ANAB	ISO/IEC 17025	L2236	01-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
California	State	2954	07-07-22
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	1631B CAR Prep	Solid	Mercury
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
Florida	NELAP	E87575	06-30-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Manganese
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
Louisiana	NELAP	03073	06-30-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

## Laboratory: Eurofins Seattle (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
Maine	State	WA01273	05-02-24
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	1631B CAR Prep	Solid	Mercury
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
Montana (UST)	State	NA	04-14-27
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	1631B CAR Prep	Solid	Mercury
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
New Jersey	NELAP	WA014	06-30-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	1631B CAR Prep	Solid	Mercury
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

## Laboratory: Eurofins Seattle (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
New York	NELAP	11662	04-01-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	1631B CAR Prep	Solid	Mercury
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
Oregon	NELAP	4167	07-07-22
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
Moisture - 2540		Solid	Percent Solids
US Fish & Wildlife	US Federal Programs	058448	05-31-22 *
USDA	US Federal Programs	P330-20-00031	02-10-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	1631B CAR Prep	Solid	Mercury
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Seattle

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

## Laboratory: Eurofins Seattle (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
Washington	State	C788	07-13-22
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	1631B CAR Prep	Solid	Mercury
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids
Wisconsin	State	399133460	08-31-22
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1638	HF Bomb Prep	Solid	Arsenic
1638	HF Bomb Prep	Solid	Barium
1638	HF Bomb Prep	Solid	Cadmium
1638	HF Bomb Prep	Solid	Chromium
1638	HF Bomb Prep	Solid	Copper
1638	HF Bomb Prep	Solid	Iron
1638	HF Bomb Prep	Solid	Lead
1638	HF Bomb Prep	Solid	Manganese
1638	HF Bomb Prep	Solid	Nickel
1638	HF Bomb Prep	Solid	Zinc
Moisture - 2540		Solid	Percent Moisture
Moisture - 2540		Solid	Percent Solids

## Sample Summary

Client: Tetra Tech, Inc.  
Project/Site: Project T423.12

Job ID: 580-112739-7

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-112739-669	G4/43REF-A1	Solid	03/29/22 00:17	04/18/22 12:35
580-112739-670	G4/43REF-B1	Solid	03/29/22 00:35	04/18/22 12:35
580-112739-671	G4/43REF-C1	Solid	03/29/22 00:51	04/18/22 12:35
580-112739-672	SRWA-1B2X-A1	Solid	03/28/22 15:32	04/18/22 12:35
580-112739-673	SRWA-2B2X-A1	Solid	03/28/22 16:07	04/18/22 12:35
580-112739-674	SRWA-2B2X-A1-FD	Solid	03/28/22 16:15	04/18/22 12:35
580-112739-675	SRWA-3B2X-A1	Solid	03/28/22 16:47	04/18/22 12:35
580-112739-676	SRWA-4B2X-A1	Solid	03/28/22 17:26	04/18/22 12:35



Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

## CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

**General Notes:**  
Please report results separately for each Project ID  
Please report all results to the MDL. J-flag results between MDL and RL  
Sediment results should be reprinted on a dry weight basis  
Please report results in PDF format with Excel EDD deliverable  
Please INVOICE separately for each Project ID

Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic Arsenic (EPA 1632)
T423.09	FUCPP-1B3X	3/19/2022	7:40	SED	FREEZE	1	1	1				
T423.09	FUCPP-1C1X	3/19/2022	5:43	SED	FREEZE	1	1	1				
T423.09	FUCPP-1C2	3/19/2022	5:24	SED	FREEZE	1	1	1				
T423.09	FUCPP-1C3	3/19/2022	3:45	SED	FREEZE	1	1	1				
T423.09	FUCPP-1D1	3/19/2022	7:01	SED	FREEZE	1	1	1				
T423.09	FUCPP-1D2	3/19/2022	17:18	SED	FREEZE	1	1	1				
T423.09	FUCPP-1D3	3/19/2022	3:06	SED	FREEZE	1	1	1				
T423.09	FUCPP-1E2	3/19/2022	2:42	SED	FREEZE	1	1	1				
T423.09	FUCPP-1F2	3/19/2022	2:22	SED	FREEZE	1	1	1				
T423.09	FUCPP-1G2	3/19/2022	2:01	SED	FREEZE	1	1	1				
T423.09	FUCPP-2C3X	3/18/2022	23:11	SED	FREEZE	1	1	1				
T423.09	FUCPP-2C3X-FD	3/18/2022	23:19	SED	FREEZE	1	1	1				
T423.09	FUCPP-2E2	3/19/2022	1:23	SED	FREEZE	1	1	1				
T423.09	FUCPP-2F2	3/19/2022	1:01	SED	FREEZE	1	1	1				
T423.09	FUCPP-2G2	3/19/2022	0:33	SED	FREEZE	1	1	1				
T423.09	FUCPP-3C1	3/18/2022	22:58	SED	FREEZE	1	1	1				
T423.09	FUCPP-3C2X	3/18/2022	22:45	SED	FREEZE	1	1	1				
T423.09	FUCPP-3D1	3/18/2022	19:57	SED	FREEZE	1	1	1				
T423.09	FUCPP-3D2	3/18/2022	20:15	SED	FREEZE	1	1	1				
T423.09	FUCPP-3D3	3/18/2022	20:34	SED	FREEZE	1	1	1				
T423.09	FUCPP-3E2	3/18/2022	19:40	SED	FREEZE	1	1	1				
T423.09	FUCPP-3F2	3/18/2022	19:24	SED	FREEZE	1	1	1				
T423.09	FUCPP-3G2	3/18/2022	19:07	SED	FREEZE	1	1	1				
T423.09	FUCPP-4B2X	3/19/2022	8:10	SED	FREEZE	1	1	1				
T423.09	FUCPP-4B3X	3/19/2022	7:37	SED	FREEZE	1	1	1				
T423.09	FUCPP-4E2	3/19/2022	8:40	SED	FREEZE	1	1	1				
T423.09	FUCPP-4F2	3/19/2022	8:51	SED	FREEZE	1	1	1				
T423.09	FUCPP-4G2	3/19/2022	9:08	SED	FREEZE	1	1	1				
T423.09	FUREF-A1	3/19/2022	12:26	SED	FREEZE	1	1	1				
T423.09	FUREF-B1	3/19/2022	12:39	SED	FREEZE	1	1	1				
T423.09	FUREF-C1	3/19/2022	12:52	SED	FREEZE	1	1	1				
T423.09	FUWE-1B2X	3/18/2022	17:34	SED	FREEZE	1	1	1				
T423.09	FUWE-2B2X	3/18/2022	17:17	SED	FREEZE	1	1	1				
T423.09	FUWE-3B1Y	3/18/2022	16:49	SED	FREEZE	1	1	1				
T423.09	FUWE-3B1Y-FD	3/18/2022	16:57	SED	FREEZE	1	1	1				
T423.09	FUWE-4B2X	3/18/2022	16:35	SED	FREEZE	1	1	1				



Relinquished by:

Relinquished by:

Received by:

Received by:

31 MAR 22

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic arsenic (EPA 1632)
T423.09	FUCPP-1C2-SW-1	3/19/2022	4:01	SW	FREEZE				1	1	1	
T423.09	FUCPP-1C2-SW-20	3/19/2022	4:09	SW	FREEZE				1	1	1	
T423.09	FUCPP-1C2-SW-40	3/19/2022	4:21	SW	FREEZE				1	1	1	
T423.09	FUCPP-1C2-SW-B	3/19/2022	4:33	SW	FREEZE				1	1	1	
T423.09	FUCPP-1C2-SW-B-FD	3/19/2022	4:46	SW	FREEZE				1	1	1	
T423.09	FUCPP-3C2X-SW-1	3/18/2022	21:44	SW	FREEZE				1	1	1	
T423.09	FUCPP-3C2X-SW-20	3/18/2022	21:52	SW	FREEZE				1	1	1	
T423.09	FUCPP-3C2X-SW-40	3/18/2022	22:11	SW	FREEZE				1	1	1	
T423.09	FUCPP-EQ	3/18/2022	21:30	SW	FREEZE				1	1	1	
T423.09	FUCPP-WB	3/18/2022	21:25	SW	FREEZE				1	1	1	
T423.09	FUREF-SW-1	3/19/2022	9:18	SW	FREEZE				1	1	1	
T423.09	FUREF-SW-20	3/19/2022	10:24	SW	FREEZE				1	1	1	
T423.09	FUREF-SW-40	3/19/2022	10:33	SW	FREEZE				1	1	1	
T423.09	FUREF-SW-B	3/19/2022	10:45	SW	FREEZE				1	1	1	
T423.10	MGWA-1B2Y	3/18/2022	12:24	SED	FREEZE	1	1	1	1			
T423.10	MGWA-1C2	3/18/2022	5:14	SED	FREEZE	1	1	1	1			
T423.10	MGWA-1CP2	3/18/2022	4:34	SED	FREEZE	1	1	1	1			
T423.10	MGWA-1D2	3/18/2022	3:53	SED	FREEZE	1	1	1	1			
T423.10	MGWA-2B2X	3/18/2022	10:54	SED	FREEZE	1	1	1	1			
T423.10	MGWA-2B2X-FD	3/18/2022	11:18	SED	FREEZE	1	1	1	1			
T423.10	MGWA-2C2	3/18/2022	10:25	SED	FREEZE	1	1	1	1			
T423.10	MGWA-3B2X	3/17/2022	23:29	SED	FREEZE	1	1	1	1			
T423.10	MGWA-3C2	3/17/2022	22:59	SED	FREEZE	1	1	1	1			
T423.10	MGWA-3CP2	3/17/2022	22:25	SED	FREEZE	1	1	1	1			
T423.10	MGWA-3D2	3/17/2022	17:35	SED	FREEZE	1	1	1	1			
T423.10	MGWA-4B2X	3/18/2022	7:35	SED	FREEZE	1	1	1	1			
T423.10	MGWA-4C2	3/18/2022	7:06	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1C1	3/22/2022	4:05	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1C1-FD	3/22/2022	4:23	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1C2	3/22/2022	3:26	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1CP1	3/22/2022	4:55	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1CP2	3/22/2022	5:31	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1CP3X	3/22/2022	7:18	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1D2	3/22/2022	7:48	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1E2	3/22/2022	8:18	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1F2	3/22/2022	18:48	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-1G2	3/22/2022	9:47	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-2C1X	3/21/2022	23:11	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-2C2	3/21/2022	22:45	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3CP2	3/21/2022	22:11	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-2D2	3/21/2022	21:46	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3C1	3/21/2022	4:47	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3C2	3/21/2022	4:17	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3C3X	3/21/2022	5:29	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3CP1	3/21/2022	10:33	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3CP2	3/21/2022	3:22	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3CP3X	3/20/2022	22:25	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3D2	3/20/2022	21:34	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3E2	3/20/2022	20:57	SED	FREEZE	1	1	1	1			
T423.10	NPCPP-3F2X	3/20/2022	20:28	SED	FREEZE	1	1	1	1			

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### CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com


Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic arsenic (EPA 1632)
T423 10	NPCCP-3G2	3/20/2022	20:02	SED	FREEZE	1	1	1				
T423 10	NPCCP-4C2	3/21/2022	11:03	SED	FREEZE	1	1	1				
T423 10	NPCCP-4CP2	3/21/2022	20:07	SED	FREEZE	1	1	1				
T423 10	NPCCP-4D2	3/21/2022	20:39	SED	FREEZE	1	1	1				
T423 10	NPREF-A1	3/23/2022	17:20	SED	FREEZE	1	1	1				
T423 10	NPREF-B1	3/23/2022	17:09	SED	FREEZE	1	1	1				
T423 10	NPREF-C1	3/23/2022	17:34	SED	FREEZE	1	1	1				
T423 10	NPWB-1C2	3/23/2022	4:37	SED	FREEZE	1	1	1				
T423 10	NPWB-1CP2	3/23/2022	5:07	SED	FREEZE	1	1	1				
T423 10	NPWB-1CP2-FD	3/23/2022	5:28	SED	FREEZE	1	1	1				
T423 10	NPWB-1D2	3/23/2022	10:18	SED	FREEZE	1	1	1				
T423 10	NPWB-2B3	3/22/2022	20:01	SED	FREEZE	1	1	1				
T423 10	NPWB-2C2X	3/22/2022	20:26	SED	FREEZE	1	1	1				
T423 10	NPWB-3B2	3/22/2022	19:38	SED	FREEZE	1	1	1				
T423 10	NPWB-3C2	3/22/2022	22:31	SED	FREEZE	1	1	1				
T423 10	NPWB-3CP2	3/22/2022	22:03	SED	FREEZE	1	1	1				
T423 10	NPWB-3D2	3/22/2022	21:35	SED	FREEZE	1	1	1				
T423 10	NPWB-4B3X	3/23/2022	4:03	SED	FREEZE	1	1	1				
T423 10	NPWB-4C2	3/23/2022	3:27	SED	FREEZE	1	1	1				
T423 10	NPWG-1B2X	3/20/2022	5:23	SED	FREEZE	1	1	1				
T423 10	NPWG-1C2	3/20/2022	6:07	SED	FREEZE	1	1	1				
T423 10	NPWG-1CP2	3/20/2022	15:13	SED	FREEZE	1	1	1				
T423 10	NPWG-1D2	3/20/2022	19:10	SED	FREEZE	1	1	1				
T423 10	NPWG-2B2X	3/20/2022	16:46	SED	FREEZE	1	1	1				
T423 10	NPWG-2B2X-FD	3/20/2022	17:06	SED	FREEZE	1	1	1				
T423 10	NPWG-2C2	3/20/2022	17:33	SED	FREEZE	1	1	1				
T423 10	NPWG-3B2X	3/20/2022	1:37	SED	FREEZE	1	1	1				
T423 10	NPWG-3C2	3/19/2022	23:09	SED	FREEZE	1	1	1				
T423 10	NPWG-3CP2	3/19/2022	22:41	SED	FREEZE	1	1	1				
T423 10	NPWG-3D2	3/19/2022	22:11	SED	FREEZE	1	1	1				
T423 10	NPWG-4B2X	3/20/2022	2:39	SED	FREEZE	1	1	1				
T423 10	NPWG-4C2	3/20/2022	3:12	SED	FREEZE	1	1	1				
T423 10	PACPP-1C1	3/14/2022	10:48	SED	FREEZE	1	1	1				
T423 10	PACPP-1C2X	3/14/2022	10:05	SED	FREEZE	1	1	1				
T423 10	PACPP-1C3X	3/12/2022	23:02	SED	FREEZE	1	1	1				
T423 10	PACPP-1CP1	3/14/2022	11:16	SED	FREEZE	1	1	1				
T423 10	PACPP-1CP2X	3/12/2022	21:51	SED	FREEZE	1	1	1				
T423 10	PACPP-1CP3	3/12/2022	22:29	SED	FREEZE	1	1	1				
T423 10	PACPP-1D2	3/12/2022	21:11	SED	FREEZE	1	1	1				
T423 10	PACPP-1E2	3/12/2022	20:05	SED	FREEZE	1	1	1				
T423 10	PACPP-1G2	3/12/2022	19:25	SED	FREEZE	1	1	1				
T423 10	PACPP-1G2	3/12/2022	18:42	SED	FREEZE	1	1	1				
T423 10	PACPP-2C2	3/14/2022	4:58	SED	FREEZE	1	1	1				
T423 10	PACPP-2CP2	3/14/2022	3:50	SED	FREEZE	1	1	1				
T423 10	PACPP-2D2	3/14/2022	9:15	SED	FREEZE	1	1	1				
T423 10	PACPP-3C1	3/14/2022	15:45	SED	FREEZE	1	1	1				
T423 10	PACPP-3C2Y	3/14/2022	2:36	SED	FREEZE	1	1	1				
T423 10	PACPP-3C3X	3/14/2022	19:52	SED	FREEZE	1	1	1				
T423 10	PACPP-3CP1X	3/13/2022	4:50	SED	FREEZE	1	1	1				

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## CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic Arsenic (EPA 1632)
T423.10	PACPP-3CP2	3/13/2022	4:12	SED	FREEZE	1	1	1	1			
T423.10	PACPP-3CP3	3/13/2022	3:34	SED	FREEZE	1	1	1	1			
T423.10	PACPP-3D2X	3/13/2022	2:30	SED	FREEZE	1	1	1	1			
T423.10	PACPP-3E2X	3/13/2022	1:54	SED	FREEZE	1	1	1	1			
T423.10	PACPP-3F2X	3/13/2022	1:16	SED	FREEZE	1	1	1	1			
T423.10	PACPP-3G2	3/13/2022	0:40	SED	FREEZE	1	1	1	1			
T423.10	PACPP-4C2	3/13/2022	23:15	SED	FREEZE	1	1	1	1			
T423.10	PACPP-4CP2X	3/13/2022	20:23	SED	FREEZE	1	1	1	1			
T423.10	PACPP-4D2X	3/13/2022	19:40	SED	FREEZE	1	1	1	1			
T423.10	PAEF-A1	3/13/2022	11:17	SED	FREEZE	1	1	1	1			
T423.10	PAEF-B1	3/13/2022	13:48	SED	FREEZE	1	1	1	1			
T423.10	PAEF-C1	3/13/2022	13:59	SED	FREEZE	1	1	1	1			
T423.10	PAWB-1C2	3/14/2022	22:24	SED	FREEZE	1	1	1	1			
T423.10	PAWB-1CP2	3/14/2022	21:46	SED	FREEZE	1	1	1	1			
T423.10	PAWB-1D2	3/14/2022	21:03	SED	FREEZE	1	1	1	1			
T423.10	PAWB-2B1X	3/14/2022	22:55	SED	FREEZE	1	1	1	1			
T423.10	PAWB-2C2	3/16/2022	19:09	SED	FREEZE	1	1	1	1			
T423.10	PAWB-3B2	3/16/2022	20:14	SED	FREEZE	1	1	1	1			
T423.10	PAWB-3C2	3/16/2022	20:43	SED	FREEZE	1	1	1	1			
T423.10	PAWB-3CP2	3/15/2022	5:13	SED	FREEZE	1	1	1	1			
T423.10	PAWB-3CP2-FD	3/15/2022	5:41	SED	FREEZE	1	1	1	1			
T423.10	PAWB-3D2	3/16/2022	21:39	SED	FREEZE	1	1	1	1			
T423.10	PAWB-4B2X	3/16/2022	19:44	SED	FREEZE	1	1	1	1			
T423.10	PAWB-4C2	3/15/2022	2:39	SED	FREEZE	1	1	1	1			
T423.10	PAWE-1B1	3/16/2022	5:37	SED	FREEZE	1	1	1	1			
T423.10	PAWE-1C2	3/16/2022	5:00	SED	FREEZE	1	1	1	1			
T423.10	PAWE-1CP2	3/16/2022	4:22	SED	FREEZE	1	1	1	1			
T423.10	PAWE-1D2	3/16/2022	3:41	SED	FREEZE	1	1	1	1			
T423.10	PAWE-2B3	3/17/2022	4:55	SED	FREEZE	1	1	1	1			
T423.10	PAWE-2B3-FD	3/17/2022	5:16	SED	FREEZE	1	1	1	1			
T423.10	PAWE-2C2	3/17/2022	6:58	SED	FREEZE	1	1	1	1			
T423.10	PAWE-3B3	3/15/2022	23:19	SED	FREEZE	1	1	1	1			
T423.10	PAWE-3C2	3/15/2022	22:47	SED	FREEZE	1	1	1	1			
T423.10	PAWE-3CP2	3/15/2022	22:16	SED	FREEZE	1	1	1	1			
T423.10	PAWE-3D2	3/15/2022	21:35	SED	FREEZE	1	1	1	1			
T423.10	PAWE-4B2	3/17/2022	4:18	SED	FREEZE	1	1	1	1			
T423.10	PAWE-4C2	3/17/2022	3:39	SED	FREEZE	1	1	1	1			

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### CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic Arsenic (EPA 1632)
T423.10	MGWA-1B2Y-SW-1	3/18/2022	0:32	SW	FREEZE				1	1		
T423.10	MGWA-1B2Y-SW-20	3/18/2022	0:43	SW	FREEZE				1	1		
T423.10	MGWA-1B2Y-SW-40	3/18/2022	1:00	SW	FREEZE				1	1		
T423.10	MGWA-1CP2-SW-B	3/18/2022	1:14	SW	FREEZE				1	1		
T423.10	MGWA-1CP2-SW-1	3/18/2022	2:03	SW	FREEZE				1	1		
T423.10	MGWA-1CP2-SW-20	3/18/2022	2:10	SW	FREEZE				1	1		
T423.10	MGWA-1CP2-SW-40	3/18/2022	2:20	SW	FREEZE				1	1		
T423.10	MGWA-1CP2-SW-B	3/18/2022	2:31	SW	FREEZE				1	1		
T423.10	MGWA-1CP2-SW-B-FD	3/18/2022	2:44	SW	FREEZE				1	1		
T423.10	MGWA-3B2X-SW-1	3/17/2022	20:45	SW	FREEZE				1	1		
T423.10	MGWA-3B2X-SW-20	3/17/2022	20:53	SW	FREEZE				1	1		
T423.10	MGWA-3B2X-SW-40	3/17/2022	21:02	SW	FREEZE				1	1		
T423.10	MGWA-3B2X-SW-B	3/17/2022	21:13	SW	FREEZE				1	1		
T423.10	MGWA-3CP2-SW-1	3/17/2022	19:32	SW	FREEZE				1	1		
T423.10	MGWA-3CP2-SW-20	3/17/2022	19:39	SW	FREEZE				1	1		
T423.10	MGWA-3CP2-SW-40	3/17/2022	19:47	SW	FREEZE				1	1		
T423.10	MGWA-3CP2-SW-B	3/17/2022	20:00	SW	FREEZE				1	1		
T423.10	MGWA-EQ	3/17/2022	19:10	SW	FREEZE				1	1		
T423.10	MGWA-WB	3/17/2022	19:15	SW	FREEZE				1	1		
T423.10	NPCPP-1C2-SW-1	3/21/2022	16:57	SW	FREEZE				1	1		
T423.10	NPCPP-1C2-SW-20	3/21/2022	17:04	SW	FREEZE				1	1		
T423.10	NPCPP-1C2-SW-40	3/21/2022	17:12	SW	FREEZE				1	1		
T423.10	NPCPP-1C2-SW-B	3/21/2022	17:22	SW	FREEZE				1	1		
T423.10	NPCPP-1CP2-SW-1	3/21/2022	15:53	SW	FREEZE				1	1		
T423.10	NPCPP-1CP2-SW-20	3/21/2022	16:00	SW	FREEZE				1	1		
T423.10	NPCPP-1CP2-SW-40	3/21/2022	16:08	SW	FREEZE				1	1		
T423.10	NPCPP-1CP2-SW-B	3/21/2022	16:21	SW	FREEZE				1	1		
T423.10	NPCPP-2C2-SW-1	3/22/2022	0:31	SW	FREEZE				1	1		
T423.10	NPCPP-2C2-SW-20	3/22/2022	0:38	SW	FREEZE				1	1		
T423.10	NPCPP-2C2-SW-40	3/22/2022	0:48	SW	FREEZE				1	1		
T423.10	NPCPP-3C2-SW-1	3/22/2022	1:01	SW	FREEZE				1	1		
T423.10	NPCPP-3C2-SW-20	3/22/2022	1:52	SW	FREEZE				1	1		
T423.10	NPCPP-3C2-SW-40	3/22/2022	1:59	SW	FREEZE				1	1		
T423.10	NPCPP-3C2-SW-B	3/22/2022	2:03	SW	FREEZE				1	1		
T423.10	NPCPP-3CP2-SW-1	3/21/2022	2:20	SW	FREEZE				1	1		
T423.10	NPCPP-3CP2-SW-20	3/21/2022	2:07	SW	FREEZE				1	1		
T423.10	NPCPP-3CP2-SW-40	3/21/2022	2:15	SW	FREEZE				1	1		
T423.10	NPCPP-3CP2-SW-B	3/21/2022	2:24	SW	FREEZE				1	1		
T423.10	NPCPP-4C2-SW-1	3/21/2022	2:36	SW	FREEZE				1	1		
T423.10	NPCPP-4C2-SW-20	3/21/2022	19:26	SW	FREEZE				1	1		
T423.10	NPCPP-4C2-SW-40	3/21/2022	19:31	SW	FREEZE				1	1		
T423.10	NPCPP-4C2-SW-B	3/21/2022	19:40	SW	FREEZE				1	1		
T423.10	NPCPP-EQ	3/21/2022	19:50	SW	FREEZE				1	1		
T423.10	NPCPP-WB	3/21/2022	1:50	SW	FREEZE				1	1		
T423.10	NPCPP-WB	3/21/2022	1:45	SW	FREEZE				1	1		
T423.10	NPCPP-SW-1	3/23/2022	16:05	SW	FREEZE				1	1		
T423.10	NPCPP-SW-20	3/23/2022	16:11	SW	FREEZE				1	1		
T423.10	NPCPP-SW-40	3/23/2022	16:19	SW	FREEZE				1	1		
T423.10	NPCPP-SW-40-FD	3/23/2022	16:28	SW	FREEZE				1	1		
T423.10	NPCPP-SW-B	3/23/2022	16:37	SW	FREEZE				1	1		

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CHAIN OF CUSTODY

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Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic Arsenic (EPA 1632)
T423.10	NPWB-1C2-SW-1	3/23/2022	1:45	SW	FREEZE				1	1	1	
T423.10	NPWB-1C2-SW-20	3/23/2022	1:52	SW	FREEZE				1	1	1	
T423.10	NPWB-1C2-SW-40	3/23/2022	2:01	SW	FREEZE				1	1	1	
T423.10	NPWB-1C2-SW-B	3/23/2022	2:17	SW	FREEZE				1	1	1	
T423.10	NPWB-1CP2-SW-1	3/23/2022	0:26	SW	FREEZE				1	1	1	
T423.10	NPWB-1CP2-SW-20	3/23/2022	0:33	SW	FREEZE				1	1	1	
T423.10	NPWB-1CP2-SW-40	3/23/2022	0:42	SW	FREEZE				1	1	1	
T423.10	NPWB-1CP2-SW-B	3/23/2022	0:54	SW	FREEZE				1	1	1	
T423.10	NPWB-3B2-SW-1	3/22/2022	18:45	SW	FREEZE				1	1	1	
T423.10	NPWB-3B2-SW-20	3/22/2022	18:51	SW	FREEZE				1	1	1	
T423.10	NPWB-3B2-SW-40	3/22/2022	18:59	SW	FREEZE				1	1	1	
T423.10	NPWB-3B2-SW-B	3/22/2022	19:09	SW	FREEZE				1	1	1	
T423.10	NPWB-3CP2-SW-1	3/22/2022	16:35	SW	FREEZE				1	1	1	
T423.10	NPWB-3CP2-SW-1-FD	3/22/2022	16:40	SW	FREEZE				1	1	1	
T423.10	NPWB-3CP2-SW-20	3/22/2022	16:45	SW	FREEZE				1	1	1	
T423.10	NPWB-3CP2-SW-40	3/22/2022	16:53	SW	FREEZE				1	1	1	
T423.10	NPWB-3CP2-SW-B	3/22/2022	17:03	SW	FREEZE				1	1	1	
T423.10	NPWB-EQ	3/22/2022	16:20	SW	FREEZE				1	1	1	
T423.10	NPWB-WB	3/22/2022	16:25	SW	FREEZE				1	1	1	
T423.10	NPWG-1B2X-SW-1	3/20/2022	4:17	SW	FREEZE				1	1	1	
T423.10	NPWG-1B2X-SW-20	3/20/2022	4:24	SW	FREEZE				1	1	1	
T423.10	NPWG-1B2X-SW-40	3/20/2022	4:33	SW	FREEZE				1	1	1	
T423.10	NPWG-1B2X-SW-B	3/20/2022	4:44	SW	FREEZE				1	1	1	
T423.10	NPWG-1CP2-SW-1	3/20/2022	14:08	SW	FREEZE				1	1	1	
T423.10	NPWG-1CP2-SW-20	3/20/2022	14:13	SW	FREEZE				1	1	1	
T423.10	NPWG-1CP2-SW-40	3/20/2022	14:21	SW	FREEZE				1	1	1	
T423.10	NPWG-1CP2-SW-40-FD	3/20/2022	14:30	SW	FREEZE				1	1	1	
T423.10	NPWG-1CP2-SW-B	3/20/2022	14:40	SW	FREEZE				1	1	1	
T423.10	NPWG-3B2X-SW-1	3/20/2022	0:31	SW	FREEZE				1	1	1	
T423.10	NPWG-3B2X-SW-1	3/20/2022	1:01	SW	FREEZE				1	1	1	
T423.10	NPWG-3B2X-SW-20	3/20/2022	0:41	SW	FREEZE				1	1	1	
T423.10	NPWG-3B2X-SW-40	3/20/2022	0:30	SW	FREEZE				1	1	1	
T423.10	NPWG-3CP2-SW-1	3/19/2022	19:47	SW	FREEZE				1	1	1	
T423.10	NPWG-3CP2-SW-20	3/19/2022	19:53	SW	FREEZE				1	1	1	
T423.10	NPWG-3CP2-SW-40	3/19/2022	20:01	SW	FREEZE				1	1	1	
T423.10	NPWG-3CP2-SW-B	3/19/2022	20:11	SW	FREEZE				1	1	1	
T423.10	NPWG-EQ	3/19/2022	19:03	SW	FREEZE				1	1	1	
T423.10	NPWG-WB	3/19/2022	19:18	SW	FREEZE				1	1	1	

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*[Signature]*  
4/2/22  
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CHAIN OF CUSTODY

Report to:  
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Tetra Tech  
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Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic Arsenic (EPA 1632)
T423.10	PACPP-1C2X-SW-1	3/14/2022	13.13	SW	FREEZE				1	1	1	1
T423.10	PACPP-1C2X-SW-20	3/14/2022	13.21	SW	FREEZE				1	1	1	1
T423.10	PACPP-1C2X-SW-40	3/14/2022	13.30	SW	FREEZE				1	1	1	1
T423.10	PACPP-1C2X-SW-B	3/14/2022	13.41	SW	FREEZE				1	1	1	1
T423.10	PACPP-1CP2X-SW-1	3/14/2022	15.22	SW	FREEZE				1	1	1	1
T423.10	PACPP-1CP2X-SW-20	3/14/2022	15.29	SW	FREEZE				1	1	1	1
T423.10	PACPP-1CP2X-SW-40	3/14/2022	15.37	SW	FREEZE				1	1	1	1
T423.10	PACPP-1CP2X-SW-B	3/14/2022	15.48	SW	FREEZE				1	1	1	1
T423.10	PACPP-2C2-SW-1	3/14/2022	16.16	SW	FREEZE				1	1	1	1
T423.10	PACPP-2C2-SW-20	3/14/2022	16.23	SW	FREEZE				1	1	1	1
T423.10	PACPP-2C2-SW-40	3/14/2022	16.31	SW	FREEZE				1	1	1	1
T423.10	PACPP-2C2-SW-B	3/14/2022	16.42	SW	FREEZE				1	1	1	1
T423.10	PACPP-3C2Y-SW-1	3/14/2022	18.36	SW	FREEZE				1	1	1	1
T423.10	PACPP-3C2Y-SW-20	3/14/2022	18.44	SW	FREEZE				1	1	1	1
T423.10	PACPP-3C2Y-SW-40	3/14/2022	18.52	SW	FREEZE				1	1	1	1
T423.10	PACPP-3C2Y-SW-B	3/14/2022	19.04	SW	FREEZE				1	1	1	1
T423.10	PACPP-3CP2-SW-1	3/14/2022	0.41	SW	FREEZE				1	1	1	1
T423.10	PACPP-3CP2-SW-20	3/14/2022	0.49	SW	FREEZE				1	1	1	1
T423.10	PACPP-3CP2-SW-40	3/14/2022	1.17	SW	FREEZE				1	1	1	1
T423.10	PACPP-3CP2-SW-B	3/14/2022	1.29	SW	FREEZE				1	1	1	1
T423.10	PACPP-4C2-SW-1	3/13/2022	22.35	SW	FREEZE				1	1	1	1
T423.10	PACPP-4C2-SW-20	3/13/2022	22.44	SW	FREEZE				1	1	1	1
T423.10	PACPP-4C2-SW-40	3/13/2022	22.53	SW	FREEZE				1	1	1	1
T423.10	PACPP-4C2-SW-B	3/13/2022	23.04	SW	FREEZE				1	1	1	1
T423.10	PACPP-EQ	3/12/2022	10.10	SW	FREEZE				1	1	1	1
T423.10	PACPP-WB	3/12/2022	10.05	SW	FREEZE				1	1	1	1
T423.10	PADEF-SW-1	3/13/2022	7.38	SW	FREEZE				1	1	1	1
T423.10	PADEF-SW-20	3/13/2022	7.48	SW	FREEZE				1	1	1	1
T423.10	PADEF-SW-40	3/13/2022	7.57	SW	FREEZE				1	1	1	1
T423.10	PADEF-SW-B	3/13/2022	8.09	SW	FREEZE				1	1	1	1
T423.10	PAWB-1CP2-SW-1	3/15/2022	0.37	SW	FREEZE				1	1	1	1
T423.10	PAWB-1CP2-SW-20	3/15/2022	0.43	SW	FREEZE				1	1	1	1
T423.10	PAWB-1CP2-SW-40	3/15/2022	1.03	SW	FREEZE				1	1	1	1
T423.10	PAWB-1CP2-SW-B	3/15/2022	1.36	SW	FREEZE				1	1	1	1
T423.10	PAWB-3B2-SW-1	3/15/2022	19.16	SW	FREEZE				1	1	1	1
T423.10	PAWB-3B2-SW-1-FD	3/15/2022	19.22	SW	FREEZE				1	1	1	1
T423.10	PAWB-3B2-SW-20	3/15/2022	19.27	SW	FREEZE				1	1	1	1
T423.10	PAWB-3B2-SW-40	3/15/2022	19.37	SW	FREEZE				1	1	1	1
T423.10	PAWB-3B2-SW-B	3/15/2022	19.48	SW	FREEZE				1	1	1	1
T423.10	PAWB-3CP2-SW-1	3/15/2022	3.46	SW	FREEZE				1	1	1	1
T423.10	PAWB-3CP2-SW-20	3/15/2022	3.58	SW	FREEZE				1	1	1	1
T423.10	PAWB-3CP2-SW-40	3/15/2022	4.09	SW	FREEZE				1	1	1	1
T423.10	PAWB-3CP2-SW-B	3/15/2022	4.26	SW	FREEZE				1	1	1	1
T423.10	PAWB-EQ	3/15/2022	0.20	SW	FREEZE				1	1	1	1
T423.10	PAWB-WB	3/15/2022	0.15	SW	FREEZE				1	1	1	1

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CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic arsenic (EPA 1632)
T423.10	PAWE-1B1-SW-1	3/16/2022	0.44	SW	FREEZE				1	1	1	
T423.10	PAWE-1B1-SW-20	3/16/2022	0.53	SW	FREEZE				1	1	1	
T423.10	PAWE-1B1-SW-40	3/16/2022	1.03	SW	FREEZE				1	1	1	
T423.10	PAWE-1B1-SW-B	3/16/2022	1.19	SW	FREEZE				1	1	1	
T423.10	PAWE-1CP2-SW-1	3/16/2022	2.02	SW	FREEZE				1	1	1	
T423.10	PAWE-1CP2-SW-20	3/16/2022	2.09	SW	FREEZE				1	1	1	
T423.10	PAWE-1CP2-SW-40	3/16/2022	2.18	SW	FREEZE				1	1	1	
T423.10	PAWE-1CP2-SW-B	3/16/2022	2.30	SW	FREEZE				1	1	1	
T423.10	PAWE-3B3-SW-1	3/17/2022	0.31	SW	FREEZE				1	1	1	
T423.10	PAWE-3B3-SW-20	3/17/2022	0.37	SW	FREEZE				1	1	1	
T423.10	PAWE-3B3-SW-40	3/17/2022	0.46	SW	FREEZE				1	1	1	
T423.10	PAWE-3B3-SW-B	3/17/2022	0.57	SW	FREEZE				1	1	1	
T423.10	PAWE-3CP2-SW-1	3/17/2022	1.54	SW	FREEZE				1	1	1	
T423.10	PAWE-3CP2-SW-20	3/17/2022	2.02	SW	FREEZE				1	1	1	
T423.10	PAWE-3CP2-SW-20-FD	3/17/2022	2.09	SW	FREEZE				1	1	1	
T423.10	PAWE-3CP2-SW-40	3/17/2022	2.16	SW	FREEZE				1	1	1	
T423.10	PAWE-3CP2-SW-B	3/17/2022	2.28	SW	FREEZE				1	1	1	
T423.10	PAWE-EQ	3/16/2022	0.40	SW	FREEZE				1	1	1	
T423.10	PAWE-WB	3/16/2022	0.35	SW	FREEZE				1	1	1	
T423.11	CBREF-A1	3/24/2022	19.25	SED	FREEZE	1	1	1				
T423.11	CBREF-B1	3/24/2022	19.37	SED	FREEZE	1	1	1				
T423.11	CBREF-C1	3/24/2022	19.53	SED	FREEZE	1	1	1				
T423.11	WPWB-1B1Y	3/24/2022	11.24	SED	FREEZE	1	1	1				
T423.11	WPWB-1B2Y	3/24/2022	8.45	SED	FREEZE	1	1	1				
T423.11	WPWB-1B3X	3/24/2022	9.02	SED	FREEZE	1	1	1				
T423.11	WPWB-1C1	3/24/2022	12.25	SED	FREEZE	1	1	1				
T423.11	WPWB-1C1-FD	3/24/2022	12.33	SED	FREEZE	1	1	1				
T423.11	WPWB-1C2	3/24/2022	12.47	SED	FREEZE	1	1	1				
T423.11	WPWB-1C3	3/24/2022	13.03	SED	FREEZE	1	1	1				
T423.11	WPWB-1D1	3/24/2022	13.59	SED	FREEZE	1	1	1				
T423.11	WPWB-1D2	3/24/2022	13.41	SED	FREEZE	1	1	1				
T423.11	WPWB-1D3	3/24/2022	13.24	SED	FREEZE	1	1	1				
T423.11	WPWB-2B1X	3/24/2022	9.45	SED	FREEZE	1	1	1				
T423.11	WPWB-2C2	3/24/2022	10.00	SED	FREEZE	1	1	1				
T423.11	WPWB-3B1X	3/24/2022	11.06	SED	FREEZE	1	1	1				
T423.11	WPWB-3B2X	3/24/2022	5.32	SED	FREEZE	1	1	1				
T423.11	WPWB-3B3X	3/24/2022	5.48	SED	FREEZE	1	1	1				
T423.11	WPWB-3C1	3/24/2022	2.04	SED	FREEZE	1	1	1				
T423.11	WPWB-3C2	3/24/2022	2.21	SED	FREEZE	1	1	1				
T423.11	WPWB-3C3	3/24/2022	2.39	SED	FREEZE	1	1	1				
T423.11	WPWB-3D1	3/24/2022	1.42	SED	FREEZE	1	1	1				
T423.11	WPWB-3D2	3/24/2022	1.20	SED	FREEZE	1	1	1				
T423.11	WPWB-3D3	3/24/2022	0.86	SED	FREEZE	1	1	1				
T423.11	WPWB-4B1X	3/24/2022	3.51	SED	FREEZE	1	1	1				
T423.11	WPWB-4C2	3/24/2022	2.57	SED	FREEZE	1	1	1				
T423.11	WPWB-4C2-FD	3/24/2022	3.06	SED	FREEZE	1	1	1				

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### CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	Hg (EPA 1631B)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA 1631M)	Dry Weight	Hg (EPA 1631E)	Metals (As, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) (EPA1640)	Tissue Hg (EPA 1631B)	Tissue - Inorganic arsenic (EPA 1632)
T423.11	CBREF-SW-1	3/24/2022	17:06	SW	FREEZE				1	1		
T423.11	CBREF-SW-20	3/24/2022	17:17	SW	FREEZE				1	1		
T423.11	CBREF-SW-40	3/24/2022	17:29	SW	FREEZE				1	1		
T423.11	CBREF-SW-B	3/24/2022	17:40	SW	FREEZE				1	1		
T423.11	WPWB-1B2Y-SW-1	3/24/2022	7:16	SW	FREEZE				1	1		
T423.11	WPWB-1B2Y-SW-1-FD	3/24/2022	7:23	SW	FREEZE				1	1		
T423.11	WPWB-1B2Y-SW-20	3/24/2022	7:29	SW	FREEZE				1	1		
T423.11	WPWB-1B2Y-SW-40	3/24/2022	7:39	SW	FREEZE				1	1		
T423.11	WPWB-1B2Y-SW-B	3/24/2022	7:52	SW	FREEZE				1	1		
T423.11	WPWB-3B2X-SW-1	3/24/2022	4:19	SW	FREEZE				1	1		
T423.11	WPWB-3B2X-SW-20	3/24/2022	4:27	SW	FREEZE				1	1		
T423.11	WPWB-3B2X-SW-40	3/24/2022	4:37	SW	FREEZE				1	1		
T423.11	WPWB-3B2X-SW-B	3/24/2022	4:50	SW	FREEZE				1	1		
T423.11	WPWB-EQ	3/24/2022	0:35	SW	FREEZE				1	1		
T423.11	WPWB-WB	3/24/2022	0:32	SW	FREEZE				1	1		
T423.12	G4I43REF-A1	3/29/2022	0:17	SED	FREEZE	1	1	1				
T423.12	G4I43REF-B1	3/29/2022	0:35	SED	FREEZE	1	1	1				
T423.12	G4I43REF-C1	3/29/2022	0:51	SED	FREEZE	1	1	1				
T423.12	SRWA-1B2X-A1	3/28/2022	15:32	SED	FREEZE	1	1	1				
T423.12	SRWA-2B2X-A1	3/28/2022	16:07	SED	FREEZE	1	1	1				
T423.12	SRWA-2B2X-A1-FD	3/28/2022	16:15	SED	FREEZE	1	1	1				
T423.12	SRWA-3B2X-A1	3/28/2022	16:47	SED	FREEZE	1	1	1				
T423.12	SRWA-4B2X-A1	3/28/2022	17:26	SED	FREEZE	1	1	1				
T423.14	TAWB-1B2X	3/26/2022	18:47	TISSUE	FREEZE						1	1
T423.14	TAWB-1CP2X	3/26/2022	20:14	TISSUE	FREEZE						1	1
T423.14	TAWB-1D2	3/26/2022	23:01	TISSUE	FREEZE						1	1
T423.14	TAWB-2B2X	3/26/2022	15:52	TISSUE	FREEZE						1	1
T423.14	TAWB-3B1Y	3/26/2022	0:21	TISSUE	FREEZE						1	1
T423.14	TAWB-3CP2	3/26/2022	2:16	TISSUE	FREEZE						1	1
T423.14	TAWB-3D2	3/26/2022	9:40	TISSUE	FREEZE						1	1
T423.14	TAWB-4B2X	3/26/2022	9:48	TISSUE	FREEZE						1	1
T423.14	TAWC-1B2X	3/25/2022	16:24	TISSUE	FREEZE						1	1
T423.14	TAWC-1CP2	3/25/2022	18:58	TISSUE	FREEZE						1	1
T423.14	TAWC-1D2	3/25/2022	21:42	TISSUE	FREEZE						1	1
T423.14	TAWC-2B2X	3/25/2022	14:23	TISSUE	FREEZE						1	1
T423.14	TAWC-3B2X	3/25/2022	3:53	TISSUE	FREEZE						1	1
T423.14	TAWC-3CP2	3/25/2022	4:52	TISSUE	FREEZE						1	1
T423.14	TAWC-3D2	3/25/2022	7:40	TISSUE	FREEZE						1	1
T423.14	TAWC-4B2X	3/25/2022	12:32	TISSUE	FREEZE						1	1
T423.14	TAWE-1B2X	3/27/2022	20:11	TISSUE	FREEZE						1	1
T423.14	TAWE-1CP2	3/27/2022	1:45	TISSUE	FREEZE						1	1
T423.14	TAWE-1D2	3/27/2022	4:47	TISSUE	FREEZE						1	1
T423.14	TAWE-2B2X	3/27/2022	17:23	TISSUE	FREEZE						1	1
T423.14	TAWE-3B2X	3/27/2022	13:09	TISSUE	FREEZE						1	1
T423.14	TAWE-3CP2	3/27/2022	15:00	TISSUE	FREEZE						1	1
T423.14	TAWE-3D2	3/27/2022	3:47	TISSUE	FREEZE						1	1
T423.14	TAWE-4B2X	3/27/2022	22:30	TISSUE	FREEZE						1	1

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Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., ste 150  
Lafayette, CA  
ted.donn@tetratech.com

### General Notes:


Please report results separately for each Project ID (T423.03, T423.05, t423.09, MKT2)  
Please report all results to the MDL, J-flag results between MDL and RL  
Please report results in PDF format with Excel EDD deliverable  
Please INVOICE separately for each Project ID

PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
T423.03	ERCPP-1002	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1003	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1009	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1011	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1011-DUP	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1015	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1024	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1025	FISH TISSUE	FROZEN	1	1	1
T423.03	ERCPP-1028	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1029	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1032	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1043	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1045	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1046	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1047	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1051	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1052	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1053	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1062	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1064	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1066	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1074	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1075	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1077	FISH TISSUE	FROZEN	1	1	1
T423.03	ERCPP-1078	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1079	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1080	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1082	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1101	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1108	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1109	FISH TISSUE	FROZEN	1		

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# CHAIN OF CUSTODY

Ship to:  
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Report to:  
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PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
T423.03	ERCPP-1110	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1111	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1112	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1113	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1114	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1116	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1116-DUP	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1122	FISH TISSUE	FROZEN	1	1	1
T423.03	ERCPP-1125	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1126	FISH TISSUE	FROZEN	1		
T423.03	ERCPP-1128	FISH TISSUE	FROZEN	1	1	1
T423.03	ERWP-2002	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2003	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2004	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2013	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2013-DUP	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2014	FISH TISSUE	FROZEN	1	1	1
T423.03	ERWP-2023	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2027	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2028	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2029	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2031	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2032	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2043	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2044	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2045	FISH TISSUE	FROZEN	1	1	1
T423.03	ERWP-2049	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2050	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2051	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2051-DUP	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2052	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2053	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2054	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2056	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2061	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2062	FISH TISSUE	FROZEN	1		

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PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
T423.03	ERWP-2081	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2086	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2087	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2088	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2101	FISH TISSUE	FROZEN	1	1	1
T423.03	ERWP-2102	FISH TISSUE	FROZEN	1		
T423.03	ERWP-2121	FISH TISSUE	FROZEN	1		

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PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
T423.05	SACPP-2141	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2142	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2142-DUP	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2143	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2144	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2161	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2162	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2162-DUP	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2163	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2164	FISH TISSUE	FROZEN	1	1	1
T423.05	SACPP-2170	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2171	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2178	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2180	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2181	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2184	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2185	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2201	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2205	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2208	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2209	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2213	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2214	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2215	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2216	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2321	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2325	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2328	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2329	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2330	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2332	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2334	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2335	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2336	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2339	FISH TISSUE	FROZEN	1	1	1
T423.05	SACPP-2340	FISH TISSUE	FROZEN	1		

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PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-I (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
T423.05	SACPP-2342	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2344	FISH TISSUE	FROZEN	1	1	1
T423.05	SACPP-2345	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2348	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2361	FISH TISSUE	FROZEN	1	1	1
T423.05	SACPP-2362	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2363	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2364	FISH TISSUE	FROZEN	1		
T423.05	SACPP-2367	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2221	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2227	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2232	FISH TISSUE	FROZEN	1	1	1
T423.05	SAWG-2234	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2237	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2242	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2244	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2249	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2250	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2261	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2262	FISH TISSUE	FROZEN	1	1	1
T423.05	SAWG-2263	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2263-DUP	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2264	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2267	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2268	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2268-DUP	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2271	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2272	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2274	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2278	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2278-DUP	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2279	FISH TISSUE	FROZEN	1	1	1
T423.05	SAWG-2280	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2281	FISH TISSUE	FROZEN	1		
T423.05	SAWG-2310	FISH TISSUE	FROZEN	1		

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PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
T423.09	FUCPP-1141	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1142	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1142-DUP	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1143	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1144	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1145	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1146	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1147	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1148	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1149	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1241	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1243	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1245	FISH TISSUE	FROZEN	1	1	1
T423.09	FUCPP-1246	FISH TISSUE	FROZEN	1	1	1
T423.09	FUCPP-1247	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1248	FISH TISSUE	FROZEN	1	1	1
T423.09	FUCPP-1249	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1250	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1252	FISH TISSUE	FROZEN	1	1	1
T423.09	FUCPP-1254	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1261	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1262	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1265	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1282	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1283	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1283-DUP	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1284	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1286	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1287	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1288	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1289	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1291	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1301	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1302	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1303	FISH TISSUE	FROZEN	1		
T423.09	FUCPP-1305	FISH TISSUE	FROZEN	1		

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## CHAIN OF CUSTODY

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PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
T423.09	FUGPP-1306	FISH TISSUE	FROZEN	1		
T423.09	FUGPP-1308	FISH TISSUE	FROZEN	1		
T423.09	FUGPP-1309	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1161	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1162	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1162-DUP	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1164	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1165	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1166	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1167	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1169	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1171	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1172	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1174	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1176	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1177	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1178	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1178-DUP	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1179	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1180	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1181	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1183	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1185	FISH TISSUE	FROZEN	1	1	1
T423.09	FUWE-1186	FISH TISSUE	FROZEN	1	1	1
T423.09	FUWE-1187	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1188	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1191	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1192	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1193	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1194	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1201	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1203	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1204	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1205	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1207	FISH TISSUE	FROZEN	1	1	1
T423.09	FUWE-1209	FISH TISSUE	FROZEN	1	1	1

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PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
T423.09	FUWE-1211	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1212	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1213	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1214	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1215	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1217	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1222	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1223	FISH TISSUE	FROZEN	1		
T423.09	FUWE-1225	FISH TISSUE	FROZEN	1		

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PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
MKT2	SKLMKT-001	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-001-DUP	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-002	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-003	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-004	FISH TISSUE	FROZEN	1	1	1
MKT2	SKLMKT-005	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-006	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-007	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-008	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-009	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-010	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-011	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-012	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-012-DUP	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-013	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-014	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-015	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-016	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-017	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-018	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-019	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-020	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-021	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-022	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-023	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-024	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-025	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-026	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-027	FISH TISSUE	FROZEN	1	1	1
MKT2	SKLMKT-028	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-029	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-030	FISH TISSUE	FROZEN	1	1	1
MKT2	SKLMKT-031	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-032	FISH TISSUE	FROZEN	1	1	1
MKT2	SKLMKT-032-DUP	FISH TISSUE	FROZEN	1	1	1
MKT2	SKLMKT-033	FISH TISSUE	FROZEN	1		

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Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

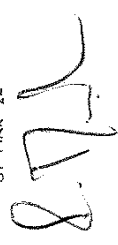
## CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., ste 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
MKT2	SKLMKT-035	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-037	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-038	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-039	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-040	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-043	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-044	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-045	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-046	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-047	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-049	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-052	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-053	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-054	FISH TISSUE	FROZEN	1	1	1
MKT2	SKLMKT-055	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-057	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-058	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-059	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-061	FISH TISSUE	FROZEN	1	1	1
MKT2	SKLMKT-062	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-063	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-064	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-066	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-070	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-071	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-072	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-073	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-074	FISH TISSUE	FROZEN	1	1	1
MKT2	SKLMKT-076	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-077	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-079	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-079-DUP	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-080	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-081	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-082	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-083	FISH TISSUE	FROZEN	1		

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CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA



Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., ste 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	MEDIUM	PRESERVATION	Hg-1 (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)	Barium (Tissue, 1638M)
MKT2	SKLMKT-087	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-090	FISH TISSUE	FROZEN	1		
MKT2	SKLMKT-092	FISH TISSUE	FROZEN	1		

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## Login Sample Receipt Checklist

Client: Tetra Tech, Inc.

Job Number: 580-112739-7

Login Number: 112739

List Source: Eurofins Seattle

List Number: 1

Creator: Groden, Kyle J

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	



Enthalpy Analytical  
931 West Barkley Ave  
Orange, CA 92868  
(714) 771-6900

enthalpy.com

Lab Job Number: 461637  
Report Level: II  
Report Date: 06/17/2022

**Analytical Report** *prepared for:*

Ted Donn  
Tetra Tech, Inc.  
3697 Mt. Diablo Blvd.  
Suite 150  
Lafayette, CA 94549

Project: COTL - T423.12 - Gulf of Thailand

*Authorized for release by:*

John Goyette, Service Center Manager  
(510) 204-2233 Ext 13112  
[john.goyette@enthalpy.com](mailto:john.goyette@enthalpy.com)

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the above signature which applies to this PDF file as well as any associated electronic data deliverable files. The results contained in this report meet all requirements of NELAP and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

CA ELAP# 1338, NELAP# 4038, SCAQMD LAP# 18LA0518, LACSD ID# 10105



## Sample Summary

Ted Donn  
Tetra Tech, Inc.  
3697 Mt. Diablo Blvd.  
Suite 150  
Lafayette, CA 94549

Lab Job #: 461637  
Project No: COTL  
Location: T423.12 - Gulf of Thailand  
Date Received: 04/21/22

Sample ID	Lab ID	Collected	Matrix
G4/43REF-A1	461637-001	03/29/22 00:17	Soil
G4/43REF-B1	461637-002	03/29/22 00:35	Soil
G4/43REF-C1	461637-003	03/29/22 00:51	Soil
SRWA-1B2X-A1	461637-004	03/28/22 15:32	Soil
SRWA-2B2X-A1	461637-005	03/28/22 16:07	Soil
SRWA-2B2X-A1-FD	461637-006	03/28/22 16:15	Soil
SRWA-3B2X-A1	461637-007	03/28/22 16:47	Soil
SRWA-4B2X-A1	461637-008	03/28/22 17:26	Soil

## Case Narrative

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Tetra Tech, Inc.  
3697 Mt. Diablo Blvd.  
Suite 150  
Lafayette, CA 94549  
Ted Donn

Lab Job Number: 461637  
Project No: COTL  
Location: T423.12 - Gulf of Thailand  
Date Received: 04/21/22

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This data package contains sample and QC results for eight soil samples, requested for the above referenced project on 04/21/22. The samples were received cold and intact.

**TPH-Extractables by GC (EPA 8015M):**

No analytical problems were encountered.

**Moisture (ASTM D2216):**

No analytical problems were encountered.

461637  
461638  
461640  
461665  
461681  
461683


Ship to:  
Enthalpy Analytical  
931 W. Barkley Ave.  
Orange, CA 92868  
714-771-6900

CHAIN OF CUSTODY


Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetrattech.com

**General Notes:**  
Please report results separately for each Project ID  
Please report all results to the MDL. J-flag results between MDL and RL  
Sediment results should be reported on a dry weight basis  
Please report results in PDF format with Excel EDD deliverable  
Please INVOICE separately for each Project ID

Project ID	SampleID	Date	Time	Medium	Preservation	TPH (EPA 8015 M) (C10-C14, C14-C24, C24-C36)	Dry Weight
T423.09	FUCPP-1B3X	3/19/2022	7:40	SED	FREEZE	1	1
T423.09	FUCPP-1C1X	3/19/2022	5:43	SED	FREEZE	1	1
T423.09	FUCPP-1C2	3/19/2022	5:24	SED	FREEZE	1	1
T423.09	FUCPP-1C3	3/19/2022	3:45	SED	FREEZE	1	1
T423.09	FUCPP-1D1	3/19/2022	7:01	SED	FREEZE	1	1
T423.09	FUCPP-1D2	3/19/2022	17:18	SED	FREEZE	1	1
T423.09	FUCPP-1D3	3/19/2022	3:06	SED	FREEZE	1	1
T423.09	FUCPP-1E2	3/19/2022	2:42	SED	FREEZE	1	1
T423.09	FUCPP-1F2	3/19/2022	2:22	SED	FREEZE	1	1
T423.09	FUCPP-1G2	3/19/2022	2:01	SED	FREEZE	1	1
T423.09	FUCPP-2C3X	3/18/2022	23:11	SED	FREEZE	1	1
T423.09	FUCPP-2C3X-FD	3/18/2022	23:19	SED	FREEZE	1	1
T423.09	FUCPP-2E2	3/19/2022	1:23	SED	FREEZE	1	1
T423.09	FUCPP-2F2	3/19/2022	1:01	SED	FREEZE	1	1
T423.09	FUCPP-2G2	3/19/2022	0:33	SED	FREEZE	1	1
T423.09	FUCPP-3C1	3/18/2022	22:58	SED	FREEZE	1	1
T423.09	FUCPP-3C2X	3/18/2022	22:45	SED	FREEZE	1	1
T423.09	FUCPP-3D1	3/18/2022	19:57	SED	FREEZE	1	1
T423.09	FUCPP-3D2	3/18/2022	20:15	SED	FREEZE	1	1
T423.09	FUCPP-3D3	3/18/2022	20:34	SED	FREEZE	1	1
T423.09	FUCPP-3E2	3/18/2022	19:40	SED	FREEZE	1	1
T423.09	FUCPP-3F2	3/18/2022	19:24	SED	FREEZE	1	1
T423.09	FUCPP-3G2	3/18/2022	19:07	SED	FREEZE	1	1
T423.09	FUCPP-4B2X	3/19/2022	8:10	SED	FREEZE	1	1
T423.09	FUCPP-4B3X	3/19/2022	7:37	SED	FREEZE	1	1
T423.09	FUCPP-4E2	3/19/2022	8:40	SED	FREEZE	1	1
T423.09	FUCPP-4F2	3/19/2022	8:51	SED	FREEZE	1	1
T423.09	FUCPP-4G2	3/19/2022	9:08	SED	FREEZE	1	1

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
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CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	TPH (EPA 8015 M) (C10-C14, C14-C24, C24-C36)	Dry Weight
T423.09	FUREF-A1	3/19/2022	12:26	SED	FREEZE	1	1
T423.09	FUREF-B1	3/19/2022	12:39	SED	FREEZE	1	1
T423.09	FUREF-C1	3/19/2022	12:52	SED	FREEZE	1	1
T423.09	FUWE-1B2X	3/18/2022	17:34	SED	FREEZE	1	1
T423.09	FUWE-2B2X	3/18/2022	17:17	SED	FREEZE	1	1
T423.09	FUWE-3B1Y	3/18/2022	16:49	SED	FREEZE	1	1
T423.09	FUWE-3B1Y-FD	3/18/2022	16:57	SED	FREEZE	1	1
T423.09	FUWE-4B2X	3/18/2022	16:35	SED	FREEZE	1	1
T423.10	MGWA-1B2Y	3/18/2022	12:24	SED	FREEZE	1	1
T423.10	MGWA-1C2	3/18/2022	5:14	SED	FREEZE	1	1
T423.10	MGWA-1CP2	3/18/2022	4:34	SED	FREEZE	1	1
T423.10	MGWA-1D2	3/18/2022	3:53	SED	FREEZE	1	1
T423.10	MGWA-2B2X	3/18/2022	10:54	SED	FREEZE	1	1
T423.10	MGWA-2B2X-FD	3/18/2022	11:18	SED	FREEZE	1	1
T423.10	MGWA-2C2	3/18/2022	10:25	SED	FREEZE	1	1
T423.10	MGWA-3B2X	3/17/2022	23:29	SED	FREEZE	1	1
T423.10	MGWA-3C2	3/17/2022	22:59	SED	FREEZE	1	1
T423.10	MGWA-3CP2	3/17/2022	22:25	SED	FREEZE	1	1
T423.10	MGWA-3D2	3/17/2022	17:35	SED	FREEZE	1	1
T423.10	MGWA-4B2X	3/18/2022	7:35	SED	FREEZE	1	1
T423.10	MGWA-4C2	3/18/2022	7:06	SED	FREEZE	1	1
T423.10	NPCPP-1C1	3/22/2022	4:05	SED	FREEZE	1	1
T423.10	NPCPP-1C1-FD	3/22/2022	4:23	SED	FREEZE	1	1
T423.10	NPCPP-1C2	3/22/2022	3:26	SED	FREEZE	1	1
T423.10	NPCPP-1CP1	3/22/2022	4:55	SED	FREEZE	1	1
T423.10	NPCPP-1CP2	3/22/2022	5:31	SED	FREEZE	1	1
T423.10	NPCPP-1CP3X	3/22/2022	7:18	SED	FREEZE	1	1
T423.10	NPCPP-1D2	3/22/2022	7:48	SED	FREEZE	1	1
T423.10	NPCPP-1E2	3/22/2022	8:18	SED	FREEZE	1	1
T423.10	NPCPP-1F2	3/22/2022	18:48	SED	FREEZE	1	1
T423.10	NPCPP-1G2	3/22/2022	9:47	SED	FREEZE	1	1
T423.10	NPCPP-2C1X	3/21/2022	23:11	SED	FREEZE	1	1
T423.10	NPCPP-2C2	3/21/2022	22:45	SED	FREEZE	1	1
T423.10	NPCPP-2CP2	3/21/2022	22:11	SED	FREEZE	1	1
T423.10	NPCPP-2D2	3/21/2022	21:46	SED	FREEZE	1	1
T423.10	NPCPP-3C1	3/21/2022	4:47	SED	FREEZE	1	1
T423.10	NPCPP-3C2	3/21/2022	4:17	SED	FREEZE	1	1

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CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	TPH (EPA 8015 M) (C10-C14, C14-C24, C24-C36)	Dry Weight
T423.10	NPCPP-3C3X	3/21/2022	5:29	SED	FREEZE	1	1
T423.10	NPCPP-3CP1	3/21/2022	10:33	SED	FREEZE	1	1
T423.10	NPCPP-3CP2	3/21/2022	3:22	SED	FREEZE	1	1
T423.10	NPCPP-3CP3X	3/20/2022	22:25	SED	FREEZE	1	1
T423.10	NPCPP-3D2	3/20/2022	21:34	SED	FREEZE	1	1
T423.10	NPCPP-3E2	3/20/2022	20:57	SED	FREEZE	1	1
T423.10	NPCPP-3F2X	3/20/2022	20:28	SED	FREEZE	1	1
T423.10	NPCPP-3G2	3/20/2022	20:02	SED	FREEZE	1	1
T423.10	NPCPP-4C2	3/21/2022	11:03	SED	FREEZE	1	1
T423.10	NPCPP-4CP2	3/21/2022	20:07	SED	FREEZE	1	1
T423.10	NPCPP-4D2	3/21/2022	20:39	SED	FREEZE	1	1
T423.10	NPREF-A1	3/23/2022	17:20	SED	FREEZE	1	1
T423.10	NPREF-B1	3/23/2022	17:09	SED	FREEZE	1	1
T423.10	NPREF-C1	3/23/2022	17:34	SED	FREEZE	1	1
T423.10	NPWB-1C2	3/23/2022	4:37	SED	FREEZE	1	1
T423.10	NPWB-1CP2	3/23/2022	5:07	SED	FREEZE	1	1
T423.10	NPWB-1CP2-FD	3/23/2022	5:28	SED	FREEZE	1	1
T423.10	NPWB-1D2	3/23/2022	10:18	SED	FREEZE	1	1
T423.10	NPWB-2B3	3/22/2022	20:01	SED	FREEZE	1	1
T423.10	NPWB-2C2X	3/22/2022	20:26	SED	FREEZE	1	1
T423.10	NPWB-3B2	3/22/2022	19:38	SED	FREEZE	1	1
T423.10	NPWB-3C2	3/22/2022	22:31	SED	FREEZE	1	1
T423.10	NPWB-3CP2	3/22/2022	22:03	SED	FREEZE	1	1
T423.10	NPWB-3D2	3/22/2022	21:35	SED	FREEZE	1	1
T423.10	NPWB-4B3X	3/23/2022	4:03	SED	FREEZE	1	1
T423.10	NPWB-4C2	3/23/2022	3:27	SED	FREEZE	1	1
T423.10	NPWG-1B2X	3/20/2022	5:23	SED	FREEZE	1	1
T423.10	NPWG-1C2	3/20/2022	6:07	SED	FREEZE	1	1
T423.10	NPWG-1CP2	3/20/2022	15:13	SED	FREEZE	1	1
T423.10	NPWG-1D2	3/20/2022	19:10	SED	FREEZE	1	1
T423.10	NPWG-2B2X	3/20/2022	16:46	SED	FREEZE	1	1
T423.10	NPWG-2B2X-FD	3/20/2022	17:06	SED	FREEZE	1	1
T423.10	NPWG-2C2	3/20/2022	17:33	SED	FREEZE	1	1
T423.10	NPWG-3B2X	3/20/2022	1:37	SED	FREEZE	1	1
T423.10	NPWG-3C2	3/19/2022	23:09	SED	FREEZE	1	1
T423.10	NPWG-3CP2	3/19/2022	22:41	SED	FREEZE	1	1

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Orange, CA 92868  
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CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	TPH (EPA 8015 M) (C10-C14, C14-C24, C24-C36)	Dry Weight
T423.10	NPWG-3D2	3/19/2022	22:11	SED	FREEZE	1	1
T423.10	NPWG-4B2X	3/20/2022	2:39	SED	FREEZE	1	1
T423.10	NPWG-4C2	3/20/2022	3:12	SED	FREEZE	1	1
T423.10	PACPP-1C1	3/14/2022	10:48	SED	FREEZE	1	1
T423.10	PACPP-1C2X	3/14/2022	10:05	SED	FREEZE	1	1
T423.10	PACPP-1C3X	3/12/2022	23:02	SED	FREEZE	1	1
T423.10	PACPP-1CP1	3/14/2022	11:16	SED	FREEZE	1	1
T423.10	PACPP-1CP2X	3/12/2022	21:51	SED	FREEZE	1	1
T423.10	PACPP-1CP3	3/12/2022	22:29	SED	FREEZE	1	1
T423.10	PACPP-1D2	3/12/2022	21:11	SED	FREEZE	1	1
T423.10	PACPP-1E2	3/12/2022	20:05	SED	FREEZE	1	1
T423.10	PACPP-1F2	3/12/2022	19:25	SED	FREEZE	1	1
T423.10	PACPP-1G2	3/12/2022	18:42	SED	FREEZE	1	1
T423.10	PACPP-2C2	3/14/2022	4:58	SED	FREEZE	1	1
T423.10	PACPP-2CP2	3/14/2022	3:50	SED	FREEZE	1	1
T423.10	PACPP-2D2	3/14/2022	9:15	SED	FREEZE	1	1
T423.10	PACPP-3C1	3/14/2022	15:45	SED	FREEZE	1	1
T423.10	PACPP-3C2Y	3/14/2022	2:36	SED	FREEZE	1	1
T423.10	PACPP-3C3X	3/14/2022	19:52	SED	FREEZE	1	1
T423.10	PACPP-3CP1X	3/13/2022	4:50	SED	FREEZE	1	1
T423.10	PACPP-3CP2	3/13/2022	4:12	SED	FREEZE	1	1
T423.10	PACPP-3CP3	3/13/2022	3:34	SED	FREEZE	1	1
T423.10	PACPP-3D2X	3/13/2022	2:30	SED	FREEZE	1	1
T423.10	PACPP-3E2X	3/13/2022	1:54	SED	FREEZE	1	1
T423.10	PACPP-3F2X	3/13/2022	1:16	SED	FREEZE	1	1
T423.10	PACPP-3G2	3/13/2022	0:40	SED	FREEZE	1	1
T423.10	PACPP-4C2	3/13/2022	23:15	SED	FREEZE	1	1
T423.10	PACPP-4CP2X	3/13/2022	20:23	SED	FREEZE	1	1
T423.10	PACPP-4D2X	3/13/2022	19:40	SED	FREEZE	1	1
T423.10	PAREF-A1	3/13/2022	11:17	SED	FREEZE	1	1
T423.10	PAREF-B1	3/13/2022	13:48	SED	FREEZE	1	1
T423.10	PAREF-C1	3/13/2022	13:59	SED	FREEZE	1	1

Relinquished by:   
31 MAR 22

Relinquished by:

Recieved by:   
4/21/22 10:10


Recieved by:

Ship to:  
Enthalpy Analytical  
931 W. Barkley Ave.  
Orange, CA 92868  
714-771-6900

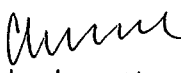
CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	TPH (EPA 8015 M) (C10-C14, C14-C24, C24-C36)	Dry Weight
T423.10	PAWB-1C2	3/14/2022	22:24	SED	FREEZE	1	1
T423.10	PAWB-1CP2	3/14/2022	21:46	SED	FREEZE	1	1
T423.10	PAWB-1D2	3/14/2022	21:03	SED	FREEZE	1	1
T423.10	PAWB-2B1X	3/14/2022	22:55	SED	FREEZE	1	1
T423.10	PAWB-2C2	3/16/2022	19:09	SED	FREEZE	1	1
T423.10	PAWB-3B2	3/16/2022	20:14	SED	FREEZE	1	1
T423.10	PAWB-3C2	3/16/2022	20:43	SED	FREEZE	1	1
T423.10	PAWB-3CP2	3/15/2022	5:13	SED	FREEZE	1	1
T423.10	PAWB-3CP2-FD	3/15/2022	5:41	SED	FREEZE	1	1
T423.10	PAWB-3D2	3/16/2022	21:39	SED	FREEZE	1	1
T423.10	PAWB-4B2X	3/16/2022	19:44	SED	FREEZE	1	1
T423.10	PAWB-4C2	3/15/2022	2:39	SED	FREEZE	1	1
T423.10	PAWE-1B1	3/16/2022	5:37	SED	FREEZE	1	1
T423.10	PAWE-1C2	3/16/2022	5:00	SED	FREEZE	1	1
T423.10	PAWE-1CP2	3/16/2022	4:22	SED	FREEZE	1	1
T423.10	PAWE-1D2	3/16/2022	3:41	SED	FREEZE	1	1
T423.10	PAWE-2B3	3/17/2022	4:55	SED	FREEZE	1	1
T423.10	PAWE-2B3-FD	3/17/2022	5:16	SED	FREEZE	1	1
T423.10	PAWE-2C2	3/17/2022	6:58	SED	FREEZE	1	1
T423.10	PAWE-3B3	3/15/2022	23:19	SED	FREEZE	1	1
T423.10	PAWE-3C2	3/15/2022	22:47	SED	FREEZE	1	1
T423.10	PAWE-3CP2	3/15/2022	22:16	SED	FREEZE	1	1
T423.10	PAWE-3D2	3/15/2022	21:35	SED	FREEZE	1	1
T423.10	PAWE-4B2	3/17/2022	4:18	SED	FREEZE	1	1
T423.10	PAWE-4C2	3/17/2022	3:39	SED	FREEZE	1	1
T423.11	CBREF-A1	3/24/2022	19:25	SED	FREEZE	1	1
T423.11	CBREF-B1	3/24/2022	19:37	SED	FREEZE	1	1
T423.11	CBREF-C1	3/24/2022	19:53	SED	FREEZE	1	1
T423.11	WPWB-1B1Y	3/24/2022	11:24	SED	FREEZE	1	1
T423.11	WPWB-1B2Y	3/24/2022	8:45	SED	FREEZE	1	1
T423.11	WPWB-1B3X	3/24/2022	9:02	SED	FREEZE	1	1
T423.11	WPWB-1C1	3/24/2022	12:25	SED	FREEZE	1	1
T423.11	WPWB-1C1-FD	3/24/2022	12:33	SED	FREEZE	1	1
T423.11	WPWB-1C2	3/24/2022	12:47	SED	FREEZE	1	1
T423.11	WPWB-1C3	3/24/2022	13:03	SED	FREEZE	1	1
T423.11	WPWB-1D1	3/24/2022	13:59	SED	FREEZE	1	1
T423.11	WPWB-1D2	3/24/2022	13:41	SED	FREEZE	1	1

Relinquished by:   
31 MAR 22

Relinquished by:

Recieved by:   
4/21/22 10:10

Recieved by:




Ship to:  
Enthalpy Analytical  
931 W. Barkley Ave.  
Orange, CA 92868  
714-771-6900


CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd.  
Lafayette, CA  
ted.donn@tetratech.com

Project ID	SampleID	Date	Time	Medium	Preservation	TPH (EPA 8015 M) (C10-C14, C14-C24, C24-C36)	Dry Weight
T423.11	WPWB-1D3	3/24/2022	13:24	SED	FREEZE	1	1
T423.11	WPWB-2B1X	3/24/2022	9:45	SED	FREEZE	1	1
T423.11	WPWB-2C2	3/24/2022	10:00	SED	FREEZE	1	1
T423.11	WPWB-3B1X	3/24/2022	11:06	SED	FREEZE	1	1
T423.11	WPWB-3B2X	3/24/2022	5:32	SED	FREEZE	1	1
T423.11	WPWB-3B3X	3/24/2022	5:48	SED	FREEZE	1	1
T423.11	WPWB-3C1	3/24/2022	2:04	SED	FREEZE	1	1
T423.11	WPWB-3C2	3/24/2022	2:21	SED	FREEZE	1	1
T423.11	WPWB-3C3	3/24/2022	2:39	SED	FREEZE	1	1
T423.11	WPWB-3D1	3/24/2022	1:42	SED	FREEZE	1	1
T423.11	WPWB-3D2	3/24/2022	1:20	SED	FREEZE	1	1
T423.11	WPWB-3D3	3/24/2022	0:56	SED	FREEZE	1	1
T423.11	WPWB-4B1X	3/24/2022	3:51	SED	FREEZE	1	1
T423.11	WPWB-4C2	3/24/2022	2:57	SED	FREEZE	1	1
T423.11	WPWB-4C2-FD	3/24/2022	3:06	SED	FREEZE	1	1
T423.12	G4/43REF-A1	3/29/2022	0:17	SED	FREEZE	1	1
T423.12	G4/43REF-B1	3/29/2022	0:35	SED	FREEZE	1	1
T423.12	G4/43REF-C1	3/29/2022	0:51	SED	FREEZE	1	1
T423.12	SRWA-1B2X-A1	3/28/2022	15:32	SED	FREEZE	1	1
T423.12	SRWA-2B2X-A1	3/28/2022	16:07	SED	FREEZE	1	1
T423.12	SRWA-2B2X-A1-FD	3/28/2022	16:15	SED	FREEZE	1	1
T423.12	SRWA-3B2X-A1	3/28/2022	16:47	SED	FREEZE	1	1
T423.12	SRWA-4B2X-A1	3/28/2022	17:26	SED	FREEZE	1	1

Relinquished by:   
31 MAR 22

Relinquished by:

Recieved by:   
4/21/22 10:10

Recieved by:



# ENTHALPY ANALYTICAL

## SAMPLE ACCEPTANCE CHECKLIST

### Section 1

Client: Tetra Tech

Project: T423.12 - Gulf of Thailand

Date Received: 4/21/22

Sampler's Name Present: ☐ Yes ☒ No

### Section 2

Sample(s) received in a cooler? ☒ Yes, How many? 3 ☐ No (skip section 2) Sample Temp (°C) (No Cooler) : \_\_\_\_\_

Sample Temp (°C), One from each cooler: #1: -1.3 #2: -0.8 #3: -15.5 #4: \_\_\_\_\_

(Acceptance range is < 6°C but not frozen (for Microbiology samples, acceptance range is < 10°C but not frozen). It is acceptable for samples collected the same day as sample receipt to have a higher temperature as long as there is evidence that cooling has begun.)

Shipping Information: Dry ice

### Section 3

Was the cooler packed with: ☒ Ice ☐ Ice Packs ☐ Bubble Wrap ☐ Styrofoam  
☐ Paper ☐ None ☐ Other \_\_\_\_\_

Cooler Temp (°C): #1: -7.7 #2: 0.3 #3: -7.8 #4: \_\_\_\_\_

### Section 4

	YES	NO	N/A
Was a COC received?	✓		
Are sample IDs present?	✓		
Are sampling dates & times present?	✓		
Is a relinquished signature present?	✓		
Are the tests required clearly indicated on the COC?	✓		
Are custody seals present?		✓	
If custody seals are present, were they intact?			✓
Are all samples sealed in plastic bags? (Recommended for Microbiology samples)	✓		
Did all samples arrive intact? If no, indicate in Section 4 below.	✓		
Did all bottle labels agree with COC? (ID, dates and times)	✓		
Were the samples collected in the correct containers for the required tests?	✓		
Are the containers labeled with the correct preservatives?			✓
Is there headspace in the VOA vials greater than 5-6 mm in diameter?			✓
Was a sufficient amount of sample submitted for the requested tests?	✓		

### Section 5 Explanations/Comments

Jars cracked upon receipt: 461665-027, 461631-005, 461631-008, 461666-010, 461681-005, 461681-021, 461640-002, 461640-012, 461640-025.

See email for sample ID discrepancies.

### Section 6

For discrepancies, how was the Project Manager notified? ☐ Verbal PM Initials: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
☒ Email (email sent to/on): JLG / 4/21/22

Project Manager's response:

Completed By: Chun Date: 4/21/22

ORIGIN ID: CCRA  
BARBARA MAGOON  
TETRA TECH, INC  
3697 MT. DIABLO BLVD #150

LA FAYETTE, CA 94549  
UNITED STATES US

TO ENTHALPY

ENTHALPY

931 W. BARKLEY AVE.

ORANGE CA 92868

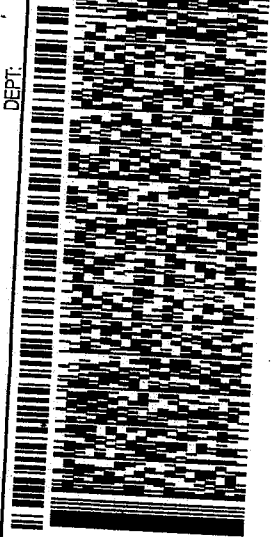
(714) 771-8900

INV:

PO:

REF: EVENT 202203

DEPT:



FedEx  
Express



2221822818911111

560J2/BD/F9/FE4A

WEIGHT: 23x13x12 IN  
DRY ICE: 0.91 KG  
BILL SENDER

1 of 4

TRK#

0201

7766 2432 7734

## MASTER ##

92 APVA

THU - 21 APR 10:30A

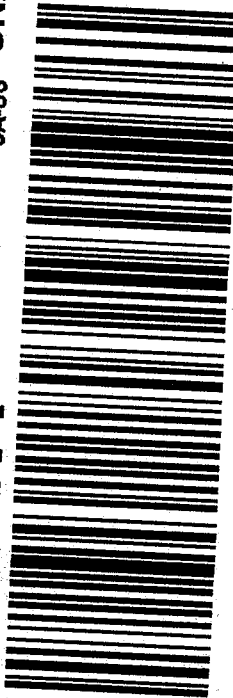
PRIORITY OVERNIGHT

ICE

92868

SNA

CA-US



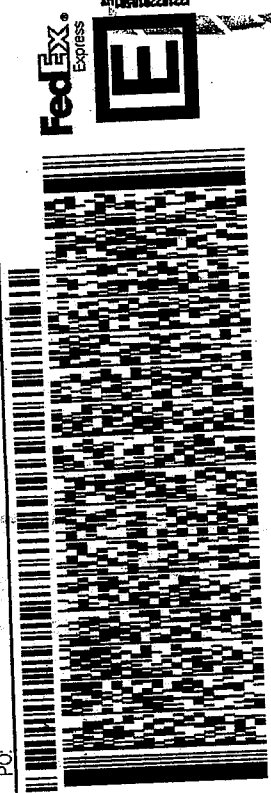
INSPECTION BY ORIGIN  
@G SPECIALIST  
EMP # 5093 10

110005 E0058 JAN

3687 MT. DIABLO BLVD #150  
LAFAYETTE, CA 94549  
UNITED STATES US

TO ENTHALPY  
ENTHALPY  
931 W. BARKLEY AVE.

ORANGE CA 92868  
REF: EVENT 202203  
(714) 771-6900  
INV. PO:

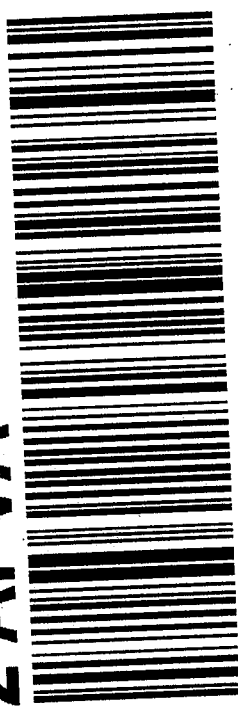


THU - 21 APR 10:30A  
PRIORITY OVERNIGHT

2 of 4  
MPS# 7766 2432 7182  
Mstr# 7766 2432 7734

92 APVA

0201  
92868  
CA-US  
SNA



INSPECTION BY ORIGIN  
DG SPECIALIST  
EMP # 5093110

55D.J2BD.F9A.F4A

111003 M-1558 M

ORIGIN/D/CORR (925) 283-3771  
BARBARA MAGOON  
TETRA TECH INC  
3697 MT. DIABLO BLVD #150

LAFAYETTE, CA 94540  
UNITED STATES US

SHIP DATE: 20APR22  
ACTWGT: 35.00 LB  
CAD: 250816822/NET4460  
DIMS: 23x13x12 IN  
DRY ICE: 0.91 KG  
BILL SENDER

TO **ENTHALPY**  
**ENTHALPY**  
**931 W. BARKLEY AVE.**

**ORANGE CA 92868**

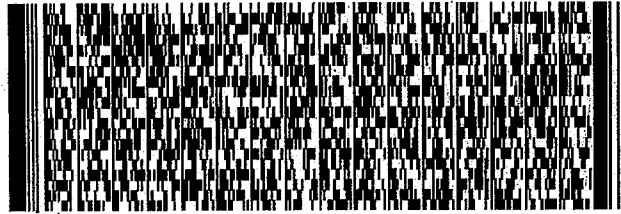
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REF: EVENT 202203

INV:

PO:

DEPT:



**FedEx**  
Express



56012BD93FE4A

3 of 4

**THU - 21 APR 10:30A**  
**PRIORITY OVERNIGHT**

MPS#

0283

**7766 2432 7274**

Mstr# 7766 2432 7734

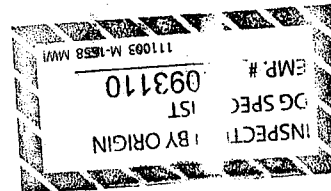
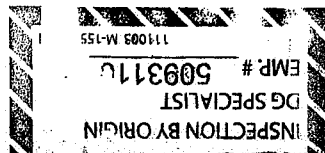
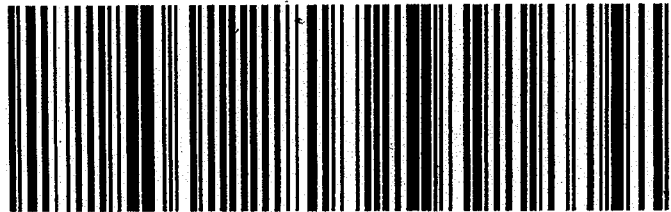
0201

ICE

**92868**

CA-US **SNA**

**92 APVA**



## Extractable Carbon Chain

**Lab #:** 461637

**Project#:** COTL

**Client:** Tetra Tech, Inc.

**Location:** T423.12 - Gulf of Thailand

**Field ID:** G4/43REF-A1

**Moisture:** 51%

**Prepared:** 05/19/22

**Type:** SAMPLE

**Diln Fac:** 1.000

**Analyzed:** 05/20/22

**Lab ID:** 461637-001

**Batch#:** 289768

**Prep:** EPA 3580

**Matrix:** Soil

**Sampled:** 03/29/22

**Analysis:** EPA 8015M

**Basis:** dry

**Received:** 04/21/22

**Analyst:** MES

Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	21	3.3	mg/Kg
TPH (C14-C24)	ND	21	3.3	mg/Kg
ORO C28-C44	ND	41	3.3	mg/Kg

Surrogate	%REC	Limits
n-Triacontane	95	70-130

**Field ID:** G4/43REF-B1

**Moisture:** 52%

**Prepared:** 05/19/22

**Type:** SAMPLE

**Diln Fac:** 1.000

**Analyzed:** 05/20/22

**Lab ID:** 461637-002

**Batch#:** 289768

**Prep:** EPA 3580

**Matrix:** Soil

**Sampled:** 03/29/22

**Analysis:** EPA 8015M

**Basis:** dry

**Received:** 04/21/22

**Analyst:** MES

Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	21	3.4	mg/Kg
TPH (C14-C24)	ND	21	3.4	mg/Kg
ORO C28-C44	ND	42	3.4	mg/Kg

Surrogate	%REC	Limits
n-Triacontane	94	70-130

**Field ID:** G4/43REF-C1

**Moisture:** 55%

**Prepared:** 05/19/22

**Type:** SAMPLE

**Diln Fac:** 1.000

**Analyzed:** 05/20/22

**Lab ID:** 461637-003

**Batch#:** 289768

**Prep:** EPA 3580

**Matrix:** Soil

**Sampled:** 03/29/22

**Analysis:** EPA 8015M

**Basis:** dry

**Received:** 04/21/22

**Analyst:** MES

Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	22	3.5	mg/Kg
TPH (C14-C24)	ND	22	3.5	mg/Kg
ORO C28-C44	ND	44	3.5	mg/Kg

Surrogate	%REC	Limits
n-Triacontane	93	70-130

## Extractable Carbon Chain

<b>Lab #:</b> 461637		<b>Project#:</b> COTL		
<b>Client:</b> Tetra Tech, Inc.		<b>Location:</b> T423.12 - Gulf of Thailand		
<b>Field ID:</b> SRWA-1B2X-A1	<b>Moisture:</b> 51%	<b>Prepared:</b> 05/19/22		
<b>Type:</b> SAMPLE	<b>Diln Fac:</b> 1.000	<b>Analyzed:</b> 05/20/22		
<b>Lab ID:</b> 461637-004	<b>Batch#:</b> 289768	<b>Prep:</b> EPA 3580		
<b>Matrix:</b> Soil	<b>Sampled:</b> 03/28/22	<b>Analysis:</b> EPA 8015M		
<b>Basis:</b> dry	<b>Received:</b> 04/21/22	<b>Analyst:</b> MES		
Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	21	3.3	mg/Kg
TPH (C14-C24)	ND	21	3.3	mg/Kg
ORO C28-C44	ND	41	3.3	mg/Kg
Surrogate	%REC		Limits	
n-Triacontane	89		70-130	
<b>Field ID:</b> SRWA-2B2X-A1		<b>Moisture:</b> 43%		<b>Prepared:</b> 05/19/22
<b>Type:</b> SAMPLE		<b>Diln Fac:</b> 1.000		<b>Analyzed:</b> 05/20/22
<b>Lab ID:</b> 461637-005		<b>Batch#:</b> 289768		<b>Prep:</b> EPA 3580
<b>Matrix:</b> Soil		<b>Sampled:</b> 03/28/22		<b>Analysis:</b> EPA 8015M
<b>Basis:</b> dry		<b>Received:</b> 04/21/22		<b>Analyst:</b> MES
Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	18	2.8	mg/Kg
TPH (C14-C24)	ND	18	2.8	mg/Kg
ORO C28-C44	ND	35	2.8	mg/Kg
Surrogate	%REC		Limits	
n-Triacontane	93		70-130	
<b>Field ID:</b> SRWA-2B2X-A1-FD		<b>Moisture:</b> 44%		<b>Prepared:</b> 05/19/22
<b>Type:</b> SAMPLE		<b>Diln Fac:</b> 1.000		<b>Analyzed:</b> 05/20/22
<b>Lab ID:</b> 461637-006		<b>Batch#:</b> 289768		<b>Prep:</b> EPA 3580
<b>Matrix:</b> Soil		<b>Sampled:</b> 03/28/22		<b>Analysis:</b> EPA 8015M
<b>Basis:</b> dry		<b>Received:</b> 04/21/22		<b>Analyst:</b> MES
Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	18	2.9	mg/Kg
TPH (C14-C24)	ND	18	2.9	mg/Kg
ORO C28-C44	ND	36	2.9	mg/Kg
Surrogate	%REC		Limits	
n-Triacontane	89		70-130	



## Extractable Carbon Chain

**Lab #:** 461637

**Client:** Tetra Tech, Inc.

**Project#:** COTL

**Location:** T423.12 - Gulf of Thailand

**Field ID:** SRWA-3B2X-A1

**Type:** SAMPLE

**Lab ID:** 461637-007

**Matrix:** Soil

**Basis:** dry

**Moisture:** 43%

**Diln Fac:** 1.000

**Batch#:** 289768

**Sampled:** 03/28/22

**Received:** 04/21/22

**Prepared:** 05/19/22

**Analyzed:** 05/20/22

**Prep:** EPA 3580

**Analysis:** EPA 8015M

**Analyst:** MES

Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	18	2.8	mg/Kg
<b>TPH (C14-C24)</b>	<b>5.7 J</b>	18	2.8	mg/Kg
ORO C28-C44	ND	35	2.8	mg/Kg
Surrogate	%REC		Limits	
n-Triacontane	93		70-130	

**Field ID:** SRWA-4B2X-A1

**Type:** SAMPLE

**Lab ID:** 461637-008

**Matrix:** Soil

**Basis:** dry

**Moisture:** 50%

**Diln Fac:** 1.000

**Batch#:** 289768

**Sampled:** 03/28/22

**Received:** 04/21/22

**Prepared:** 05/19/22

**Analyzed:** 05/20/22

**Prep:** EPA 3580

**Analysis:** EPA 8015M

**Analyst:** MES

Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	20	3.2	mg/Kg
TPH (C14-C24)	ND	20	3.2	mg/Kg
ORO C28-C44	ND	40	3.2	mg/Kg
Surrogate	%REC		Limits	
n-Triacontane	91		70-130	

**Type:** BLANK

**Lab ID:** QC990524

**Matrix:** Soil

**Diln Fac:** 1.000

**Batch#:** 289768

**Prepared:** 05/19/22

**Analyzed:** 05/20/22

**Prep:** EPA 3580

**Analysis:** EPA 8015M

**Analyst:** MES

Analyte	Result	RL	MDL	Units
TPH (C10-C14)	ND	10	1.6	mg/Kg
TPH (C14-C24)	ND	10	1.6	mg/Kg
ORO C28-C44	ND	20	1.6	mg/Kg
Surrogate	%REC		Limits	
n-Triacontane	89		70-130	

Legend

**J:** Estimated value

**MDL:** Method Detection Limit

**ND:** Not Detected at or above MDL

**RL:** Reporting Limit

**Extractable Carbon Chain: Batch QC****Lab #:** 461637**Project#:** COTL**Client:** Tetra Tech, Inc.**Location:** T423.12 - Gulf of Thailand**Type:** LCS**Batch#:** 289768**Analysis:** EPA 8015M**Lab ID:** QC990525**Prepared:** 05/19/22**Analyst:** MES**Matrix:** Soil**Analyzed:** 05/20/22**Diln Fac:** 1.000**Prep:** EPA 3580

Analyte	Spiked	Result	%REC	Limits	Units
Diesel C10-C28	250.0	255.1	102	76-122	mg/Kg
Surrogate			%REC	Limits	
n-Triacontane			94	70-130	

## Extractable Carbon Chain: Batch QC

**Lab #:** 461637

**Project#:** COTL

**Client:** Tetra Tech, Inc.

**Location:** T423.12 - Gulf of Thailand

**Field ID:** SRWA-1B2X-A1

**Matrix:** Soil

**Batch#:** 289768

**Analyzed:** 05/20/22

**Type:** MS

**Basis:** dry

**Sampled:** 03/28/22

**Prep:** EPA 3580

**MSS Lab ID:** 461637-004

**Moisture:** 51%

**Received:** 04/21/22

**Analysis:** EPA 8015M

**Lab ID:** QC990526

**Diln Fac:** 1.000

**Prepared:** 05/19/22

**Analyst:** MES

Analyte	MSS Result	Spiked	Result	%REC	Limits	Units
Diesel C10-C28	<3.282	507.7	522.9	103	62-126	mg/Kg

Surrogate	%REC	Limits
n-Triacontane	96	70-130

**Field ID:** SRWA-1B2X-A1

**Matrix:** Soil

**Batch#:** 289768

**Analyzed:** 05/20/22

**Type:** MSD

**Basis:** dry

**Sampled:** 03/28/22

**Prep:** EPA 3580

**MSS Lab ID:** 461637-004

**Moisture:** 51%

**Received:** 04/21/22

**Analysis:** EPA 8015M

**Lab ID:** QC990527

**Diln Fac:** 1.000

**Prepared:** 05/19/22

**Analyst:** MES

Analyte	Spiked	Result	%REC	Limits	Units	RPD	Lim
Diesel C10-C28	507.7	498.3	98	62-126	mg/Kg	5	35

Surrogate	%REC	Limits
n-Triacontane	89	70-130

Legend

**RPD:** Relative Percent Difference

## Moisture

**Lab #:** 461637

**Client:** Tetra Tech, Inc.

**Project#:** COTL

**Location:** T423.12 - Gulf of Thailand

**Field ID:** G4/43REF-A1

**Lab ID:** 461637-001

**Matrix:** Soil

**Diln Fac:** 1.000

**Batch#:** 288708

**Sampled:** 03/29/22

**Received:** 04/21/22

**Prepared:** 05/03/22

**Analyzed:** 05/04/22

**Prep:** METHOD

**Analysis:** ASTM D2216

**Analyst:** DNA

Analyte	Result	RL	Units
Moisture, Percent	51	1	%

**Field ID:** G4/43REF-B1

**Lab ID:** 461637-002

**Matrix:** Soil

**Diln Fac:** 1.000

**Batch#:** 288708

**Sampled:** 03/29/22

**Received:** 04/21/22

**Prepared:** 05/03/22

**Analyzed:** 05/04/22

**Prep:** METHOD

**Analysis:** ASTM D2216

**Analyst:** DNA

Analyte	Result	RL	Units
Moisture, Percent	52	1	%

**Field ID:** G4/43REF-C1

**Lab ID:** 461637-003

**Matrix:** Soil

**Diln Fac:** 1.000

**Batch#:** 288708

**Sampled:** 03/29/22

**Received:** 04/21/22

**Prepared:** 05/03/22

**Analyzed:** 05/04/22

**Prep:** METHOD

**Analysis:** ASTM D2216

**Analyst:** DNA

Analyte	Result	RL	Units
Moisture, Percent	55	1	%

**Field ID:** SRWA-1B2X-A1

**Lab ID:** 461637-004

**Matrix:** Soil

**Diln Fac:** 1.000

**Batch#:** 288708

**Sampled:** 03/28/22

**Received:** 04/21/22

**Prepared:** 05/03/22

**Analyzed:** 05/04/22

**Prep:** METHOD

**Analysis:** ASTM D2216

**Analyst:** DNA

Analyte	Result	RL	Units
Moisture, Percent	51	1	%

**Field ID:** SRWA-2B2X-A1

**Lab ID:** 461637-005

**Matrix:** Soil

**Diln Fac:** 1.000

**Batch#:** 288708

**Sampled:** 03/28/22

**Received:** 04/21/22

**Prepared:** 05/03/22

**Analyzed:** 05/04/22

**Prep:** METHOD

**Analysis:** ASTM D2216

**Analyst:** DNA

Analyte	Result	RL	Units
Moisture, Percent	43	1	%

**Field ID:** SRWA-2B2X-A1-FD

**Lab ID:** 461637-006

**Matrix:** Soil

**Diln Fac:** 1.000

**Batch#:** 288708

**Sampled:** 03/28/22

**Received:** 04/21/22

**Prepared:** 05/03/22

**Analyzed:** 05/04/22

**Prep:** METHOD

**Analysis:** ASTM D2216

**Analyst:** DNA

Analyte	Result	RL	Units
Moisture, Percent	44	1	%

## Moisture

<b>Lab #:</b> 461637	<b>Project#:</b> COTL	
<b>Client:</b> Tetra Tech, Inc.	<b>Location:</b> T423.12 - Gulf of Thailand	
<b>Field ID:</b> SRWA-3B2X-A1	<b>Batch#:</b> 288708	<b>Analyzed:</b> 05/04/22
<b>Lab ID:</b> 461637-007	<b>Sampled:</b> 03/28/22	<b>Prep:</b> METHOD
<b>Matrix:</b> Soil	<b>Received:</b> 04/21/22	<b>Analysis:</b> ASTM D2216
<b>Diln Fac:</b> 1.000	<b>Prepared:</b> 05/03/22	<b>Analyst:</b> DNA

Analyte	Result	RL	Units
Moisture, Percent	43	1	%

<b>Field ID:</b> SRWA-4B2X-A1	<b>Batch#:</b> 288708	<b>Analyzed:</b> 05/04/22
<b>Lab ID:</b> 461637-008	<b>Sampled:</b> 03/28/22	<b>Prep:</b> METHOD
<b>Matrix:</b> Soil	<b>Received:</b> 04/21/22	<b>Analysis:</b> ASTM D2216
<b>Diln Fac:</b> 1.000	<b>Prepared:</b> 05/03/22	<b>Analyst:</b> DNA

Analyte	Result	RL	Units
Moisture, Percent	50	1	%

Legend

RL: Reporting Limit

## Moisture: Batch QC

<b>Lab #:</b> 461637	<b>Project#:</b> COTL	
<b>Client:</b> Tetra Tech, Inc.	<b>Location:</b> T423.12 - Gulf of Thailand	
<b>Field ID:</b> SRWA-4B2X-A1	<b>Diln Fac:</b> 1.000	<b>Analyzed:</b> 05/04/22
<b>Type:</b> SDUP	<b>Batch#:</b> 288708	<b>Prep:</b> METHOD
<b>MSS Lab ID:</b> 461637-008	<b>Sampled:</b> 03/28/22	<b>Analysis:</b> ASTM D2216
<b>Lab ID:</b> QC987404	<b>Received:</b> 04/21/22	<b>Analyst:</b> DNA
<b>Matrix:</b> Soil	<b>Prepared:</b> 05/03/22	

Analyte	MSS Result	Result	RL	Units	RPD	Lim
Moisture, Percent	49.91	49.90	1.000	%	0	26

Legend

**RL:** Reporting Limit

**RPD:** Relative Percent Difference

### Report of Samples Analysis

**Issued Date** : 24 June 2022  
**Customer** : Tetra Tech Inc.  
 77 Soi Udomsuk 39/1, Sukhumvit 103 Road, Bangchak,  
 Phrakhanong, Bangkok 10260  
 Tel : 0 2361 3767 Fax : 0 2361 3768  
**Tested by** : Physical Analysis Section,  
 Technical Support for Material Analysis Division, MTEC  
**Date received** : 11 May 2022  
**Date analyzed** : 21 June 2022  
**Samples** : Seabed Sediment No.176 – 182 of 182 samples.  
**Identification No.** : See sample detail  
**Instrument** : Mastersizer 2000, Malvern Instruments.  
**Test method** : Laser diffraction technique.  
**Analytical conditions** : Red light source : He-Ne laser source,  $\lambda$  : 633 nm.  
 Blue light source : Solid state light source  
 Beam length : 2.35 mm.  
 Particle size range analysis : 0.02 – 2,000  $\mu\text{m}$ .  
 Dispersion unit : Hydro 2000S (A)  
 Dispersing medium : De-ionized water  
 Treatment : Ultrasound 10 minutes with ultrasonic bath.  
 : Stir at 2000 rpm during measuring.  
 Sample refractive index : 1.5300 (as default standard wet)  
 Number of experiments : 3  
 Laser power : 87.3

**Sample preparation** : 1. Prepare the instrument for wet analysis. Stirrer should be set at 2000 rpm on Hydro 2000S (A).  
 2. 10 – 50 ml. of sample was dispersed and ultrasound 10 minutes with ultrasonic bath.  
 3. Add the dispersed sample into Hydro 2000S (A) unit and measure the dispersed sample with Mastersizer 2000.  
 4. All measurements are made three times.

**Samples detail** :

Sample No.	Sample Name	Sample No.	Sample Name
1	G4/43REF-A1	5	SRWA-2B2X-A1
2	G4/43REF-B1	6	SRWA-3B2X-A1
3	G4/43REF-C1	7	SRWA-4B2X-A1
4	SRWA-1B2X-A1		



**Technical Terms**

:

**Obscuration** : value at particle come cover to laser beam (percent), ranging from 10 – 30%.

**Residual** : on error value of analysis. This value should be less than 5%.

**D [4, 3]** : mean diameter value by volume.

**D [3, 2]** : mean diameter value by surface area.

**D (v, 0.1)** : 10 volume percent less than or equal to a given diameter.

**D (v, 0.5)** : 50 volume percent less than or equal to a given diameter, median diameter.

**D (v, 0.9)** : 90 volume percent less than or equal to a given diameter.

**Span** : the width of the distribution, which is independent of median size (D (v, 0.5)).

**Uniformity** : a measure of the absolute deviations from the median(D (v, 0.5)).

**Specific S.A.** : specific surface area, calculated from density and D [3, 2] of a sample.

**Results :**

MTEC received samples from Tetra Tech Inc. Laser diffraction technique is used in order to analyze the particle size and size distribution by wet analysis.

The results of the particle size and size distribution of samples are shown in tables 1 – 14 and the attachments No.1 – 21.

**Table 1** Mastersizer 2000 results of G4/43REF-A1

No.of measurement	Sub-run	D [4,3] (µm)	D (v,0.1) (µm)	D (v,0.5) (µm)	D (v,0.9) (µm)	Span
<b>1</b>	1	30.65	1.49	16.59	76.25	4.51
	2	31.74	1.50	16.58	77.76	4.60
	3	31.14	1.51	16.55	77.19	4.57
<b>2</b>	1	31.47	1.51	16.39	78.29	4.68
	2	31.14	1.49	16.16	76.19	4.62
	3	31.57	1.49	15.76	77.20	4.80
<b>3</b>	1	31.72	1.49	15.80	77.37	4.80
	2	31.46	1.50	15.84	78.28	4.85
	3	30.34	1.48	15.34	76.14	4.87
<b>Mean</b>		31.25	1.49	16.11	77.18	4.70
<b>STD</b>		0.48	0.01	0.45	0.85	0.13
<b>RSD%</b>		1.55	0.69	2.79	1.10	2.84

**Table 2** Mastersizer 2000 results of G4/43REF-A1 (Volume in%) (By customer request)

No.of measurement	Sub-run	0.02 - 3.9 (micron)	3.9 – 62.5 (micron)	62.5 - 2000 (micron)	Mode (micron)
<b>1</b>	1	23.82	61.94	14.24	31.24
	2	23.77	61.62	14.61	31.45
	3	23.72	61.80	14.47	31.46
<b>2</b>	1	23.83	61.41	14.77	30.57
	2	24.02	61.82	14.16	30.88
	3	24.26	61.51	14.23	29.70
<b>3</b>	1	24.22	61.53	14.26	29.94
	2	24.17	61.25	14.58	29.98
	3	24.52	61.48	14.01	28.96
<b>Mean</b>		24.04	61.60	14.37	30.46
<b>STD</b>		0.27	0.22	0.25	0.87

**Table 3** Mastersizer 2000 results of G4/43REF-B1

No.of measurement	Sub-run	D [4,3] (µm)	D (v,0.1) (µm)	D (v,0.5) (µm)	D (v,0.9) (µm)	Span
<b>1</b>	1	41.50	1.45	21.26	101.20	4.69
	2	41.00	1.45	21.17	99.74	4.64
	3	40.47	1.73	22.98	97.14	4.15
<b>2</b>	1	41.93	1.73	22.83	98.40	4.24
	2	41.80	1.74	22.89	98.71	4.24
	3	40.60	1.71	22.44	97.87	4.29
<b>3</b>	1	41.53	1.71	22.23	98.20	4.34
	2	41.65	1.71	21.90	97.05	4.35
	3	42.73	1.72	22.21	100.44	4.44
<b>Mean</b>		41.47	1.66	22.21	98.75	4.38
<b>STD</b>		0.70	0.12	0.67	1.44	0.19
<b>RSD%</b>		1.69	7.15	3.01	1.46	4.23

**Table 4** Mastersizer 2000 results of G4/43REF-B1 (Volume in%) (By customer request)

No.of measurement	Sub-run	0.02 - 3.9 (micron)	3.9 – 62.5 (micron)	62.5 - 2000 (micron)	Mode (micron)
<b>1</b>	1	22.40	55.83	21.78	51.43
	2	22.42	55.97	21.61	52.85
	3	20.28	58.30	21.42	49.30
<b>2</b>	1	20.32	58.00	21.68	51.20
	2	20.27	58.10	21.63	49.58
	3	20.48	58.17	21.35	48.66
<b>3</b>	1	20.56	58.01	21.44	50.01
	2	20.68	58.42	20.90	48.14
	3	20.52	57.94	21.54	47.99
<b>Mean</b>		20.88	57.64	21.48	49.91
<b>STD</b>		0.88	1.00	0.26	1.64



**Table 5** Mastersizer 2000 results of G4/43REF-C1

No.of measurement	Sub-run	D [4,3] (μm)	D (v,0.1) (μm)	D (v,0.5) (μm)	D (v,0.9) (μm)	Span
<b>1</b>	1	57.03	1.63	25.70	139.27	5.36
	2	58.51	1.63	25.87	139.85	5.34
	3	56.41	1.62	25.29	131.89	5.15
<b>2</b>	1	56.79	1.63	25.20	136.06	5.34
	2	57.28	1.62	24.95	135.97	5.39
	3	57.57	1.62	25.44	139.77	5.43
<b>3</b>	1	58.31	1.61	24.86	135.19	5.37
	2	57.16	1.59	24.32	138.03	5.61
	3	57.64	1.90	26.80	137.47	5.06
<b>Mean</b>		57.41	1.65	25.38	137.06	5.34
<b>STD</b>		0.68	0.09	0.70	2.59	0.16
<b>RSD%</b>		1.19	5.75	2.78	1.89	2.95

**Table 6** Mastersizer 2000 results of G4/43REF-C1 (Volume in%) (By customer request)

No.of measurement	Sub-run	0.02 - 3.9 (micron)	3.9 - 62.5 (micron)	62.5 - 2000 (micron)	Mode (micron)
<b>1</b>	1	20.66	50.66	28.68	67.00
	2	20.65	50.20	29.14	71.05
	3	20.85	51.00	28.15	68.10
<b>2</b>	1	20.79	50.89	28.32	68.08
	2	20.91	50.72	28.37	70.41
	3	20.81	50.13	29.06	72.39
<b>3</b>	1	21.00	50.60	28.40	70.97
	2	21.20	50.69	28.11	69.04
	3	19.11	51.84	29.06	69.37
<b>Mean</b>		20.66	50.75	28.59	69.60
<b>STD</b>		0.61	0.50	0.41	1.74

**Table 7** Mastersizer 2000 results of SRWA-1B2X-A1

No.of measurement	Sub-run	D [4,3] (μm)	D (v,0.1) (μm)	D (v,0.5) (μm)	D (v,0.9) (μm)	Span
<b>1</b>	1	44.57	1.67	22.33	111.15	4.90
	2	43.50	1.64	21.83	105.00	4.74
	3	44.36	1.66	22.24	109.70	4.86
<b>2</b>	1	42.23	1.65	21.86	104.46	4.70
	2	42.25	1.64	21.49	106.30	4.87
	3	43.57	1.64	21.62	106.47	4.85
<b>3</b>	1	41.72	1.65	21.82	107.84	4.87
	2	42.45	1.66	21.66	108.33	4.92
	3	41.61	1.64	21.12	105.07	4.90
<b>Mean</b>		42.92	1.65	21.77	107.15	4.85
<b>STD</b>		1.11	0.01	0.37	2.28	0.08
<b>RSD%</b>		2.58	0.70	1.69	2.13	1.56



**Table 8** Mastersizer 2000 results of SRWA-1B2X-A1 (Volume in%) (By customer request)

No.of measurement	Sub-run	0.02 - 3.9 (micron)	3.9 – 62.5 (micron)	62.5 - 2000 (micron)	Mode (micron)
<b>1</b>	1	20.17	57.65	22.18	32.16
	2	20.44	58.26	21.31	32.27
	3	20.20	57.69	22.12	32.08
<b>2</b>	1	20.35	58.15	21.50	32.26
	2	20.52	58.40	21.08	31.70
	3	20.46	58.20	21.34	32.33
<b>3</b>	1	20.37	57.99	21.64	32.17
	2	20.38	57.95	21.67	31.79
	3	20.64	58.41	20.95	31.60
<b>Mean</b>		20.39	58.08	21.53	32.04
<b>STD</b>		0.15	0.28	0.42	0.27

**Table 9** Mastersizer 2000 results of SRWA-2B2X-A1

No.of measurement	Sub-run	D [4,3] (μm)	D (v,0.1) (μm)	D (v,0.5) (μm)	D (v,0.9) (μm)	Span
<b>1</b>	1	76.23	1.94	43.02	191.80	4.41
	2	79.47	1.93	42.52	195.95	4.56
	3	79.87	1.94	43.08	200.99	4.62
<b>2</b>	1	80.62	1.94	43.39	200.82	4.58
	2	76.24	1.92	41.76	194.26	4.61
	3	81.18	1.91	42.18	197.00	4.63
<b>3</b>	1	78.57	1.94	43.26	204.44	4.68
	2	79.78	1.93	42.90	200.98	4.64
	3	76.12	1.84	39.24	197.43	4.98
<b>Mean</b>		78.67	1.92	42.37	198.19	4.64
<b>STD</b>		1.99	0.03	1.29	3.95	0.15
<b>RSD%</b>		2.53	1.62	3.04	1.99	3.26

**Table 10** Mastersizer 2000 results of SRWA-2B2X-A1 (Volume in%) (By customer request)

No.of measurement	Sub-run	0.02 - 3.9 (micron)	3.9 – 62.5 (micron)	62.5 - 2000 (micron)	Mode (micron)
<b>1</b>	1	17.39	40.75	41.86	105.39
	2	17.45	40.96	41.59	103.45
	3	17.37	40.77	41.86	103.70
<b>2</b>	1	17.35	40.48	42.17	104.94
	2	17.58	40.90	41.52	108.35
	3	17.60	40.77	41.63	103.52
<b>3</b>	1	17.40	40.40	42.20	105.89
	2	17.47	40.39	42.15	108.13
	3	18.16	41.35	40.49	106.71
<b>Mean</b>		17.53	40.75	41.72	105.56
<b>STD</b>		0.25	0.31	0.53	1.88



**Table 11** Mastersizer 2000 results of SRWA-3B2X-A1

No.of measurement	Sub-run	D [4,3] (µm)	D (v,0.1) (µm)	D (v,0.5) (µm)	D (v,0.9) (µm)	Span
<b>1</b>	1	89.47	1.65	35.08	252.60	7.15
	2	86.44	1.60	32.16	228.10	7.04
	3	84.50	1.61	33.27	235.84	7.04
<b>2</b>	1	83.39	1.59	31.69	228.46	7.16
	2	80.11	1.58	31.62	216.94	6.81
	3	78.30	1.77	32.40	203.54	6.23
<b>3</b>	1	78.03	1.79	33.36	205.38	6.10
	2	85.10	1.58	31.92	229.89	7.15
	3	79.42	1.81	34.57	211.36	6.06
<b>Mean</b>		82.75	1.67	32.90	223.57	6.75
<b>STD</b>		4.00	0.10	1.26	15.82	0.48
<b>RSD%</b>		4.83	5.85	3.84	7.08	7.09

**Table 12** Mastersizer 2000 results of SRWA-3B2X-A1 (Volume in%) (By customer request)

No.of measurement	Sub-run	0.02 - 3.9 (micron)	3.9 – 62.5 (micron)	62.5 - 2000 (micron)	Mode (micron)
<b>1</b>	1	19.97	40.44	39.59	110.02
	2	20.57	41.58	37.85	104.37
	3	20.36	40.90	38.74	113.49
<b>2</b>	1	20.71	41.73	37.56	102.69
	2	20.78	41.44	37.78	106.80
	3	19.64	42.71	37.65	104.17
<b>3</b>	1	19.43	42.19	38.38	110.26
	2	20.75	40.89	38.36	110.85
	3	19.25	41.57	39.18	107.30
<b>Mean</b>		20.16	41.49	38.34	107.77
<b>STD</b>		0.60	0.70	0.71	3.62

**Table 13** Mastersizer 2000 results of SRWA-4B2X-A1

No.of measurement	Sub-run	D [4,3] (µm)	D (v,0.1) (µm)	D (v,0.5) (µm)	D (v,0.9) (µm)	Span
<b>1</b>	1	65.58	2.06	34.55	153.47	4.38
	2	66.66	2.08	34.72	158.78	4.51
	3	63.36	2.05	33.85	153.96	4.49
<b>2</b>	1	61.85	2.05	33.52	152.49	4.49
	2	67.34	2.04	33.72	160.94	4.71
	3	61.35	1.98	31.99	148.87	4.59
<b>3</b>	1	63.89	2.00	32.44	155.61	4.74
	2	62.68	1.98	31.79	147.60	4.58
	3	68.18	2.00	32.67	162.49	4.91
<b>Mean</b>		64.54	2.03	33.25	154.91	4.60
<b>STD</b>		2.48	0.04	1.07	5.10	0.16
<b>RSD%</b>		3.85	1.85	3.22	3.29	3.51

**Table 14** Mastersizer 2000 results of SRWA-4B2X-A1 (Volume in%) (By customer request)

No.of measurement	Sub-run	0.02 - 3.9 (micron)	3.9 – 62.5 (micron)	62.5 - 2000 (micron)	Mode (micron)
<b>1</b>	1	16.40	49.63	33.97	73.65
	2	16.29	49.56	34.15	72.18
	3	16.50	49.84	33.67	72.83
<b>2</b>	1	16.57	50.03	33.40	72.33
	2	16.58	49.56	33.86	72.89
	3	17.03	50.63	32.34	70.50
<b>3</b>	1	16.91	50.09	33.00	72.12
	2	17.04	50.61	32.35	72.60
	3	16.94	49.52	33.54	73.91
<b>Mean</b>		16.69	49.94	33.37	72.56
<b>STD</b>		0.28	0.44	0.67	0.99

**Note :** 1. The specific surface area is inapplicable unless the density of a sample is known.  
2. The results of particle size distribution are dispersion particle only.  
3. Some particle of sample are vary size and size over range of instrument.

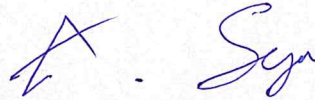
**Interpretation/Opinion :** None

**Attached pages :**

The attachment number	Detail
1 – 3	Mastersizer 2000 results of G4/43REF-A1
4 – 6	Mastersizer 2000 results of G4/43REF-B1
7 – 9	Mastersizer 2000 results of G4/43REF-C1
10 – 12	Mastersizer 2000 results of SRWA-1B2X-A1
13 – 15	Mastersizer 2000 results of SRWA-2B2X-A1
16 – 18	Mastersizer 2000 results of SRWA-3B2X-A1
19 – 21	Mastersizer 2000 results of SRWA-4B2X-A1

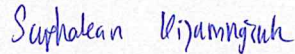


**Work performed by :**



(Mr.Arintarached Sirinantawittaya)

**Approved by :**



(Ms.Suphakan Kijamnajsuk)

**Remark**

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3. Experimental results are only valid for the specimens tested.



# Result : Analysis Report

Attached page 1

## Sample Details

Sample ID : G4/43REF-A1\_1

Measured : 21 มิถุนายน 2565 13:41:54

Sample File : C:\Users\001827\Desktop\งานเรา\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam\_Tetratich\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 13:41:55

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

## System Details

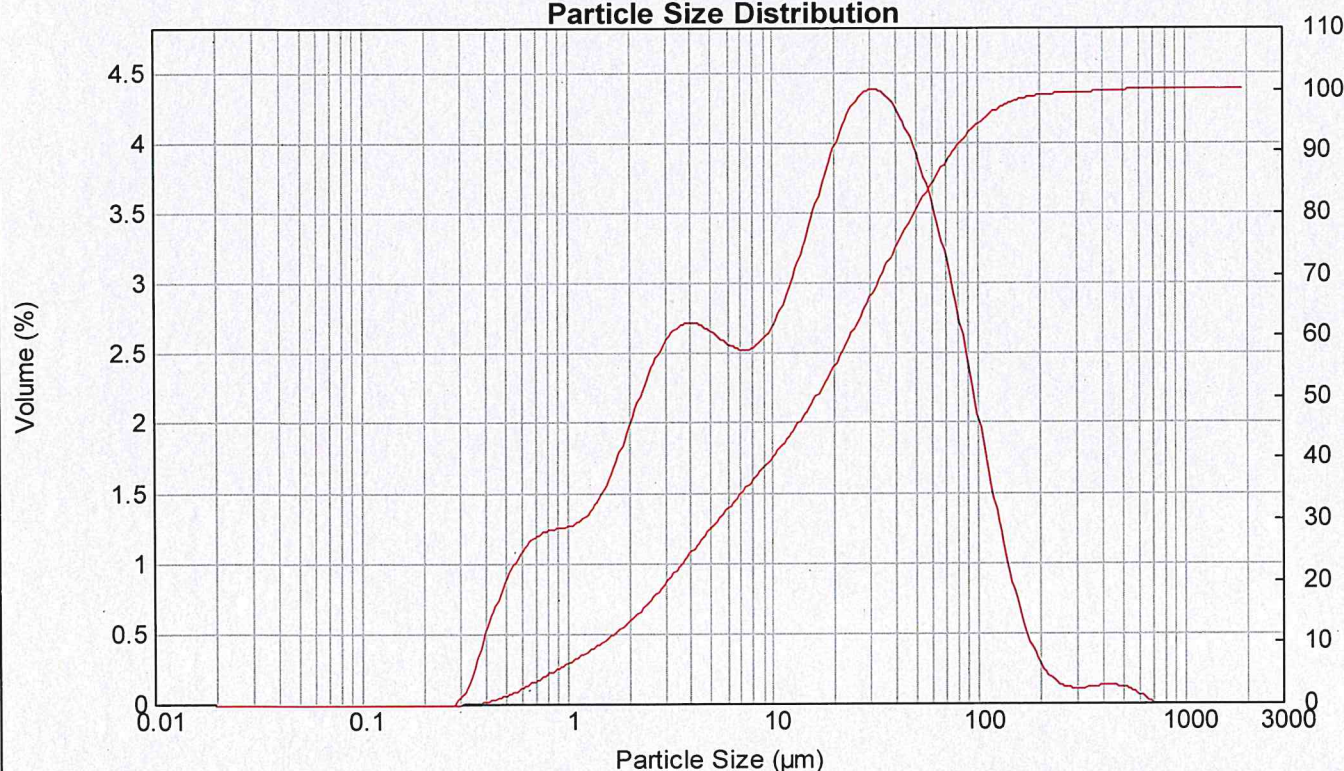
Accessory Name : Hydro 2000S (A)      Beam Length (mm) : 2.35      Obscuration (%) : 20.16      Residual (%) : 0.686  
Particle RI : 1.530      Absorption : 0.1      Dispersant Name : Water      Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume      Concentration : 0.0152 %Vol      Specific Surface Area : 1.42 m<sup>2</sup>/g  
Mean Diameters :      D (0.1) : 1.5 um      D (0.5) : 16.58 um      D (0.9) : 77.76 um  
D [4,3] 31.74 um      D [3,2] : 4.21 um      Span : 4.599      Uniformity : 1.57

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.30	7.952	2.57	58.573	3.48	430.887	0.13
0.023	0.00	0.172	0.00	1.262	1.39	9.283	2.69	68.291	3.09	502.377	0.10
0.027	0.00	0.200	0.00	1.471	1.57	10.823	2.90	79.621	2.62	585.729	0.05
0.032	0.00	0.233	0.00	1.715	1.81	12.619	3.18	92.832	2.11	682.910	0.00
0.037	0.00	0.272	0.01	2.000	2.08	14.713	3.49	108.234	1.59	796.214	0.00
0.043	0.00	0.317	0.15	2.332	2.34	17.154	3.81	126.191	1.11	928.318	0.00
0.050	0.00	0.370	0.47	2.719	2.55	20.000	4.08	147.128	0.70	1082.339	0.00
0.059	0.00	0.431	0.72	3.170	2.68	23.318	4.28	171.539	0.41	1261.915	0.00
0.068	0.00	0.502	0.95	3.696	2.73	27.187	4.38	200.000	0.23	1471.285	0.00
0.080	0.00	0.586	1.11	4.309	2.70	31.698	4.37	233.183	0.14	1715.392	0.00
0.093	0.00	0.683	1.20	5.024	2.64	36.957	4.27	271.871	0.11	2000.000	0.00
0.108	0.00	0.796	1.24	5.857	2.56	43.089	4.08	316.979	0.11		
0.126	0.00	0.928	1.26	6.829	2.53	50.238	3.82	369.570	0.13		
0.147	0.00	1.082		7.952		58.573		430.887			

## Particle Size Distribution





# Result : Analysis Report

Attached page 2

## Sample Details

Sample ID : G4/43REF-A1\_2

Measured : 21 มิถุนายน 2565 13:42:57

Sample File : C:\Users\001827\Desktop\งานเทค\Technical service\Tetra  
MTEC0884\_65\_176\_182 of 182 sam\_tetratetech\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 13:42:58

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

## System Details

Accessory Name : Hydro 2000S (A)      Beam Length (mm) : 2.35      Obscuration (%) : 19.93      Residual (%) : 0.679  
Particle RI : 1.530      Absorption : 0.1      Dispersant Name : Water      Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume      Concentration : 0.0149 %Vol      Specific Surface Area : 1.43 m<sup>2</sup>/g  
Mean Diameters :      D (0.1) : 1.49 um      D (0.5) : 16.16 um      D (0.9) : 76.19 um  
D [4,3] : 31.14 um      D [3,2] : 4.18 um      Span : 4.622      Uniformity : 1.59

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.31	7.962	2.61	58.573	3.45	430.887	0.13
0.023	0.00	0.172	0.00	1.262	1.41	9.283	2.73	68.291	3.05	502.377	0.13
0.027	0.00	0.200	0.00	1.471	1.58	10.823	2.94	79.621	2.59	585.729	0.09
0.032	0.00	0.233	0.00	1.715	1.83	12.619	3.21	92.832	2.07	682.910	0.00
0.037	0.00	0.272	0.01	2.000	2.11	14.713	3.52	108.234	1.55	796.214	0.00
0.043	0.00	0.317	0.15	2.332	2.37	17.154	3.83	126.191	1.06	928.318	0.00
0.050	0.00	0.370	0.47	2.719	2.58	20.000	4.09	147.128	0.66	1082.339	0.00
0.059	0.00	0.431	0.72	3.170	2.72	23.318	4.27	171.539	0.37	1261.915	0.00
0.068	0.00	0.502	0.95	3.696	2.76	27.187	4.36	200.000	0.18	1471.285	0.00
0.080	0.00	0.586	1.11	4.309	2.74	31.698	4.34	233.183	0.09	1715.392	0.00
0.093	0.00	0.683	1.21	5.024	2.67	36.957	4.23	271.871	0.07	2000.000	0.00
0.108	0.00	0.796	1.25	5.857	2.60	43.089	4.04	316.979	0.08		
0.126	0.00	0.928	1.27	6.829	2.57	50.238	3.77	369.570	0.11		
0.147	0.00	1.082		7.962		58.573		430.887			

## Particle Size Distribution





## Result : Analysis Report

Attached page 3

### Sample Details

Sample ID : G4/43REF-A1\_3

Measured : 21 มิถุนายน 2565 13:44:48

Sample File : C:\Users\001827\Desktop\งานเทค\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam\_Tetrattech\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 13:44:49

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

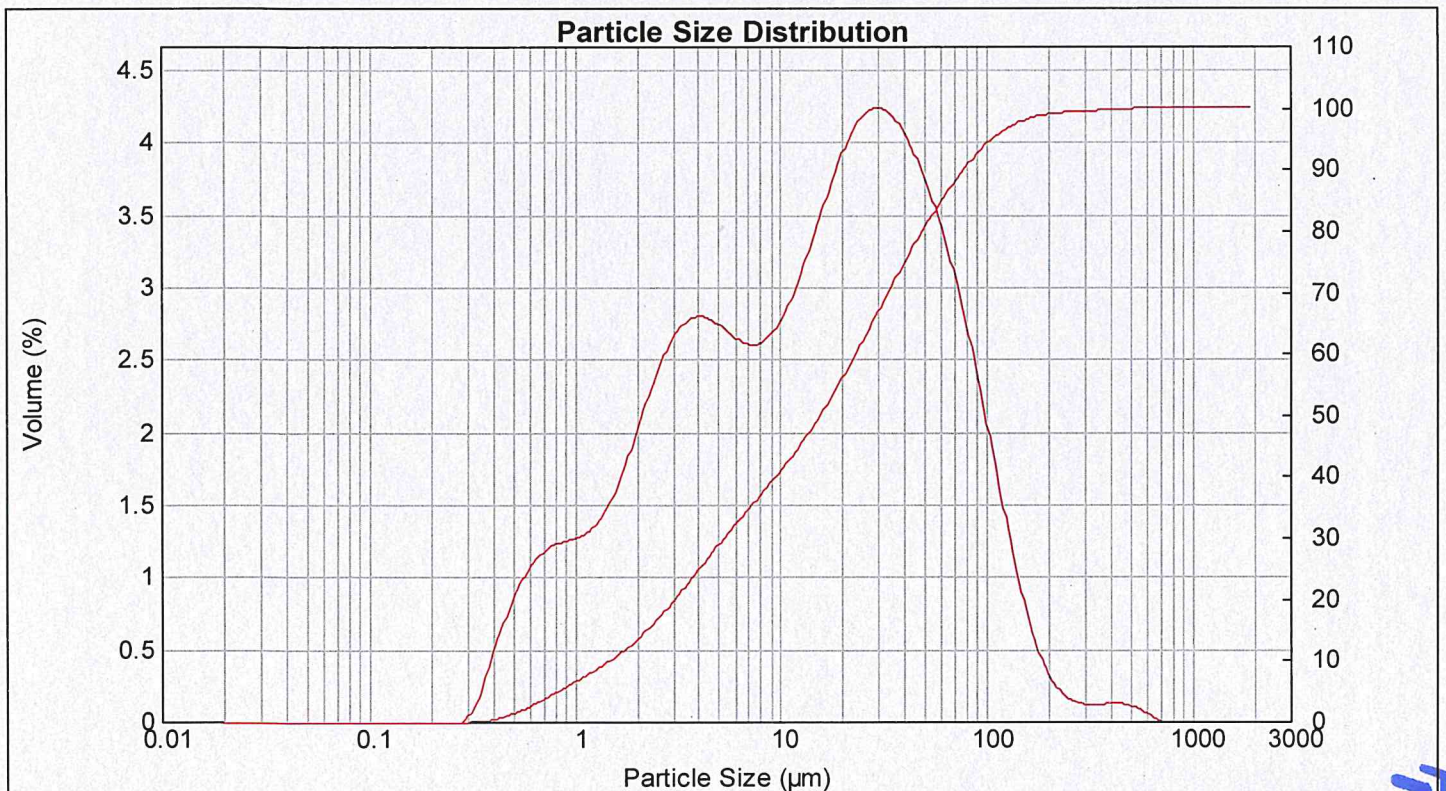
### System Details

Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 19.60 Residual (%) : 0.659  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume Concentration : 0.0145 %Vol Specific Surface Area : 1.43 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.5 um D (0.5) : 15.84 um D (0.9) : 78.28 um  
D [4,3] : 31.46 um D [3,2] : 4.18 um Span : 4.848 Uniformity : 1.64

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.32	7.962	2.65	58.573	3.35	430.887	0.12
0.023	0.00	0.172	0.00	1.262	1.42	9.283	2.76	68.291	3.00	502.377	0.09
0.027	0.00	0.200	0.00	1.471	1.60	10.823	2.96	79.621	2.58	585.729	0.04
0.032	0.00	0.233	0.00	1.715	1.85	12.619	3.22	92.832	2.11	682.910	0.00
0.037	0.00	0.272	0.01	2.000	2.13	14.713	3.51	108.234	1.62	796.214	0.00
0.043	0.00	0.317	0.15	2.332	2.40	17.154	3.79	126.191	1.14	928.318	0.00
0.050	0.00	0.370	0.46	2.719	2.62	20.000	4.03	147.128	0.74	1082.339	0.00
0.059	0.00	0.431	0.71	3.170	2.76	23.318	4.18	171.539	0.45	1261.915	0.00
0.068	0.00	0.502	0.94	3.696	2.81	27.187	4.25	200.000	0.26	1471.285	0.00
0.080	0.00	0.586	1.10	4.309	2.79	31.698	4.21	233.183	0.16	1715.392	0.00
0.093	0.00	0.683	1.20	5.024	2.72	36.957	4.09	271.871	0.12	2000.000	0.00
0.108	0.00	0.796	1.25	5.857	2.65	43.089	3.90	316.979	0.12		
0.126	0.00	0.928	1.27	6.829	2.62	50.238	3.65	369.570	0.12		
0.147	0.00	1.082		7.962		58.573		430.887			





## Result : Analysis Report

Attached page 4

### Sample Details

Sample ID : G4/43REF-B1\_1

Measured : 21 มิถุนายน 2565 14:05:46

Sample File : C:\Users\001827\Desktop\งานเทคนิค\Technical service\Tetra  
MTEC0884\_65\_176\_182 of 182 sam\_Tetrach\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 14:05:47

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

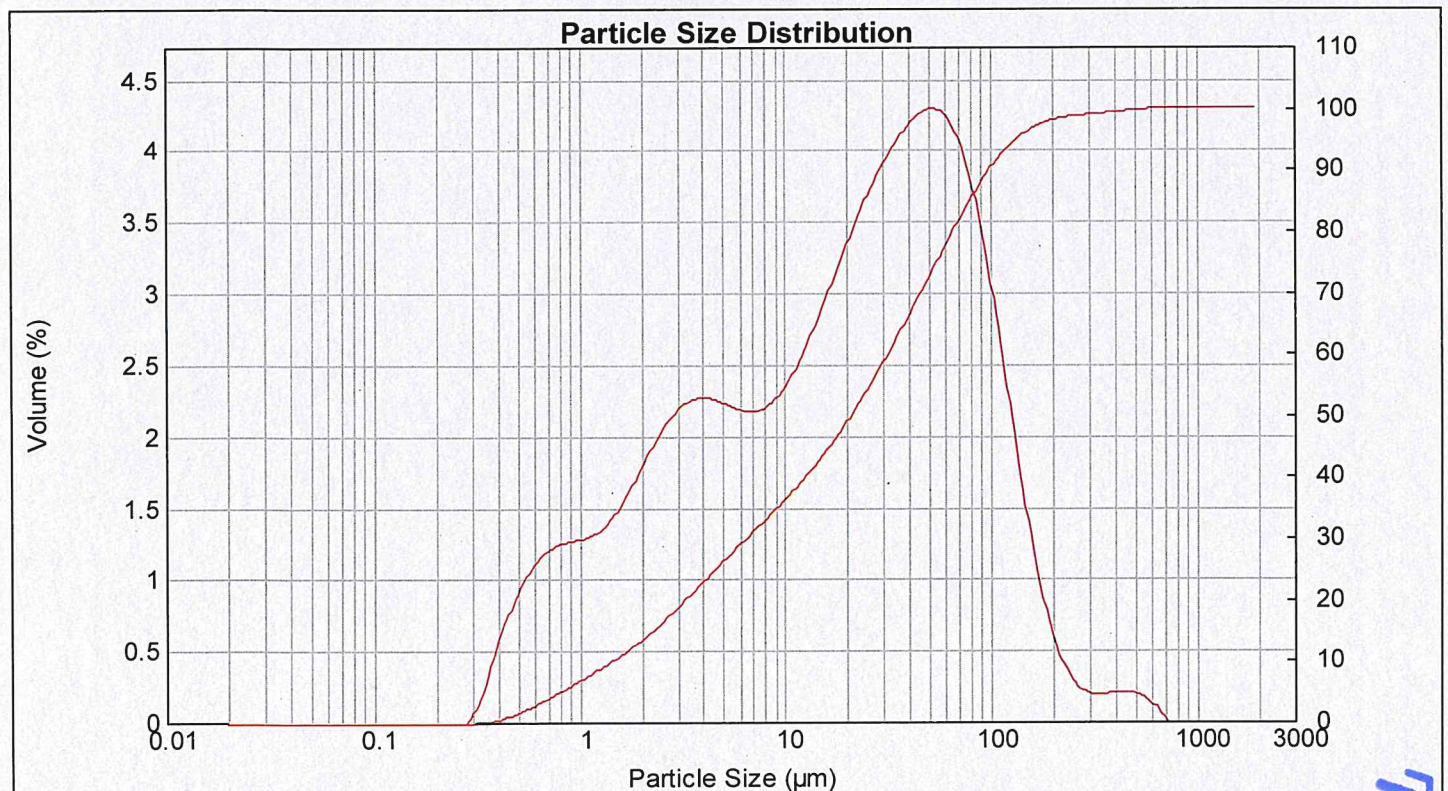
### System Details

Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 19.82 Residual (%) : 0.358  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume Concentration : 0.0157 %Vol Specific Surface Area : 1.39 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.45 um D (0.5) : 21.17 um D (0.9) : 99.73 um  
D [4,3] : 41 um D [3,2] : 4.3 um Span : 4.642 Uniformity : 1.61

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.31	7.962	2.23	58.573	4.23	430.887	0.21
0.023	0.00	0.172	0.00	1.262	1.38	9.283	2.34	68.291	4.01	502.377	0.19
0.027	0.00	0.200	0.00	1.471	1.51	10.823	2.51	79.621	3.64	585.729	0.12
0.032	0.00	0.233	0.00	1.715	1.67	12.619	2.72	92.832	3.13	682.910	0.01
0.037	0.00	0.272	0.02	2.000	1.86	14.713	2.96	108.234	2.51	796.214	0.00
0.043	0.00	0.317	0.21	2.332	2.03	17.154	3.22	126.191	1.87	928.318	0.00
0.050	0.00	0.370	0.54	2.719	2.17	20.000	3.46	147.128	1.28	1082.339	0.00
0.059	0.00	0.431	0.78	3.170	2.25	23.318	3.68	171.539	0.81	1261.915	0.00
0.068	0.00	0.502	0.99	3.696	2.28	27.187	3.88	200.000	0.49	1471.285	0.00
0.080	0.00	0.586	1.13	4.309	2.26	31.698	4.05	233.183	0.30	1715.392	0.00
0.093	0.00	0.683	1.22	5.024	2.22	36.957	4.19	271.871	0.21	2000.000	0.00
0.108	0.00	0.796	1.26	5.857	2.19	43.089	4.28	316.979	0.20		
0.126	0.00	0.928	1.28	6.829	2.19	50.238	4.30	369.570	0.21		
0.147	0.00	1.082		7.962		58.573		430.887			





# Result : Analysis Report

Attached page 5

## Sample Details

Sample ID : G4/43REF-B1\_2

Measured : 21 มิถุนายน 2565 14:07:53

Sample File : C:\Users\001827\Desktop\งานทาง\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam\_tetrattech\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 14:07:54

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

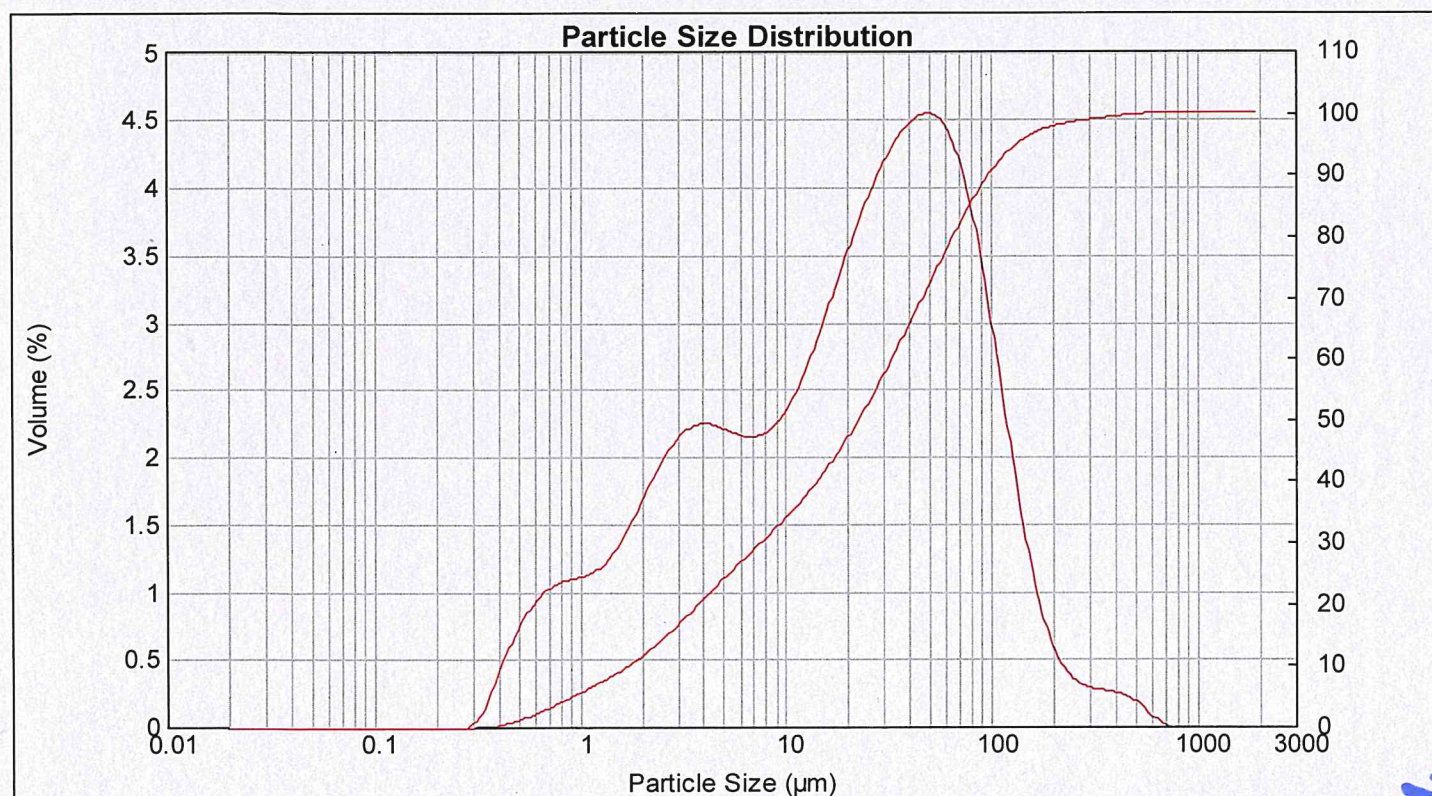
## System Details

Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 19.34 Residual (%) : 0.801  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume Concentration : 0.0167 %Vol Specific Surface Area : 1.23 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.74 um D (0.5) : 22.89 um D (0.9) : 98.71 um  
D [4,3] : 41.8 um D [3,2] : 4.87 um Span : 4.237 Uniformity : 1.49

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.15	7.962	2.21	58.573	4.42	430.887	0.22
0.023	0.00	0.172	0.00	1.262	1.23	9.283	2.34	68.291	4.13	502.377	0.16
0.027	0.00	0.200	0.00	1.471	1.36	10.823	2.53	79.621	3.67	585.729	0.07
0.032	0.00	0.233	0.00	1.715	1.55	12.619	2.78	92.832	3.07	682.910	0.00
0.037	0.00	0.272	0.01	2.000	1.76	14.713	3.07	108.234	2.40	796.214	0.00
0.043	0.00	0.317	0.12	2.332	1.96	17.154	3.37	126.191	1.74	928.318	0.00
0.050	0.00	0.370	0.39	2.719	2.12	20.000	3.66	147.128	1.17	1082.339	0.00
0.059	0.00	0.431	0.61	3.170	2.22	23.318	3.93	171.539	0.76	1261.915	0.00
0.068	0.00	0.502	0.81	3.696	2.25	27.187	4.16	200.000	0.50	1471.285	0.00
0.080	0.00	0.586	0.96	4.309	2.24	31.698	4.34	233.183	0.36	1715.392	0.00
0.093	0.00	0.683	1.05	5.024	2.20	36.957	4.48	271.871	0.28	2000.000	0.00
0.108	0.00	0.796	1.09	5.857	2.16	43.089	4.56	316.979	0.26		
0.126	0.00	0.928	1.11	6.829	2.16	50.238	4.55	369.570	0.26		
0.147	0.00	1.082		7.962		58.573		430.887			





## Result : Analysis Report

Attached page 6

### Sample Details

Sample ID : G4/43REF-B1\_3

Measured : 21 มิถุนายน 2565 14:09:29

Sample File : C:\Users\001827\Desktop\งานงาน\Technical service\Tetra  
MTEC0884\_65\_176-182\_02\_182\MTEC0884\_65\_176\_182\_02\_182

Analysed : 21 มิถุนายน 2565 14:09:30

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

### System Details

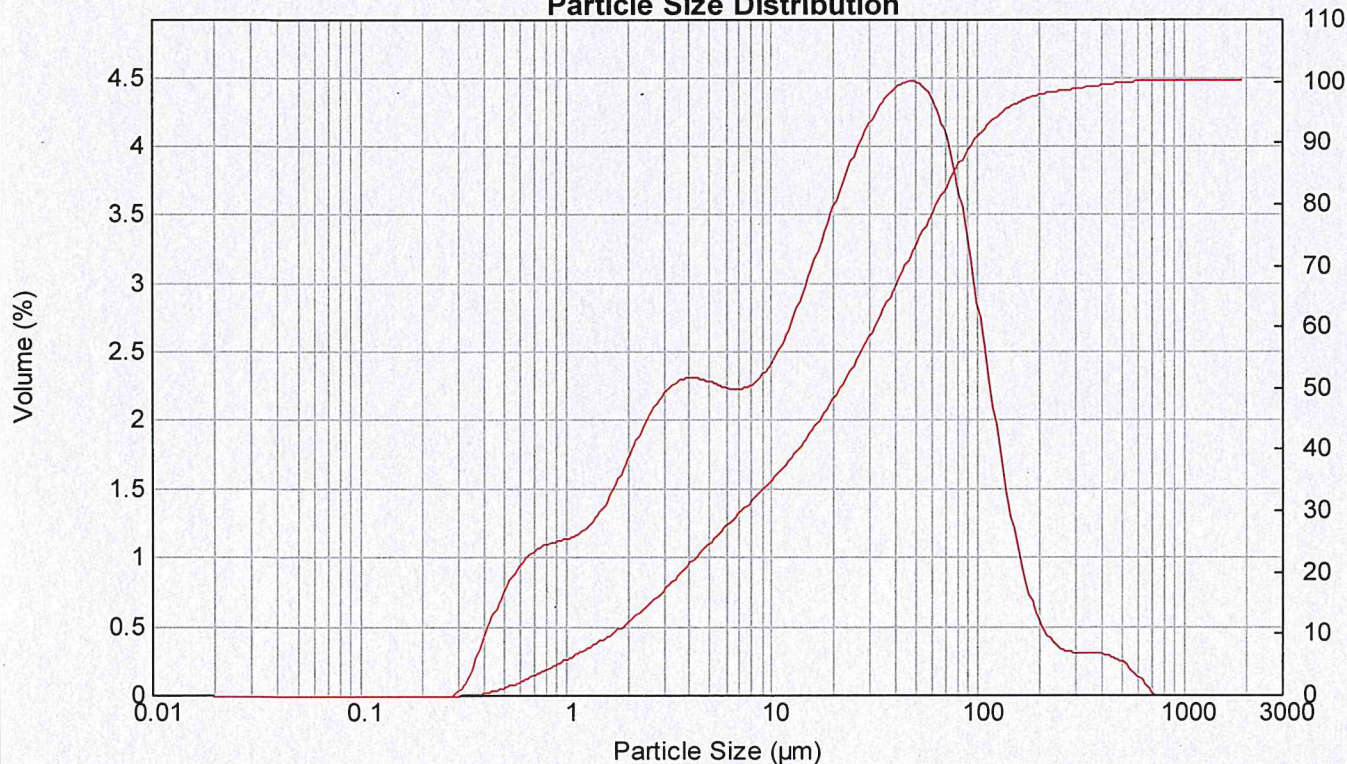
Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 19.07 Residual (%) : 0.779  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume Concentration : 0.0162 %Vol Specific Surface Area : 1.25 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.71 um D (0.5) : 21.9 um D (0.9) : 97.05 um  
D [4,3] : 41.65 um D [3,2] : 4.79 um Span : 4.354 Uniformity : 1.57

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.17	7.962	2.29	58.573	4.30	430.887	0.27
0.023	0.00	0.172	0.00	1.262	1.25	9.283	2.41	68.291	4.00	502.377	0.21
0.027	0.00	0.200	0.00	1.471	1.39	10.823	2.60	79.621	3.53	585.729	0.11
0.032	0.00	0.233	0.00	1.715	1.58	12.619	2.84	92.832	2.93	682.910	0.01
0.037	0.00	0.272	0.01	2.000	1.80	14.713	3.11	108.234	2.26	796.214	0.00
0.043	0.00	0.317	0.12	2.332	2.00	17.154	3.40	126.191	1.62	928.318	0.00
0.050	0.00	0.370	0.39	2.719	2.17	20.000	3.67	147.128	1.08	1082.339	0.00
0.059	0.00	0.431	0.62	3.170	2.27	23.318	3.92	171.539	0.70	1261.915	0.00
0.068	0.00	0.502	0.82	3.696	2.31	27.187	4.13	200.000	0.47	1471.285	0.00
0.080	0.00	0.586	0.97	4.309	2.31	31.698	4.30	233.183	0.35	1715.392	0.00
0.093	0.00	0.683	1.06	5.024	2.27	36.957	4.42	271.871	0.31	2000.000	0.00
0.108	0.00	0.796	1.11	5.857	2.24	43.089	4.48	316.979	0.30		
0.126	0.00	0.928	1.13	6.829	2.23	50.238	4.45	369.570	0.30		
0.147	0.00	1.082		7.962		58.573		430.887			

### Particle Size Distribution





## Result : Analysis Report

Attached page 7

### Sample Details

Sample ID : G4/43REF-C1\_1

Measured : 21 มิถุนายน 2565 14:22:16

Sample File : C:\Users\001827\Desktop\งานเทค\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam\_tetratech\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 14:22:18

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

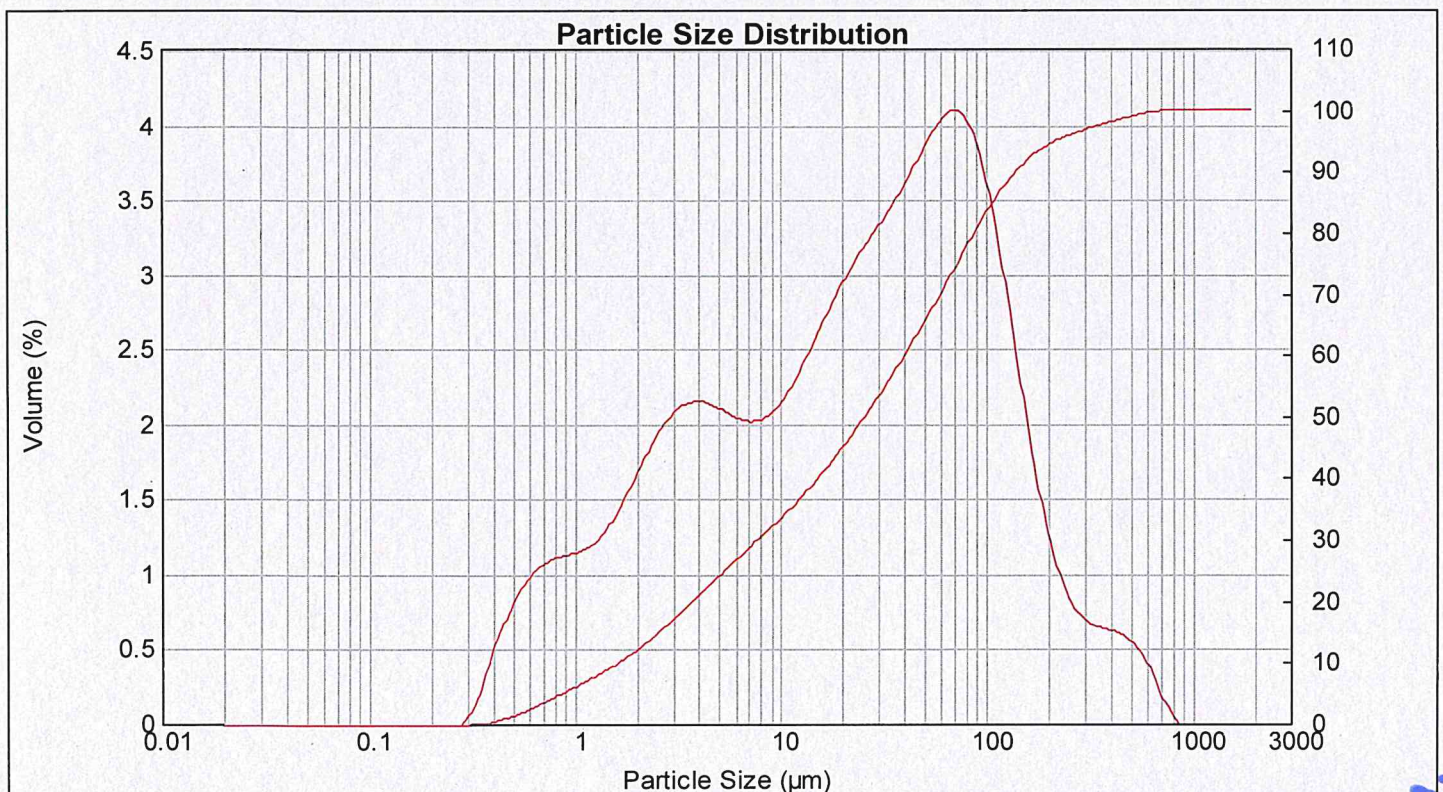
### System Details

Accessory Name : Hydro 2000S (A)      Beam Length (mm) : 2.35      Obscuration (%) : 20.08      Residual (%) : 0.356  
Particle RI : 1.530      Absorption : 0.1      Dispersant Name : Water      Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume      Concentration : 0.0173 %Vol      Specific Surface Area : 1.27 m<sup>2</sup>/g  
Mean Diameters :      D (0.1) : 1.63 um      D (0.5) : 25.87 um      D (0.9) : 139.85 um  
D [4,3] : 58.51 um      D [3,2] : 4.73 um      Span : 5.342      Uniformity : 1.95

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.19	7.962	2.06	58.573	4.08	430.887	0.60
0.023	0.00	0.172	0.00	1.262	1.26	9.283	2.14	68.291	4.11	502.377	0.51
0.027	0.00	0.200	0.00	1.471	1.39	10.823	2.28	79.621	3.98	585.729	0.37
0.032	0.00	0.233	0.00	1.715	1.56	12.619	2.46	92.832	3.67	682.910	0.16
0.037	0.00	0.272	0.02	2.000	1.75	14.713	2.66	108.234	3.20	796.214	0.01
0.043	0.00	0.317	0.18	2.332	1.92	17.154	2.85	126.191	2.62	928.318	0.00
0.050	0.00	0.370	0.48	2.719	2.06	20.000	3.03	147.128	2.03	1082.339	0.00
0.059	0.00	0.431	0.69	3.170	2.14	23.318	3.18	171.539	1.52	1261.915	0.00
0.068	0.00	0.502	0.88	3.696	2.16	27.187	3.32	200.000	1.12	1471.285	0.00
0.080	0.00	0.586	1.01	4.309	2.14	31.698	3.45	233.183	0.86	1715.392	0.00
0.093	0.00	0.683	1.09	5.024	2.09	36.957	3.60	271.871	0.72	2000.000	0.00
0.108	0.00	0.796	1.13	5.857	2.05	43.089	3.78	316.979	0.66		
0.126	0.00	0.928	1.15	6.829	2.03	50.238	3.95	369.570	0.64		
0.147	0.00	1.082		7.962		58.573		430.887			





# Result : Analysis Report

Attached page 8

## Sample Details

Sample ID : G4/43REF-C1\_2

Measured : 21 มิถุนายน 2565 14:23:19

Sample File : C:\Users\001827\Desktop\งานทาง\Technical service\Tetra  
MTEC0884\_65\_182\_02\_182\MTEC0884\_65\_176\_102\_02\_182

Analysed : 21 มิถุนายน 2565 14:23:21

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

## System Details

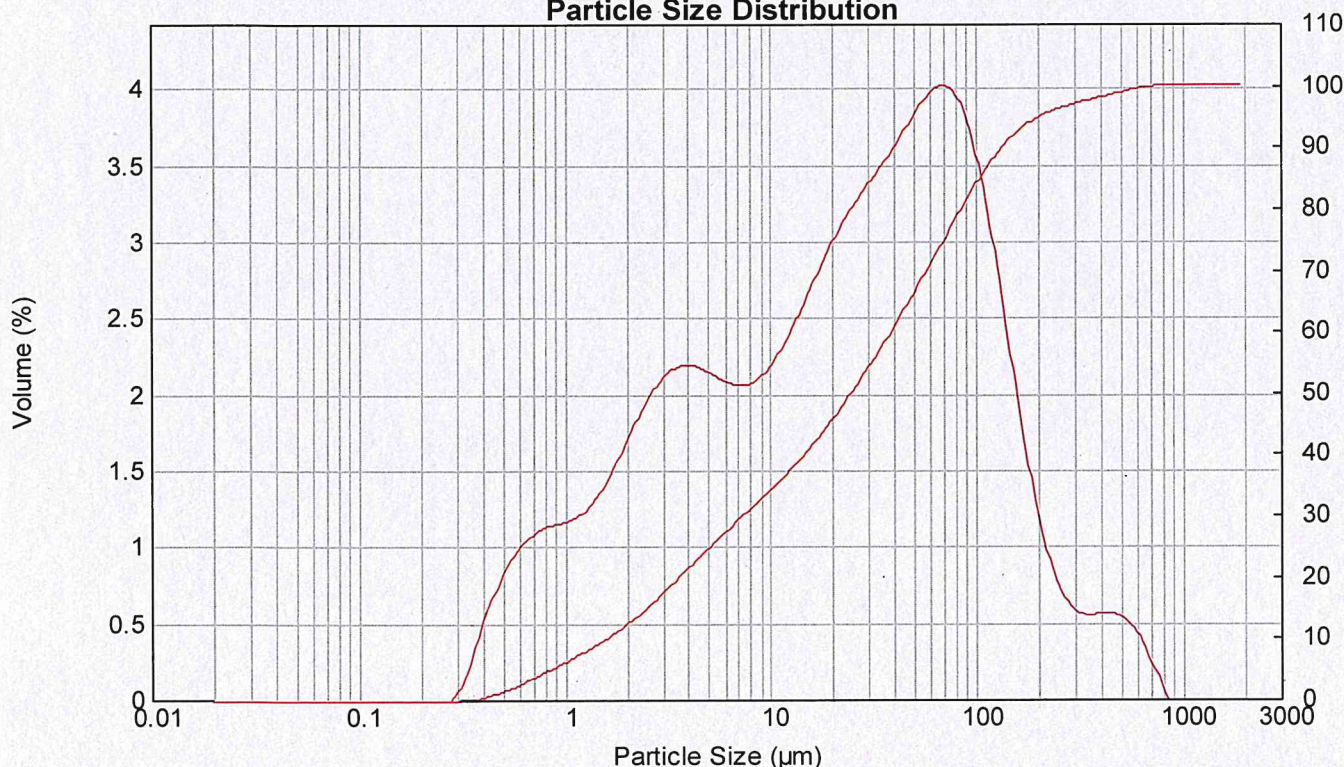
Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 19.90 Residual (%) : 0.354  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume Concentration : 0.0170 %Vol Specific Surface Area : 1.28 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.62 um D (0.5) : 24.95 um D (0.9) : 135.97 um  
D [4,3] : 57.28 um D [3,2] : 4.68 um Span : 5.386 Uniformity : 1.98

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.20	7.962	2.09	58.573	4.00	430.887	0.57
0.023	0.00	0.172	0.00	1.262	1.28	9.283	2.18	68.291	4.02	502.377	0.52
0.027	0.00	0.200	0.00	1.471	1.41	10.823	2.33	79.621	3.90	585.729	0.40
0.032	0.00	0.233	0.00	1.715	1.58	12.619	2.51	92.832	3.61	682.910	0.21
0.037	0.00	0.272	0.02	2.000	1.78	14.713	2.71	108.234	3.17	796.214	0.01
0.043	0.00	0.317	0.18	2.332	1.95	17.154	2.90	126.191	2.61	928.318	0.00
0.050	0.00	0.370	0.48	2.719	2.09	20.000	3.08	147.128	2.02	1082.339	0.00
0.059	0.00	0.431	0.70	3.170	2.17	23.318	3.23	171.539	1.48	1261.915	0.00
0.068	0.00	0.502	0.89	3.696	2.20	27.187	3.36	200.000	1.05	1471.285	0.00
0.080	0.00	0.586	1.02	4.309	2.18	31.698	3.49	233.183	0.76	1715.392	0.00
0.093	0.00	0.683	1.10	5.024	2.13	36.957	3.61	271.871	0.61	2000.000	0.00
0.108	0.00	0.796	1.14	5.857	2.08	43.089	3.76	316.979	0.56		
0.126	0.00	0.928	1.16	6.829	2.06	50.238	3.90	369.570	0.56		
0.147	0.00	1.082		7.962		58.573		430.887			

## Particle Size Distribution





## Result : Analysis Report

Attached page 9

### Sample Details

Sample ID : G4/43REF-C1\_3

Measured : 21 มิถุนายน 2565 14:24:22

Sample File : C:\Users\001827\Desktop\งานงาน\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam\_Tetrattech\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 14:24:23

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

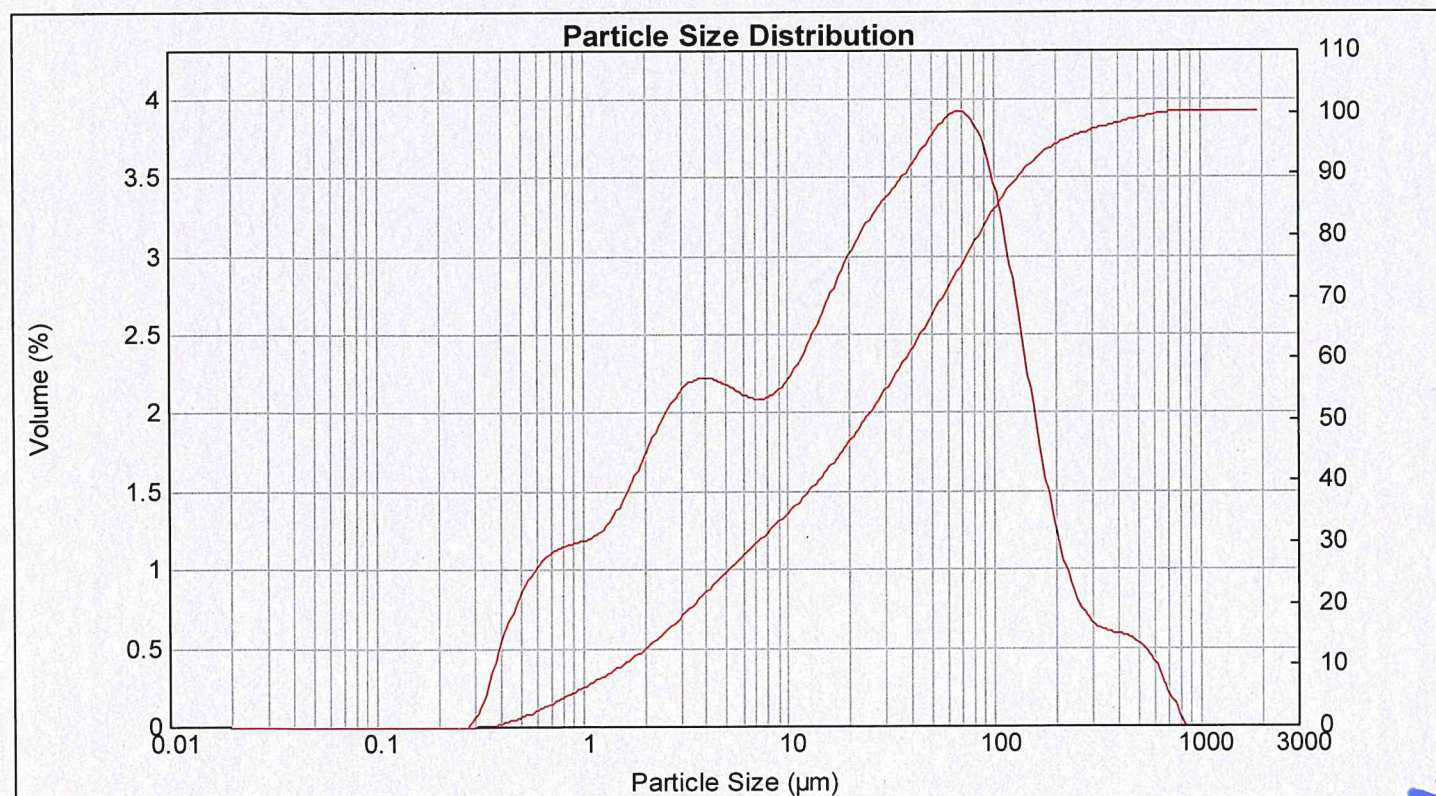
### System Details

Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 19.73 Residual (%) : 0.357  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume Concentration : 0.0166 %Vol Specific Surface Area : 1.3 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.59 um D (0.5) : 24.32 um D (0.9) : 138.03 um  
D [4,3] : 57.15 um D [3,2] : 4.62 um Span : 5.609 Uniformity : 2.04

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.22	7.962	2.12	58.573	3.91	430.887	0.57
0.023	0.00	0.172	0.00	1.262	1.30	9.283	2.20	68.291	3.91	502.377	0.50
0.027	0.00	0.200	0.00	1.471	1.43	10.823	2.34	79.621	3.79	585.729	0.38
0.032	0.00	0.233	0.00	1.715	1.61	12.619	2.52	92.632	3.50	682.910	0.18
0.037	0.00	0.272	0.02	2.000	1.80	14.713	2.72	108.234	3.08	796.214	0.01
0.043	0.00	0.317	0.18	2.332	1.98	17.154	2.91	126.191	2.55	928.318	0.00
0.050	0.00	0.370	0.49	2.719	2.12	20.000	3.08	147.128	2.01	1082.339	0.00
0.059	0.00	0.431	0.71	3.170	2.20	23.318	3.23	171.539	1.51	1261.915	0.00
0.068	0.00	0.502	0.90	3.696	2.23	27.187	3.35	200.000	1.12	1471.285	0.00
0.080	0.00	0.586	1.03	4.309	2.21	31.698	3.46	233.183	0.84	1715.392	0.00
0.093	0.00	0.683	1.11	5.024	2.16	36.957	3.57	271.871	0.69	2000.000	0.00
0.108	0.00	0.796	1.15	5.857	2.11	43.089	3.70	316.979	0.62		
0.126	0.00	0.928	1.18	6.829	2.09	50.238	3.82	369.570	0.59		
0.147	0.00	1.082		7.962		58.573		430.887			





# Result : Analysis Report

Attached page 10

## Sample Details

Sample ID : SRWA-1B2X-A1\_1

Measured : 21 มิถุนายน 2565 14:47:25

Sample File : C:\Users\001827\Desktop\งานเทค\Technical service\Tetra  
MTEC0884\_65\_176\_102 of 102

Analysed : 21 มิถุนายน 2565 14:47:27

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic bath before  
analysis and stirring at 2000 rpm during measurement.

## System Details

Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 20.59 Residual (%) : 0.791  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume Concentration : 0.0176 %Vol Specific Surface Area : 1.28 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.64 um D (0.5) : 21.83 um D (0.9) : 105 um  
D [4,3] : 43.5 um D [3,2] : 4.7 um Span : 4.735 Uniformity : 1.65

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.19	7.962	2.24	58.573	3.79	430.887	0.26
0.023	0.00	0.172	0.00	1.262	1.25	9.283	2.41	68.291	3.55	502.377	0.23
0.027	0.00	0.200	0.00	1.471	1.36	10.823	2.67	79.621	3.25	585.729	0.16
0.032	0.00	0.233	0.00	1.715	1.52	12.619	2.98	92.832	2.88	682.910	0.06
0.037	0.00	0.272	0.01	2.000	1.70	14.713	3.34	108.234	2.42	796.214	0.00
0.043	0.00	0.317	0.15	2.332	1.88	17.154	3.69	126.191	1.92	928.318	0.00
0.050	0.00	0.370	0.43	2.719	2.02	20.000	4.00	147.128	1.43	1082.339	0.00
0.059	0.00	0.431	0.67	3.170	2.12	23.318	4.22	171.539	1.00	1261.915	0.00
0.068	0.00	0.502	0.88	3.696	2.16	27.187	4.34	200.000	0.67	1471.285	0.00
0.080	0.00	0.586	1.03	4.309	2.16	31.698	4.35	233.183	0.45	1715.392	0.00
0.093	0.00	0.683	1.12	5.024	2.14	36.957	4.28	271.871	0.33	2000.000	0.00
0.108	0.00	0.796	1.16	5.857	2.12	43.089	4.15	316.979	0.28		
0.126	0.00	0.928	1.17	6.829	2.15	50.238	3.98	369.570	0.27		
0.147	0.00	1.082		7.962		58.573		430.887			

## Particle Size Distribution





## Result : Analysis Report

Attached page 11

### Sample Details

Sample ID : SRWA-1B2X-A1\_2

Measured : 21 มิถุนายน 2565 14:48:28

Sample File : C:\Users\001827\Desktop\งานทาง\Technical service\Tetra  
MTEC0884\_65\_176\_182\_02\_182\MTEC0884\_65\_176\_182\_02\_182

Analysed : 21 มิถุนายน 2565 14:48:30

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

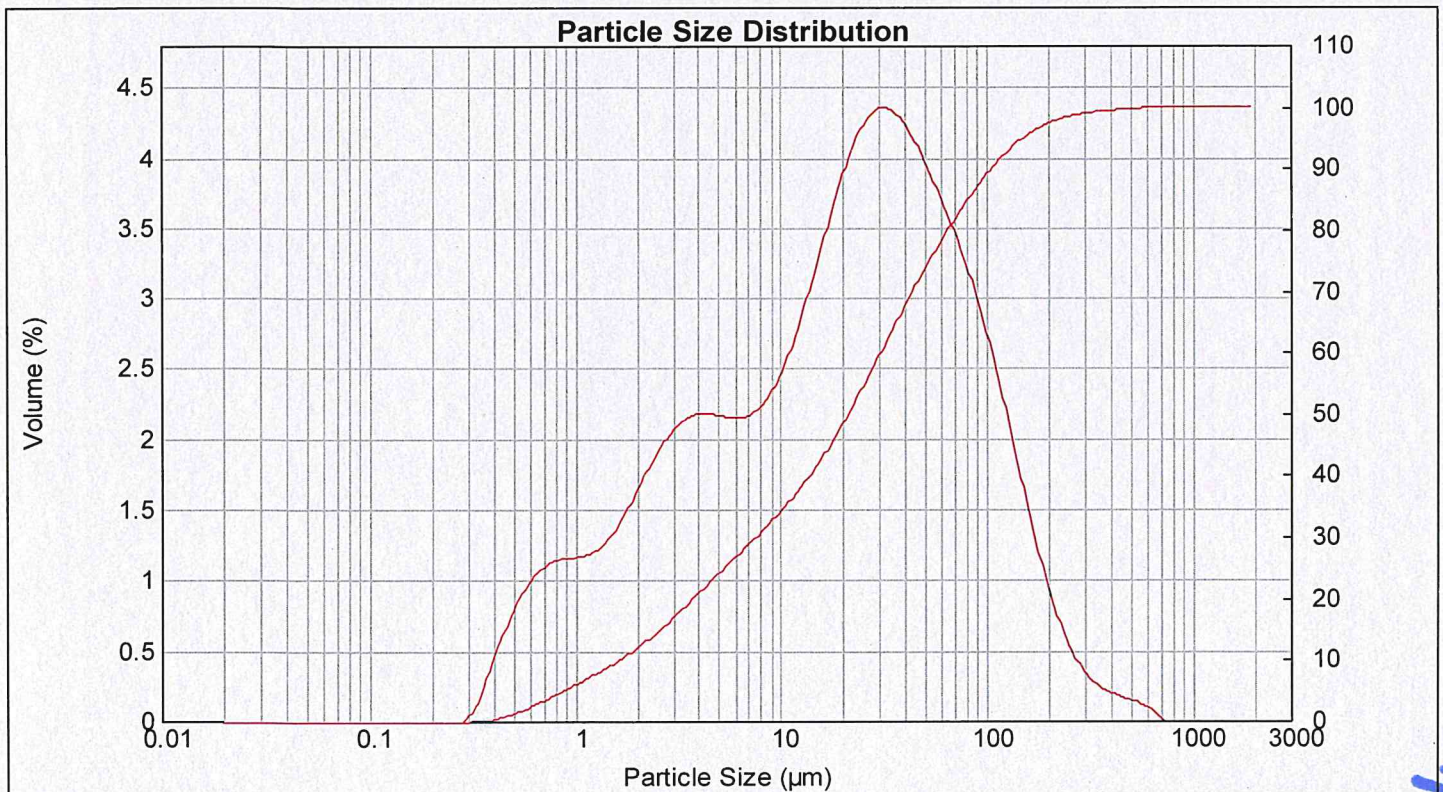
### System Details

Accessory Name : Hydro 2000S (A)      Beam Length (mm) : 2.35      Obscuration (%) : 20.32      Residual (%) : 0.776  
Particle RI : 1.530      Absorption : 0.1      Dispersant Name : Water      Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume      Concentration : 0.0173 %Vol      Specific Surface Area : 1.28 m<sup>2</sup>/g  
Mean Diameters :      D (0.1) : 1.64 um      D (0.5) : 21.49 um      D (0.9) : 106.3 um  
D [4,3] : 42.25 um      D [3,2] : 4.69 um      Span : 4.871      Uniformity : 1.62

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.19	7.962	2.28	58.573	3.65	430.887	0.17
0.023	0.00	0.172	0.00	1.262	1.25	9.283	2.45	68.291	3.40	502.377	0.14
0.027	0.00	0.200	0.00	1.471	1.37	10.823	2.70	79.621	3.12	585.729	0.09
0.032	0.00	0.233	0.00	1.715	1.53	12.619	3.01	92.832	2.79	682.910	0.01
0.037	0.00	0.272	0.01	2.000	1.72	14.713	3.36	108.234	2.40	796.214	0.00
0.043	0.00	0.317	0.15	2.332	1.90	17.154	3.71	126.191	1.97	928.318	0.00
0.050	0.00	0.370	0.43	2.719	2.04	20.000	4.02	147.128	1.55	1082.339	0.00
0.059	0.00	0.431	0.66	3.170	2.14	23.318	4.24	171.539	1.15	1261.915	0.00
0.068	0.00	0.502	0.88	3.696	2.18	27.187	4.35	200.000	0.81	1471.285	0.00
0.080	0.00	0.586	1.03	4.309	2.19	31.698	4.35	233.183	0.56	1715.392	0.00
0.093	0.00	0.683	1.12	5.024	2.17	36.957	4.26	271.871	0.38	2000.000	0.00
0.108	0.00	0.796	1.16	5.857	2.16	43.089	4.09	316.979	0.27		
0.126	0.00	0.928	1.17	6.829	2.19	50.238	3.88	369.570	0.21		
0.147	0.00	1.082		7.962		58.573		430.887			





# Result : Analysis Report

Attached page 12

## Sample Details

Sample ID : SRWA-1B2X-A1\_3

Measured : 21 มิถุนายน 2565 14:50:36

Sample File : C:\Users\001827\Desktop\งานงาน\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam Tetra tech lot2\_91.mea

Analysed : 21 มิถุนายน 2565 14:50:37

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

## System Details

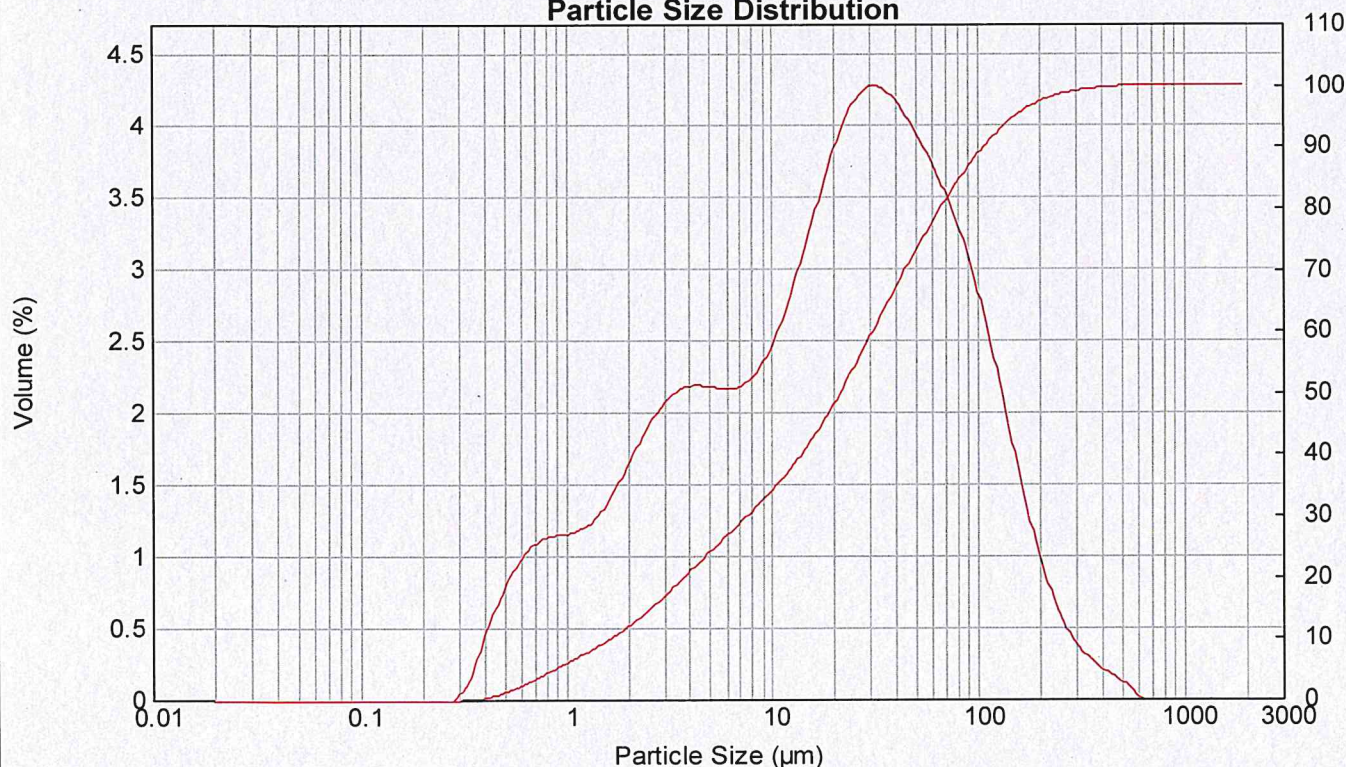
Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 19.98 Residual (%) : 0.759  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume Concentration : 0.0171 %Vol Specific Surface Area : 1.27 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.66 um D (0.5) : 21.66 um D (0.9) : 108.33 um  
D [4,3] : 42.45 um D [3,2] : 4.74 um Span : 4.924 Uniformity : 1.61

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.18	7.962	2.29	58.573	3.68	430.887	0.16
0.023	0.00	0.172	0.00	1.262	1.25	9.283	2.45	68.291	3.47	502.377	0.10
0.027	0.00	0.200	0.00	1.471	1.36	10.823	2.69	79.621	3.21	585.729	0.01
0.032	0.00	0.233	0.00	1.715	1.53	12.619	3.00	92.832	2.88	682.910	0.00
0.037	0.00	0.272	0.01	2.000	1.72	14.713	3.33	108.234	2.49	796.214	0.00
0.043	0.00	0.317	0.14	2.332	1.90	17.154	3.66	126.191	2.05	928.318	0.00
0.050	0.00	0.370	0.42	2.719	2.04	20.000	3.95	147.128	1.61	1082.339	0.00
0.059	0.00	0.431	0.65	3.170	2.14	23.318	4.16	171.539	1.20	1261.915	0.00
0.068	0.00	0.502	0.86	3.696	2.19	27.187	4.27	200.000	0.86	1471.285	0.00
0.080	0.00	0.586	1.01	4.309	2.19	31.698	4.27	233.183	0.60	1715.392	0.00
0.093	0.00	0.683	1.10	5.024	2.18	36.957	4.19	271.871	0.42	2000.000	0.00
0.108	0.00	0.796	1.15	5.857	2.17	43.089	4.05	316.979	0.30		
0.126	0.00	0.928	1.16	6.829	2.20	50.238	3.88	369.570	0.22		
0.147	0.00	1.082		7.962		58.573		430.887			

## Particle Size Distribution





# Result : Analysis Report

Attached page 13

## Sample Details

Sample ID : SRWA-2B2X-A1\_1

Measured : 21 มิถุนายน 2565 15:04:17

Sample File : C:\Users\001827\Desktop\งานงาน\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182

Analysed : 21 มิถุนายน 2565 15:04:18

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

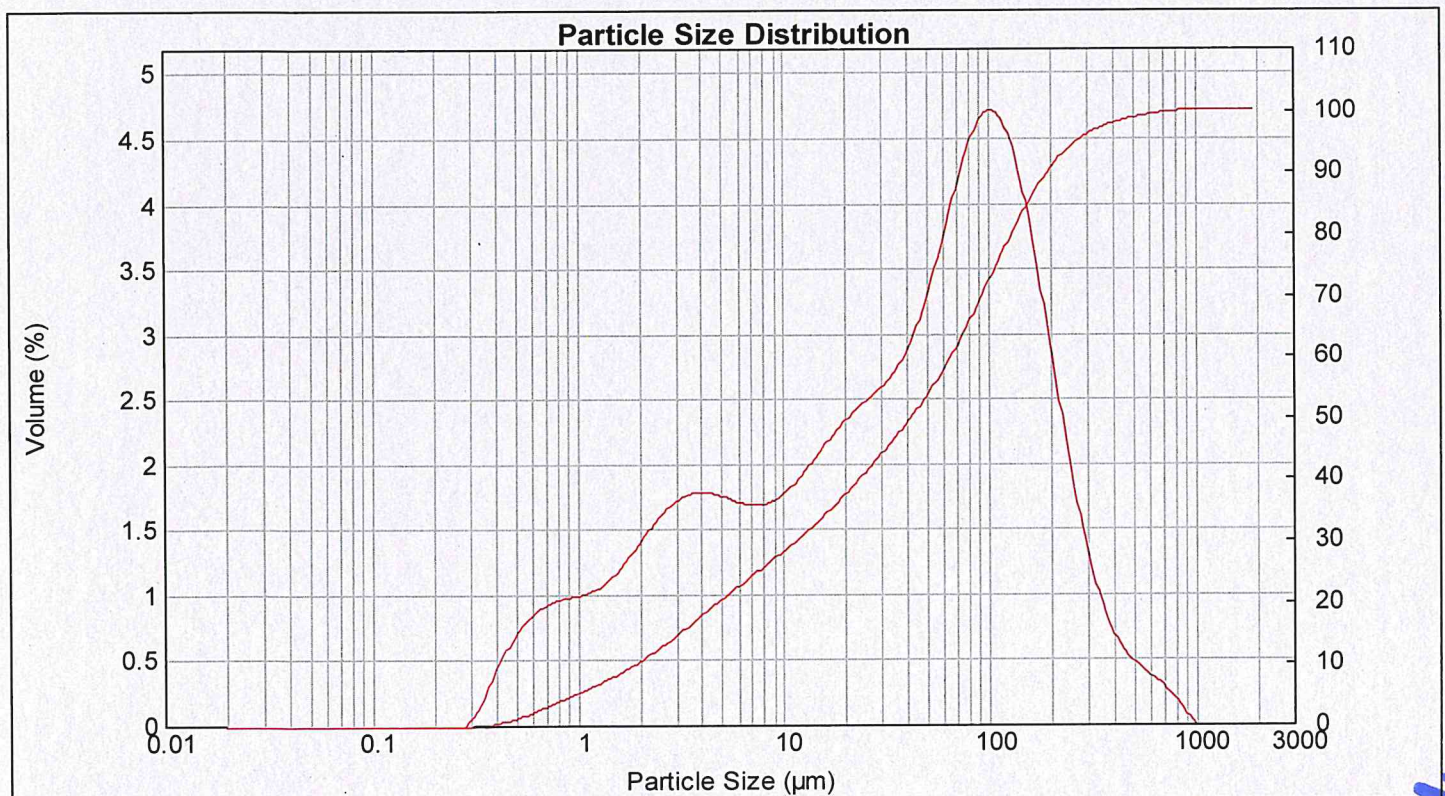
## System Details

Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 20.45 Residual (%) : 0.303  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume Concentration : 0.0208 %Vol Specific Surface Area : 1.08 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.93 um D (0.5) : 42.52 um D (0.9) : 195.95 um  
D [4,3] : 79.47 um D [3,2] : 5.54 um Span : 4.563 Uniformity : 1.58

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.02	7.962	1.71	58.573	3.86	430.887	0.55
0.023	0.00	0.172	0.00	1.262	1.08	9.283	1.77	68.291	4.26	502.377	0.45
0.027	0.00	0.200	0.00	1.471	1.18	10.823	1.87	79.621	4.57	585.729	0.36
0.032	0.00	0.233	0.00	1.715	1.31	12.619	2.00	92.832	4.72	682.910	0.27
0.037	0.00	0.272	0.02	2.000	1.46	14.713	2.14	108.234	4.65	796.214	0.15
0.043	0.00	0.317	0.16	2.332	1.59	17.154	2.27	126.191	4.36	928.318	0.01
0.050	0.00	0.370	0.41	2.719	1.70	20.000	2.38	147.128	3.88	1082.339	0.00
0.059	0.00	0.431	0.60	3.170	1.76	23.318	2.48	171.539	3.27	1261.915	0.00
0.068	0.00	0.502	0.76	3.696	1.79	27.187	2.57	200.000	2.62	1471.285	0.00
0.080	0.00	0.586	0.87	4.309	1.78	31.698	2.69	233.183	1.99	1715.392	0.00
0.093	0.00	0.683	0.94	5.024	1.74	36.957	2.86	271.871	1.45	2000.000	0.00
0.108	0.00	0.796	0.97	5.857	1.71	43.089	3.12	316.979	1.02		
0.126	0.00	0.928	0.99	6.829	1.69	50.238	3.46	369.570	0.73		
0.147	0.00	1.082		7.962		58.573		430.887			





## Result : Analysis Report

Attached page 14

### Sample Details

Sample ID : SRWA-2B2X-A1\_2

Measured : 21 มิถุนายน 2565 15:05:36

Sample File : C:\Users\001827\Desktop\งานงาน\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam\_Tetrattech\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 15:05:38

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

### System Details

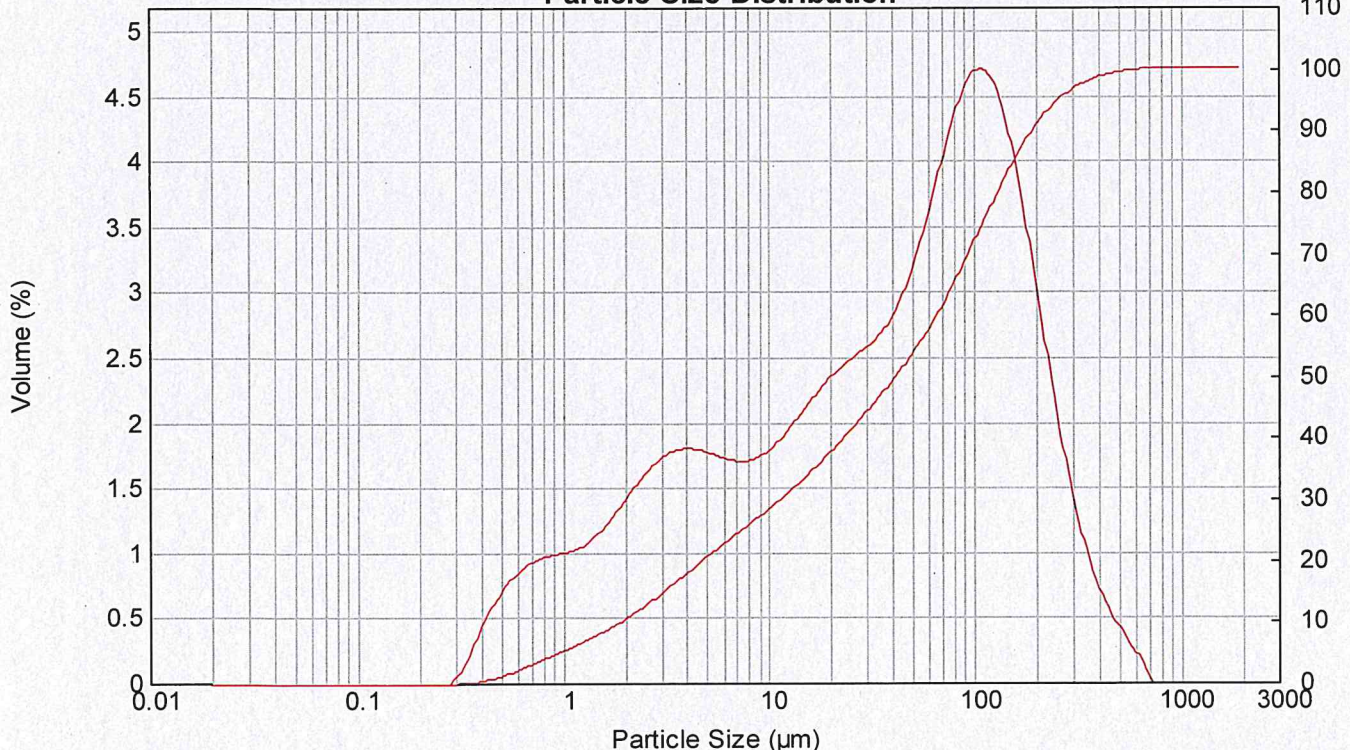
Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 20.11 Residual (%) : 0.314  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume Concentration : 0.0203 %Vol Specific Surface Area : 1.09 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.92 um D (0.5) : 41.76 um D (0.9) : 194.26 um  
D [4,3] : 76.24 um D [3,2] : 5.5 um Span : 4.606 Uniformity : 1.53

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.03	7.962	1.73	58.573	3.73	430.887	0.53
0.023	0.00	0.172	0.00	1.262	1.09	9.283	1.79	68.291	4.14	502.377	0.36
0.027	0.00	0.200	0.00	1.471	1.19	10.823	1.89	79.621	4.48	585.729	0.21
0.032	0.00	0.233	0.00	1.715	1.32	12.619	2.02	92.832	4.69	682.910	0.01
0.037	0.00	0.272	0.02	2.000	1.47	14.713	2.16	108.234	4.69	796.214	0.00
0.043	0.00	0.317	0.16	2.332	1.60	17.154	2.29	126.191	4.46	928.318	0.00
0.050	0.00	0.370	0.41	2.719	1.71	20.000	2.41	147.128	4.02	1082.339	0.00
0.059	0.00	0.431	0.60	3.170	1.78	23.318	2.50	171.539	3.43	1261.915	0.00
0.068	0.00	0.502	0.76	3.696	1.81	27.187	2.57	200.000	2.77	1471.285	0.00
0.080	0.00	0.586	0.87	4.309	1.80	31.698	2.67	233.183	2.12	1715.392	0.00
0.093	0.00	0.683	0.94	5.024	1.76	36.957	2.81	271.871	1.55	2000.000	0.00
0.108	0.00	0.796	0.98	5.857	1.73	43.089	3.03	316.979	1.09		
0.126	0.00	0.928	1.00	6.829	1.71	50.238	3.34	369.570	0.76		
0.147	0.00	1.082		7.962		58.573		430.887			

### Particle Size Distribution





# Result : Analysis Report

Attached page 15

## Sample Details

Sample ID : SRWA-2B2X-A1\_3

Measured : 21 มิถุนายน 2565 15:06:23

Sample File : C:\Users\001827\Desktop\งานเทค\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182

Analysed : 21 มิถุนายน 2565 15:06:25

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic bath before  
analysis and stirring at 2000 rpm during measurement.

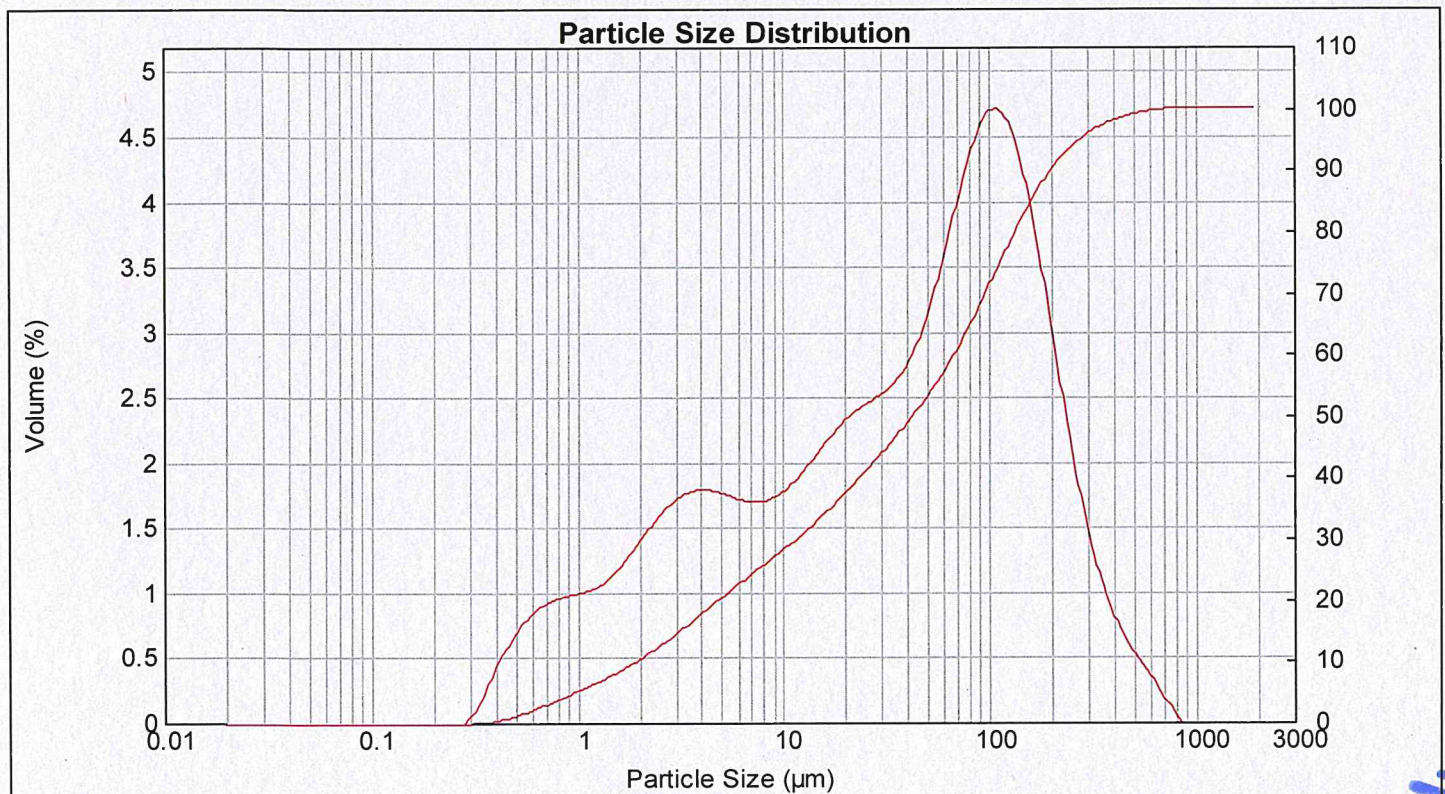
## System Details

Accessory Name : Hydro 2000S (A)      Beam Length (mm) : 2.35      Obscuration (%) : 19.96      Residual (%) : 0.309  
Particle RI : 1.530      Absorption : 0.1      Dispersant Name : Water      Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume      Concentration : 0.0202 %Vol      Specific Surface Area : 1.08 m<sup>2</sup>/g  
Mean Diameters :      D (0.1) : 1.93 um      D (0.5) : 42.9 um      D (0.9) : 200.98 um  
D [4,3] : 79.78 um      D [3,2] : 5.55 um      Span : 4.640      Uniformity : 1.57

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.03	7.962	1.72	58.573	3.70	430.887	0.64
0.023	0.00	0.172	0.00	1.262	1.09	9.283	1.78	68.291	4.12	502.377	0.47
0.027	0.00	0.200	0.00	1.471	1.19	10.823	1.88	79.621	4.48	585.729	0.33
0.032	0.00	0.233	0.00	1.715	1.32	12.619	2.00	92.832	4.69	682.910	0.16
0.037	0.00	0.272	0.02	2.000	1.46	14.713	2.14	108.234	4.45	796.214	0.01
0.043	0.00	0.317	0.16	2.332	1.59	17.154	2.27	126.191	4.00	928.318	0.00
0.050	0.00	0.370	0.41	2.719	1.70	20.000	2.37	147.128	3.41	1082.339	0.00
0.059	0.00	0.431	0.59	3.170	1.77	23.318	2.45	171.539	2.76	1261.915	0.00
0.068	0.00	0.502	0.75	3.696	1.80	27.187	2.52	200.000	2.13	1471.285	0.00
0.080	0.00	0.586	0.86	4.309	1.79	31.698	2.60	233.183	1.58	1715.392	0.00
0.093	0.00	0.683	0.94	5.024	1.76	36.957	2.74	271.871	1.16	2000.000	0.00
0.108	0.00	0.796	0.97	5.857	1.72	43.089	2.97	316.979	0.86		
0.126	0.00	0.928	1.00	6.829	1.70	50.238	3.29	369.570			
0.147	0.00	1.082		7.962		58.573		430.887			





# Result : Analysis Report

Attached page 16

## Sample Details

Sample ID : SRWA-3B2X-A1\_1

Measured : 21 มิถุนายน 2565 15:20:29

Sample File : C:\Users\001827\Desktop\งานเทค\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182

Analysed : 21 มิถุนายน 2565 15:20:31

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

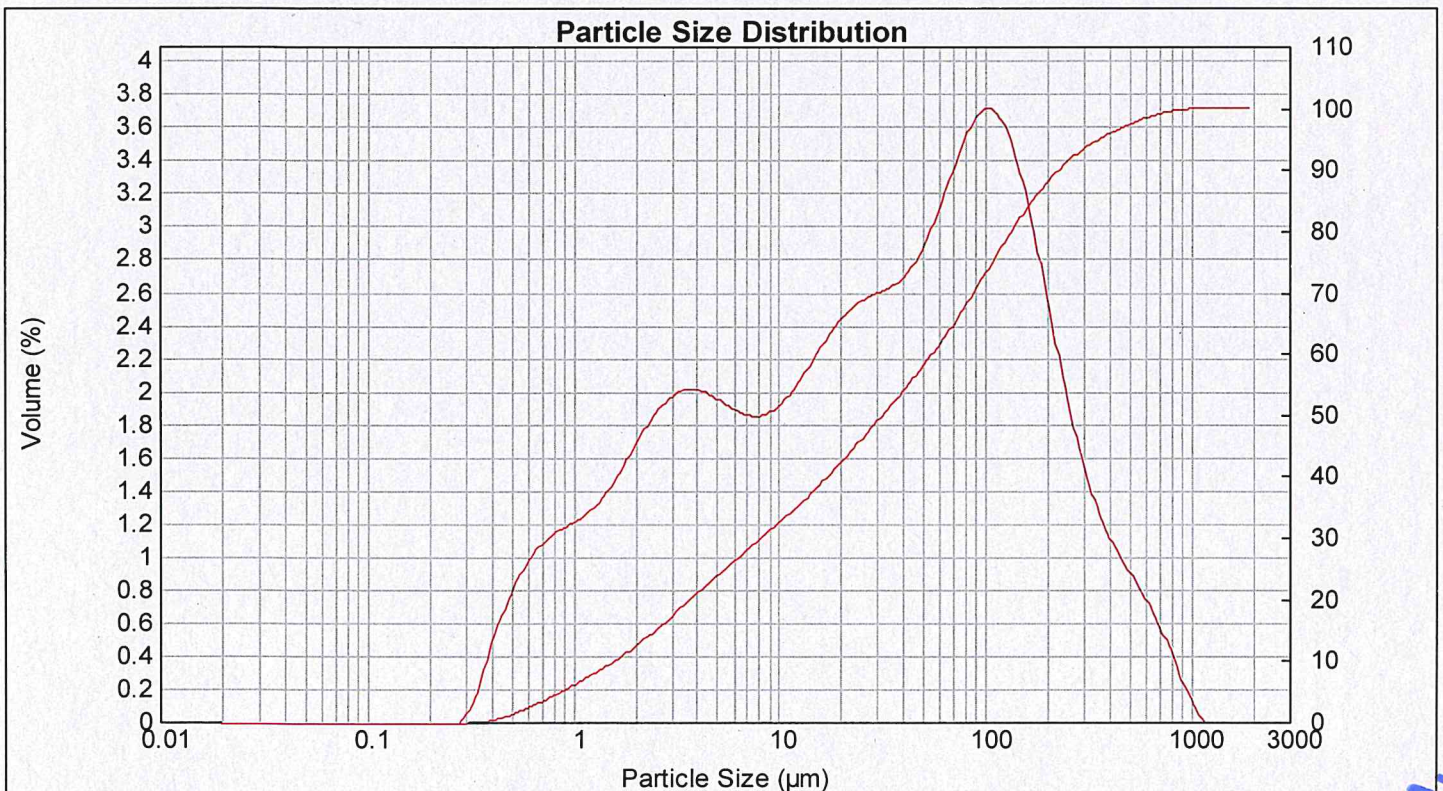
## System Details

Accessory Name : Hydro 2000S (A)      Beam Length (mm) : 2.35      Obscuration (%) : 20.67      Residual (%) : 0.338  
Particle RI : 1.530      Absorption : 0.1      Dispersant Name : Water      Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume      Concentration : 0.0183 %Vol      Specific Surface Area : 1.24 m<sup>2</sup>/g  
Mean Diameters :      D (0.1) : 1.6 um      D (0.5) : 32.16 um      D (0.9) : 228.1 um  
D [4,3] : 86.44 um      D [3,2] : 4.83 um      Span : 7.042      Uniformity : 2.4

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.26	7.962	1.87	58.573	3.18	430.887	0.99
0.023	0.00	0.172	0.00	1.262	1.34	9.283	1.92	68.291	3.42	502.377	0.86
0.027	0.00	0.200	0.00	1.471	1.45	10.823	2.01	79.621	3.62	585.729	0.71
0.032	0.00	0.233	0.00	1.715	1.59	12.619	2.13	92.832	3.72	682.910	0.54
0.037	0.00	0.272	0.02	2.000	1.74	14.713	2.26	108.234	3.68	796.214	0.35
0.043	0.00	0.317	0.16	2.332	1.87	17.154	2.38	126.191	3.50	928.318	0.16
0.050	0.00	0.370	0.45	2.719	1.96	20.000	2.48	147.128	3.19	1082.339	0.01
0.059	0.00	0.431	0.67	3.170	2.01	23.318	2.55	171.539	2.80	1261.915	0.00
0.068	0.00	0.502	0.86	3.696	2.02	27.187	2.60	200.000	2.38	1471.285	0.00
0.080	0.00	0.586	1.00	4.309	1.99	31.698	2.63	233.183	1.97	1715.392	0.00
0.093	0.00	0.683	1.10	5.024	1.94	36.957	2.69	271.871	1.62	2000.000	0.00
0.108	0.00	0.796	1.16	5.857	1.89	43.089	2.79	316.979	1.34		
0.126	0.00	0.928	1.21	6.829	1.86	50.238	2.96	369.570	1.14		
0.147	0.00	1.082		7.962		58.573		430.887			





## Result : Analysis Report

Attached page 17

### Sample Details

Sample ID : SRWA-3B2X-A1\_2

Measured : 21 มิถุนายน 2565 15:21:33

Sample File : C:\Users\001827\Desktop\งานเทคนิค\Technical service\Tetra  
MTEC0884\_65\_176-182\_02\_182\Tetra\Tetra\_02\_182\_02\_182\_02\_182

Analysed : 21 มิถุนายน 2565 15:21:34

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic bath before  
analysis and stirring at 2000 rpm during measurement.

### System Details

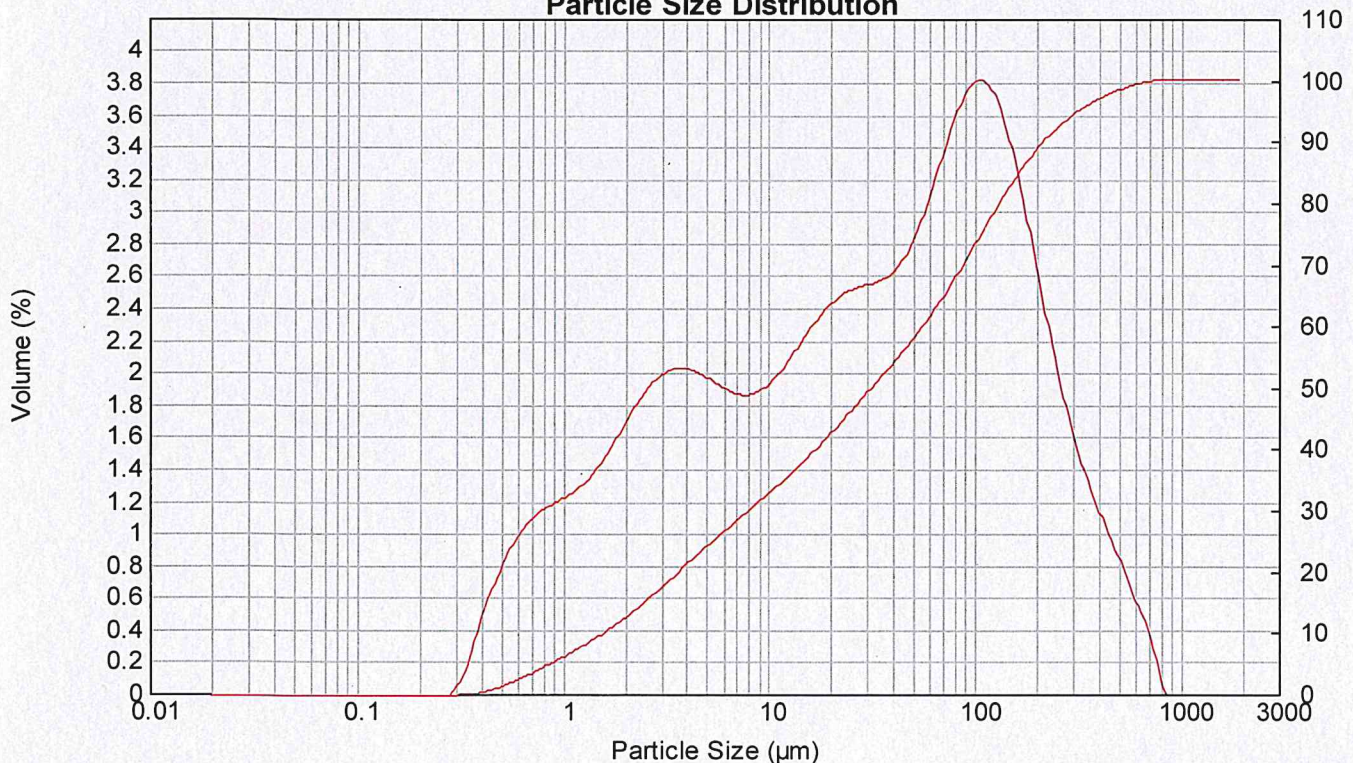
Accessory Name : Hydro 2000S (A)      Beam Length (mm) : 2.35      Obscuration (%) : 20.46      Residual (%) : 0.352  
Particle RI : 1.530      Absorption : 0.1      Dispersant Name : Water      Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume      Concentration : 0.0179 %Vol      Specific Surface Area : 1.25 m<sup>2</sup>/g  
Mean Diameters :      D (0.1) : 1.58 um      D (0.5) : 31.62 um      D (0.9) : 216.94 um  
D [4,3] : 80.11 um      D [3,2] : 4.79 um      Span : 6.811      Uniformity : 2.25

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.27	7.962	1.88	58.573	3.17	430.887	0.96
0.023	0.00	0.172	0.00	1.262	1.35	9.283	1.94	68.291	3.44	502.377	0.76
0.027	0.00	0.200	0.00	1.471	1.35	10.823	2.03	79.621	3.68	585.729	0.54
0.032	0.00	0.233	0.00	1.715	1.47	12.619	2.15	92.832	3.81	682.910	0.32
0.037	0.00	0.272	0.00	2.000	1.61	14.713	2.27	108.234	3.80	796.214	0.01
0.043	0.00	0.317	0.02	2.332	1.76	17.154	2.39	126.191	3.62	928.318	0.00
0.050	0.00	0.370	0.16	2.719	1.89	20.000	2.47	147.128	3.30	1082.339	0.00
0.059	0.00	0.431	0.46	3.170	1.98	23.318	2.52	171.539	2.90	1261.915	0.00
0.068	0.00	0.502	0.67	3.696	2.03	27.187	2.55	200.000	2.47	1471.285	0.00
0.080	0.00	0.586	0.87	4.309	2.01	31.698	2.58	233.183	2.05	1715.392	0.00
0.093	0.00	0.683	1.01	5.024	1.96	36.957	2.63	271.871	1.69	2000.000	0.00
0.108	0.00	0.796	1.17	5.857	1.90	43.089	2.74	316.979	1.40		
0.126	0.00	0.928	1.22	6.829	1.87	50.238	2.92	369.570	1.17		
0.147	0.00	1.082		7.962		58.573		430.887			

### Particle Size Distribution





# Result : Analysis Report

Attached page 18

## Sample Details

Sample ID : SRWA-3B2X-A1\_3

Measured : 21 มิถุนายน 2565 15:23:08

Sample File : C:\Users\001827\Desktop\งานเทคนิค\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam\_Tetratech lot2\_91.mea

Analysed : 21 มิถุนายน 2565 15:23:10

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

## System Details

Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 20.23 Residual (%) : 0.385  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume Concentration : 0.0177 %Vol Specific Surface Area : 1.25 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 1.58 um D (0.5) : 31.92 um D (0.9) : 229.89 um  
D [4,3] : 85.1 um D [3,2] : 4.8 um Span : 7.153 Uniformity : 2.38

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	1.27	7.962	1.88	58.573	3.04	430.887	1.12
0.023	0.00	0.172	0.00	1.262	1.35	9.283	1.93	68.291	3.32	502.377	0.95
0.027	0.00	0.200	0.00	1.471	1.47	10.823	2.02	79.621	3.59	585.729	0.72
0.032	0.00	0.233	0.00	1.715	1.61	12.619	2.14	92.832	3.76	682.910	0.44
0.037	0.00	0.272	0.02	2.000	1.75	14.713	2.26	108.234	3.79	796.214	0.14
0.043	0.00	0.317	0.16	2.332	1.88	17.154	2.37	126.191	3.64	928.318	0.01
0.050	0.00	0.370	0.46	2.719	1.98	20.000	2.45	147.128	3.33	1082.339	0.00
0.059	0.00	0.431	0.67	3.170	2.03	23.318	2.50	171.539	2.91	1261.915	0.00
0.068	0.00	0.502	0.87	3.696	2.03	27.187	2.51	200.000	2.45	1471.285	0.00
0.080	0.00	0.586	1.01	4.309	1.96	31.698	2.52	233.183	2.02	1715.392	0.00
0.093	0.00	0.683	1.11	5.024	1.91	36.957	2.55	271.871	1.68	2000.000	0.00
0.108	0.00	0.796	1.18	5.857	1.88	43.089	2.63	316.979	1.44		
0.126	0.00	0.928	1.22	6.829	1.88	50.238	2.80	369.570	1.27		
0.147	0.00	1.082		7.962		58.573		430.887			

## Particle Size Distribution





# Result : Analysis Report

Attached page 19

## Sample Details

Sample ID : SRWA-4B2X-A1\_1

Measured : 21 มิถุนายน 2565 15:34:37

Sample File : C:\Users\001827\Desktop\งานงาน\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 sam\_Tetrattech\_lot2\_91.mea

Analysed : 21 มิถุนายน 2565 15:34:39

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

## System Details

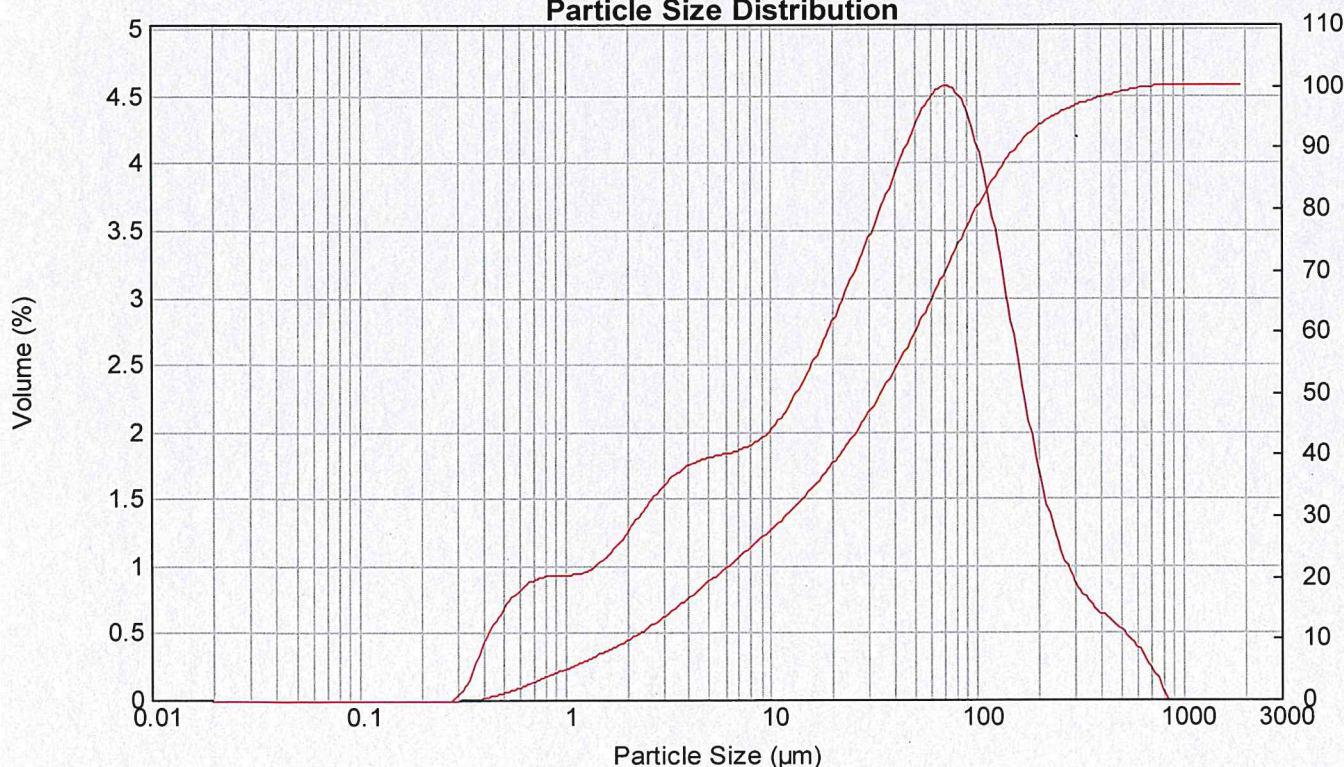
Accessory Name : Hydro 2000S (A) Beam Length (mm) : 2.35 Obscuration (%) : 19.88 Residual (%) : 0.295  
Particle RI : 1.530 Absorption : 0.1 Dispersant Name : Water Dispersant RI : 1.330

## Result Statistics

Distribution Type : Volume Concentration : 0.0207 %Vol Specific Surface Area : 1.05 m<sup>2</sup>/g  
Mean Diameters : D (0.1) : 2.08 um D (0.5) : 34.72 um D (0.9) : 158.78 um  
D [4,3] : 66.66 um D [3,2] : 5.69 um Span : 4.513 Uniformity : 1.59

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	0.95	7.962	1.93	58.573	4.54	430.887	0.58
0.023	0.00	0.172	0.00	1.262	0.98	9.283	2.02	68.291	4.59	502.377	0.49
0.027	0.00	0.200	0.00	1.471	1.06	10.823	2.14	79.621	4.48	585.729	0.37
0.032	0.00	0.233	0.00	1.715	1.18	12.619	2.30	92.832	4.19	682.910	0.21
0.037	0.00	0.272	0.01	2.000	1.31	14.713	2.49	108.234	3.74	796.214	0.01
0.043	0.00	0.317	0.14	2.332	1.45	17.154	2.70	126.191	3.18	928.318	0.00
0.050	0.00	0.370	0.40	2.719	1.58	20.000	2.93	147.128	2.58	1082.339	0.00
0.059	0.00	0.431	0.58	3.170	1.68	23.318	3.16	171.539	2.02	1261.915	0.00
0.068	0.00	0.502	0.74	3.696	1.75	27.187	3.40	200.000	1.55	1471.285	0.00
0.080	0.00	0.586	0.85	4.309	1.80	31.698	3.65	233.183	1.18	1715.392	0.00
0.093	0.00	0.683	0.91	5.024	1.83	36.957	3.90	271.871	0.93	2000.000	0.00
0.108	0.00	0.796	0.93	5.857	1.85	43.089	4.15	316.979	0.77		
0.126	0.00	0.928	0.94	6.829	1.88	50.238	4.38	369.570	0.66		
0.147	0.00	1.082		7.962		58.573		430.887			

## Particle Size Distribution





## Result : Analysis Report

Attached page 20

### Sample Details

Sample ID : SRWA-4B2X-A1\_2

Measured : 21 มิถุนายน 2565 15:36:13

Sample File : C:\Users\001827\Desktop\งานเทค\Technical service\Tetra  
MTEC0884\_65\_176-182 of 182 MTEC0884\_65\_176-182 of 182

Analysed : 21 มิถุนายน 2565 15:36:14

Sample Notes : Dispersion medium : De-ionized water.  
Treatment : Ultrasound 10 minutes with ultrasonic batch before  
analysis and stirring at 2000 rpm during measurement.

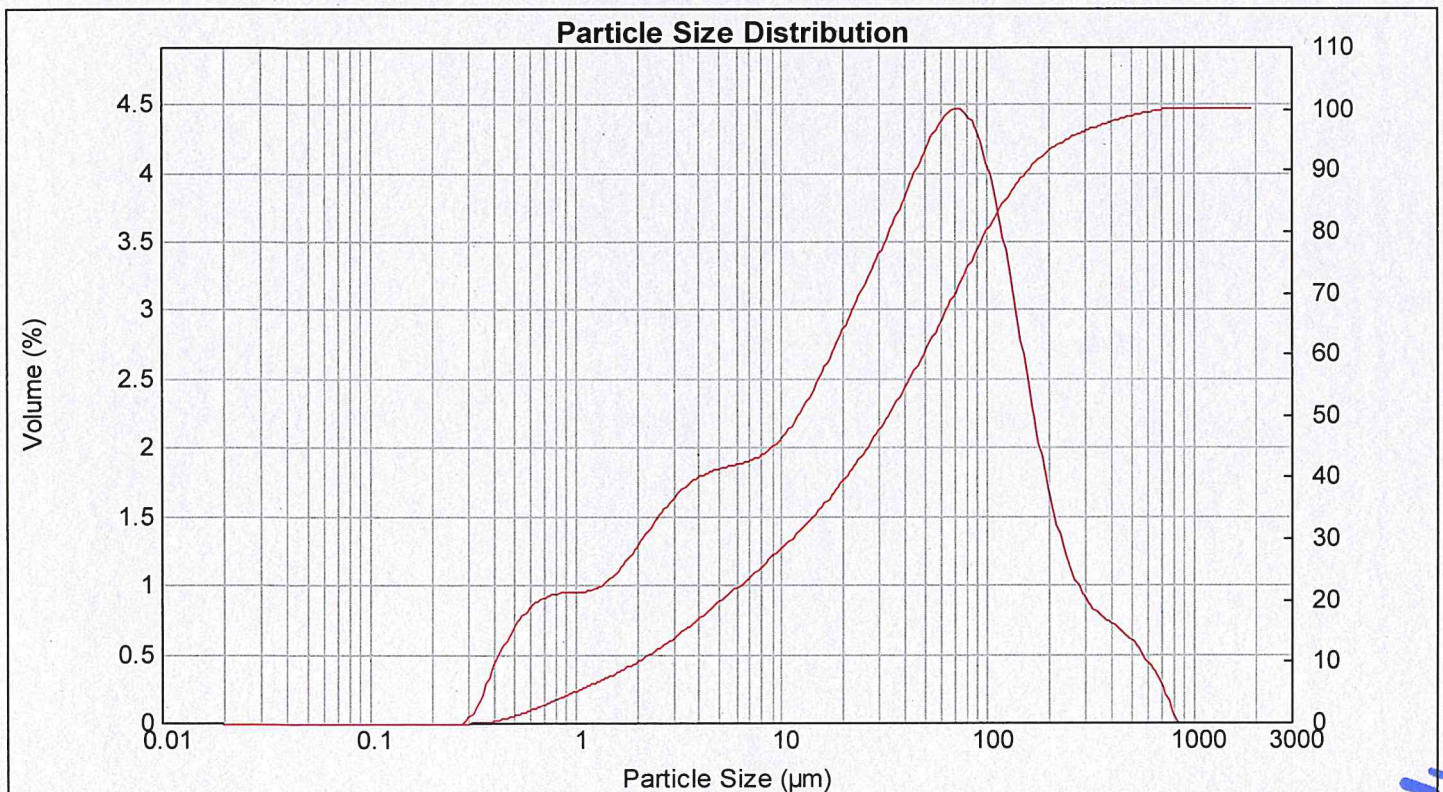
### System Details

Accessory Name : Hydro 2000S (A)      Beam Length (mm) : 2.35      Obscuration (%) : 19.46      Residual (%) : 0.299  
Particle RI : 1.530      Absorption : 0.1      Dispersant Name : Water      Dispersant RI : 1.330

### Result Statistics

Distribution Type : Volume      Concentration : 0.0199 %Vol      Specific Surface Area : 1.07 m<sup>2</sup>/g  
Mean Diameters :      D (0.1) : 2.04 um      D (0.5) : 33.72 um      D (0.9) : 160.94 um  
D [4,3] : 67.34 um      D [3,2] : 5.61 um      Span : 4.713      Uniformity : 1.67

Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %	Size (µm)	Volume In %
0.020	0.00	0.147	0.00	1.082	0.96	7.962	1.97	58.573	4.42	430.887	0.66
0.023	0.00	0.172	0.00	1.262	1.00	9.283	2.06	68.291	4.47	502.377	0.55
0.027	0.00	0.200	0.00	1.471	1.08	10.623	2.19	79.621	4.38	585.729	0.41
0.032	0.00	0.233	0.00	1.715	1.20	12.619	2.35	92.832	4.10	682.910	0.24
0.037	0.00	0.272	0.01	2.000	1.34	14.713	2.54	108.234	3.67	796.214	0.00
0.043	0.00	0.317	0.14	2.332	1.48	17.154	2.74	126.191	3.12	928.318	0.00
0.050	0.00	0.370	0.40	2.719	1.61	20.000	2.95	147.128	2.53	1082.339	0.00
0.059	0.00	0.431	0.59	3.170	1.71	23.318	3.16	171.539	1.98	1261.915	0.00
0.068	0.00	0.502	0.75	3.696	1.79	27.187	3.37	200.000	1.52	1471.285	0.00
0.080	0.00	0.586	0.86	4.309	1.83	31.698	3.59	233.183	1.17	1715.392	0.00
0.093	0.00	0.683	0.92	5.024	1.86	36.957	3.81	271.871	0.95	2000.000	0.00
0.108	0.00	0.796	0.95	5.857	1.89	43.089	4.04	316.979	0.82		
0.126	0.00	0.928	0.95	6.829	1.92	50.238	4.26	369.570	0.73		
0.147	0.00	1.082	0.95	7.962	1.92	58.573	4.26	430.887	0.73		









**APPENDIX B**  
**ANALYTICAL LABORATORY REPORTS:**  
**BENTHIC COMMUNITY**

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Benthos diversity (individuals per 0.04 square meter)

TAXA	SRWA- 1B2X-A1	SRWA- 1B2X-B1	SRWA- 1B2X-C1	SRWA- 2B2X-A1	SRWA- 2B2X-B1	SRWA- 2B2X-C1
Nemertea						
Anopla						
Heteronemertea						
Lineidae						
<i>Lineus</i> sp.1					1	
<i>Micrura</i> sp.1						
Palaeonemertea						
Tubulanidae						
<i>Callinera</i> sp.1	1	1	1			1
Sipuncula						
Phascolosomatidea						
Aspidosiphoniformes						
Aspidosiphonidae						
<i>Aspidosiphon</i> sp.2						
<i>Aspidosiphon</i> sp.3						1
Phascolosomatiformes						
Phascolosomatidae						
<i>Apionsoma</i> sp.2	2	4	2	1	1	2
Sipunculidea						
Golfingiiformes						
Golfingiidae						
<i>Golfingia</i> sp.2						1
Phascolionidae						
<i>Phascolion</i> sp.1						
<i>Phascolion</i> sp.2					1	
Annelida						
Polychaeta						
Aciculata						
Eunicidae						
<i>Eunice</i> sp.						1
<i>Lysidice</i> sp.6	2					
Glyceridae						
<i>Glycera</i> sp.						
Goniadidae						
<i>Glycinde</i> cf. <i>oligodon</i>	1					
Hartmaniellidae						
<i>Hartmaniella</i> sp.1						
Lumbrineridae						
<i>Gallardoneris thailandensis</i>	1					
<i>Geseneris</i> sp.1						1
<i>Loboneris</i> sp.1						
<i>Lumbrinerides</i> sp.1				1		1
<i>Lumbrineris</i> sp.2			1			
Nephtyidae						
<i>Aglaophamus</i> cf. <i>diciroides</i>	4	1				
<i>Aglaophamus orientalis</i>	1	1				1
<i>Aglaophamus tepens</i>		1				
Nereididae						
<i>Leonnates persicus</i>		1				
<i>Tambalagamia fauveli</i>	1					1
<i>Tambalagamia</i> sp.1		1				
Onuphidae						
<i>Onuphis</i> sp.1		2				
<i>Paradiopatra</i> sp.3		1				
Paralacydoniidae						
<i>Paralacydonia</i> sp.1		1	2			1
Phyllodoceidae						
<i>Phyllodoce</i> sp.1		1		1		1
<i>Phyllodoce</i> sp.11				1		
Pilargidae						



Benthos diversity (individuals per 0.04 square meter)

TAXA	SRWA- 1B2X-A1	SRWA- 1B2X-B1	SRWA- 1B2X-C1	SRWA- 2B2X-A1	SRWA- 2B2X-B1	SRWA- 2B2X-C1
<i>Hermundura</i> sp.1						
<i>Litocorsa</i> nr. <i>antennata</i>						3
<i>Sigambra</i> sp.1	1					
<i>Synelmis albini</i>			2			1
<i>Synelmis rigida</i>				2		
Polynoidae						
<i>Harmothoe</i> sp.						1
<i>Harmothoe</i> sp.3						
Sigalionidae						
<i>Sthenolepis japonica</i>		3			3	1
<i>Sthenolepis</i> sp.2		1				1
Syllidae						
<i>Exogone</i> ( <i>Exogone</i> ) sp.1						
<i>Sphaerosyllis</i> sp.1						
Canalipalpata						
Ampharetidae						
<i>Anobothrus</i> sp.1	1	2				3
<i>Auchenoplax crinita</i>				1		
<i>Lysippe labiata</i>			1			1
Chaetopteridae						
<i>Spiochaetopterus</i> sp.1		2	1			
Cirratulidae						
<i>Aphelochaeta</i> sp.1				1		
<i>Aphelochaeta</i> sp.3	1					
<i>Kirkegaardia</i> sp.1		1			1	
<i>Kirkegaardia</i> sp.4			2			
<i>Kirkegaardia</i> sp.5		2				
<i>Kirkegaardia</i> sp.6		1				
<i>Kirkegaardia</i> sp.7		1				
Flabelligeridae						
<i>Diplocirrus</i> sp.1	1					
Magelonidae						
<i>Magelona</i> sp.13						
Poecilochaetidae						
<i>Poecilochaetus</i> sp.9						1
Spionidae						
<i>Prionospio ehlersi</i>	2	1				2
<i>Prionospio elegantula</i>		1				4
<i>Prionospio</i> sp.			2	3	2	4
<i>Spiophanes kroeyeri</i>						
<i>Spiophanes malayensis</i>	3	1				
<i>Spiophanes</i> sp.3	1			1		
<i>Spiophanes</i> sp.4						1
Terebellidae						
<i>Pista</i> sp.2						
<i>Streblosoma</i> sp.1						
Trichobranchidae						
<i>Terebellides</i> sp.						
<i>Terebellides</i> sp.1	2			1		
<i>Terebellides</i> sp.2	1					
Capitellidae						
<i>Barantolla</i> sp.1	1	1				
<i>Capitellethus</i> sp.1		1	2			1
<i>Capitellethus</i> sp.2					1	
<i>Mediomastus</i> sp.2						
<i>Neomediomastus</i> sp.1		2				
<i>Rashgua lobatus</i>						
<i>Scyphoproctus</i> nr. <i>oculatus</i>						
<i>Scyphoproctus</i> sp.1						



Benthos diversity (individuals per 0.04 square meter)

TAXA	SRWA- 1B2X-A1	SRWA- 1B2X-B1	SRWA- 1B2X-C1	SRWA- 2B2X-A1	SRWA- 2B2X-B1	SRWA- 2B2X-C1
Cossuridae						
<i>Cossura</i> sp.2		2				
Maldanidae						
<i>Clymenella</i> sp.1						
<i>Praxillella</i> sp.3						
Opheliidae						
<i>Armandia</i> sp.						
Orbiniidae						
<i>Leitoscoloplos</i> sp.1				1		
Paraonidae						
<i>Aricidea (Aricidea)</i> sp.						
<i>Levinsenia</i> sp.						
<i>Levinsenia</i> sp.1		3			1	
<i>Levinsenia</i> sp.2						
<i>Levinsenia</i> sp.5						1
<i>Levinsenia</i> sp.9	1					
Arthropoda						
Crustacea						
Amphipoda						
Ampeliscidae						
<i>Ampelisca chinensis</i>	2					
<i>Ampelisca cyclops</i>	1	1			1	
<i>Byblis febris</i>	5	2	4			
<i>Byblis</i> sp.	3			1	1	1
Aoridae						
Aoridae						
Caprellidae						
<i>Caprella</i> sp.1			1			
Eriopisidae						
<i>Victoriopisa</i> sp.1						
Leucothoidae						
<i>Leucothoe furina</i>		1				
Oedicerotidae						
<i>Synchelidium</i> sp.1						
Phoxocephalidae						
<i>Harpiopsis vadiculus</i>						
Phoxocephalidae						
Synopiidae						
<i>Synopia</i> sp.2						1
Synopiidae sp.3						
Tryphosidae						
<i>Tryphosella</i> sp.1					1	
<i>Tryphosella</i> sp.2			1			
Tryphosidae sp.1	1	2				
Cumacea						
Leuconidae						
<i>Leucon</i> sp.1						
Nannastacidae						
<i>Campylaspis</i> sp.2						
Decapoda						
Alpheidae						
Alpheidae sp.4			1			
<i>Alpheus acutocarinatus</i>	1					
<i>Alpheus malabaricus</i>					1	
<i>Alpheus paracrinitus</i>			1	1	1	
<i>Alpheus rapacida</i>						
<i>Alpheus</i> sp.						
<i>Athanas</i> sp.						
<i>Athanas</i> sp.1						2
<i>Bermudacaris</i> sp.			1			



Benthos diversity (individuals per 0.04 square meter)

TAXA	SRWA- 1B2X-A1	SRWA- 1B2X-B1	SRWA- 1B2X-C1	SRWA- 2B2X-A1	SRWA- 2B2X-B1	SRWA- 2B2X-C1
<i>Bermudacaris</i> sp.1						
Axiidae						
<i>Calocaris</i> sp.1			1			
Callianassidae						
<i>Callianassa</i> sp.						
<i>Callianassidae</i>	1					
<i>Jocullianassa matzi</i>			1		2	1
<i>Lipkecallianassa</i> sp.1		1				1
Crangonidae						
<i>Philocheras</i> sp.1						
Iphiculidae						
<i>Iphiculus</i> sp.				1		
Paguridae						
<i>Paguridae</i> sp.1		1				
Palaemonidae						
<i>Periclimenes</i> sp.2						
Pasiphaeidae						
<i>Leptocheila pugnax</i>					1	
Pilumnidae						
<i>Ceratoplax ciliata</i>						
<i>Pilumnidae</i>						
<i>Typhlocarcinops marginata</i>			1			
Portunidae						
<i>Thalamita admete</i>					1	
Solenoceridae						
<i>Solenoceridae</i>	1					
Upogebiidae						
<i>Gebicula</i> sp.4					1	
<i>Upogebia</i> sp.1			1			
Isopoda						
Gnathiidae						
<i>Caecognathia andamanensis</i>	2	1				
Mysidacea						
Mysidae						
<i>Anchialina</i> sp.1	1		1			1
<i>Anchialina</i> sp.2						
<i>Haplostylus bengalensis</i>						
<i>Siriella</i> sp.						4
<i>Siriella</i> sp.2						
Stomatopoda						
Nannosquillidae						
<i>Acanthosquilla derijardi</i>						
Squillidae						
<i>Anchisquilla fasciata</i>					1	
<i>Cloridina verrucosa</i>						1
Tanaidacea						
Apseudidae						
<i>Apseudes</i> sp.1	1	2	6			
<i>Apseudidae</i> sp.4			1			
Leptocheiliidae						
<i>Leptocheilia</i> sp.2						
Pagurapseudidae						
<i>Pagurapseudidae</i> sp.1						
Echinodermata						
Echinoidea						
Spatangoida						
Brissidae						
<i>Brissidae</i> sp.1						
Ophiuroidea						
Ophiurida						





Benthos diversity (individuals per 0.04 square meter)

TAXA	SRWA- 1B2X-A1	SRWA- 1B2X-B1	SRWA- 1B2X-C1	SRWA- 2B2X-A1	SRWA- 2B2X-B1	SRWA- 2B2X-C1
Amphiuridae						
<i>Amphiura</i> sp.1		1				
Amphiuridae sp.1						
Amphiuridae sp.3						1
Mollusca						
Aplacophora						
Cavibelonia						
Simrothiellidae						
<i>Helicoradomenia</i> sp.1	2		1			
Bivalvia						
Cardiida						
Cardiidae						
<i>Fulvia</i> sp.1						1
Tellinidae						
<i>Tellina</i> sp.4						
Lucinida						
Lucinidae						
<i>Lucina dentifera</i>						
Myoida						
Corbulidae						
<i>Corbula</i> sp.1			1			
Nuculoida						
Nuculidae						
<i>Ennucula niponica</i>		1				1
Venerida						
Veneridae						
Veneridae						1
Veneroida						
Psammobiidae						
<i>Gari anomala</i>						
Unidentified bivalve						
Bivalvia						
Total	49	53	39	17	23	53



Benthos diversity (individuals per 0.04 square met

TAXA	SRWA- 3B2X-A1	SRWA- 3B2X-B1	SRWA- 3B2X-C1	SRWA- 4B2X-A1	SRWA- 4B2X-B1	SRWA- 4B2X-C1
Nemertea						
Anopla						
Heteronemertea						
Lineidae						
<i>Lineus</i> sp.1						
<i>Micrura</i> sp.1					1	
Palaeonemertea						
Tubulanidae						
<i>Callinera</i> sp.1			2			1
Sipuncula						
Phascolosomatidea						
Aspidosiphoniformes						
Aspidosiphonidae						
<i>Aspidosiphon</i> sp.2		1				
<i>Aspidosiphon</i> sp.3						
Phascolosomatiformes						
Phascolosomatidae						
<i>Apionsoma</i> sp.2	2			2	1	1
Sipunculidea						
Golfingiiformes						
Golfingiidae						
<i>Golfingia</i> sp.2						
Phascolionidae						
<i>Phascolion</i> sp.1						
<i>Phascolion</i> sp.2						
Annelida						
Polychaeta						
Aciculata						
Eunicidae						
<i>Eunice</i> sp.						
<i>Lysidice</i> sp.6		1				
Glyceridae						
<i>Glycera</i> sp.		1				
Goniadidae						
<i>Glycinde</i> cf. <i>oligodon</i>						
Hartmaniellidae						
<i>Hartmaniella</i> sp.1			1			1
Lumbrineridae						
<i>Gallardoneris thailandensis</i>						
<i>Geseneris</i> sp.1	1					
<i>Loboneris</i> sp.1					1	
<i>Lumbrinerides</i> sp.1	2			1	1	
<i>Lumbrineris</i> sp.2						
Nephtyidae						
<i>Aglaophamus</i> cf. <i>diciroides</i>						
<i>Aglaophamus orientalis</i>						
<i>Aglaophamus tepens</i>	2					
Nereididae						
<i>Leonnates persicus</i>						
<i>Tambalagamia fauveli</i>						
<i>Tambalagamia</i> sp.1						
Onuphidae						
<i>Onuphis</i> sp.1	2	1				
<i>Paradiopatra</i> sp.3						
Paralacydoniidae						
<i>Paralacydonia</i> sp.1	1	1	1	1	1	
Phyllodoceidae						
<i>Phyllodoce</i> sp.1			1			
<i>Phyllodoce</i> sp.11						
Pilargidae						



*Sakamon P. Hong*

Benthos diversity (individuals per 0.04 square met

TAXA	SRWA- 3B2X-A1	SRWA- 3B2X-B1	SRWA- 3B2X-C1	SRWA- 4B2X-A1	SRWA- 4B2X-B1	SRWA- 4B2X-C1
<i>Hermundura</i> sp.1		1			1	
<i>Litocorsa</i> nr. <i>antennata</i>	4				2	
<i>Sigambra</i> sp.1						
<i>Synelmis albini</i>			1		1	
<i>Synelmis rigida</i>	1			2		
Polynoidae						
<i>Harmothoe</i> sp.		1	1	1		
<i>Harmothoe</i> sp.3						1
Sigalionidae						
<i>Sthenolepis japonica</i>		2	1	2		
<i>Sthenolepis</i> sp.2		1				
Syllidae						
<i>Exogone (Exogone)</i> sp.1		1				
<i>Sphaerosyllis</i> sp.1			1	1		
Canalipalpata						
Ampharetidae						
<i>Anobothrus</i> sp.1	1					
<i>Auchenoplax crinita</i>		1				
<i>Lysippe labiata</i>						
Chaetopteridae						
<i>Spiochaetopterus</i> sp.1	2					
Cirratulidae						
<i>Aphelochaeta</i> sp.1						
<i>Aphelochaeta</i> sp.3						
<i>Kirkegaardia</i> sp.1						
<i>Kirkegaardia</i> sp.4	1	1				
<i>Kirkegaardia</i> sp.5	1				2	
<i>Kirkegaardia</i> sp.6						
<i>Kirkegaardia</i> sp.7						
Flabelligeridae						
<i>Diplocirrus</i> sp.1		1				
Magelonidae						
<i>Magelona</i> sp.13					1	
Poecilochaetidae						
<i>Poecilochaetus</i> sp.9						
Spionidae						
<i>Prionospio ehlersi</i>		2				
<i>Prionospio elegantula</i>		1				
<i>Prionospio</i> sp.	3	6		4	1	2
<i>Spiophanes kroeyeri</i>			1			
<i>Spiophanes malayensis</i>						
<i>Spiophanes</i> sp.3		1				
<i>Spiophanes</i> sp.4						
Terebellidae						
<i>Pista</i> sp.2					1	
<i>Streblosoma</i> sp.1			1			
Trichobanchidae						
<i>Terebellides</i> sp.		1				
<i>Terebellides</i> sp.1						
<i>Terebellides</i> sp.2		1	1			
Capitellidae						
<i>Barantolla</i> sp.1						
<i>Capitellethus</i> sp.1			1			
<i>Capitellethus</i> sp.2				1		
<i>Mediomastus</i> sp.2						
<i>Neomediomastus</i> sp.1					3	
<i>Rashgua lobatus</i>					1	
<i>Scyphoproctus</i> nr. <i>oculatus</i>						
<i>Scyphoproctus</i> sp.1		1				



*Sakamon P. Hong*

Benthos diversity (individuals per 0.04 square met

TAXA	SRWA- 3B2X-A1	SRWA- 3B2X-B1	SRWA- 3B2X-C1	SRWA- 4B2X-A1	SRWA- 4B2X-B1	SRWA- 4B2X-C1
Cossuridae						
<i>Cossura</i> sp.2					1	
Maldanidae						
<i>Clymenella</i> sp.1						
<i>Praxillella</i> sp.3						
Opheliidae						
<i>Armandia</i> sp.	1				1	
Orbiniidae						
<i>Leitoscoloplos</i> sp.1		1				
Paraonidae						
<i>Aricidea (Aricidea)</i> sp.		1				
<i>Levinsenia</i> sp.	2		2	1	1	
<i>Levinsenia</i> sp.1			2			
<i>Levinsenia</i> sp.2						
<i>Levinsenia</i> sp.5						
<i>Levinsenia</i> sp.9		1	1			
Arthropoda						
Crustacea						
Amphipoda						
Ampeliscidae						
<i>Ampelisca chinensis</i>						
<i>Ampelisca cyclops</i>						
<i>Byblis febris</i>	1					
<i>Byblis</i> sp.						
Aoridae						
Aoridae						
Caprellidae						
<i>Caprella</i> sp.1	1		1	1	1	
Eriopisidae						
<i>Victoriopisa</i> sp.1	1					
Leucothoidae						
<i>Leucothoe furina</i>		1	1			
Oedicerotidae						
<i>Synchelidium</i> sp.1					1	
Phoxocephalidae						
<i>Harpiopsis vadiculus</i>				1		
Phoxocephalidae						
Synopiidae						
<i>Synopia</i> sp.2						
Synopiidae sp.3				2		
Tryphosidae						
<i>Tryphosella</i> sp.1						1
<i>Tryphosella</i> sp.2	2					
Tryphosidae sp.1						
Cumacea						
Leuconidae						
<i>Leucon</i> sp.1						
Nannastacidae						
<i>Campylaspis</i> sp.2	1					
Decapoda						
Alpheidae						
Alpheidae sp.4						
<i>Alpheus acutocarinatus</i>						
<i>Alpheus malabaricus</i>						
<i>Alpheus paracrinitus</i>	2					
<i>Alpheus rapacida</i>		1				
<i>Alpheus</i> sp.					1	
<i>Athanas</i> sp.						1
<i>Athanas</i> sp.1						
<i>Bermudacaris</i> sp.		1				



Benthos diversity (individuals per 0.04 square met

TAXA	SRWA- 3B2X-A1	SRWA- 3B2X-B1	SRWA- 3B2X-C1	SRWA- 4B2X-A1	SRWA- 4B2X-B1	SRWA- 4B2X-C1
<i>Bermudacaris</i> sp.1						
Axiidae						
<i>Calocaris</i> sp.1						
Callianassidae						
<i>Callianassa</i> sp.			1			
Callianassidae						
<i>Jocullianassa matzi</i>		3	1			
<i>Lipkecallianassa</i> sp.1	2			1		
Crangonidae						
<i>Philocheiras</i> sp.1					1	
Iphiculidae						
<i>Iphiculus</i> sp.						
Paguridae						
Paguridae sp.1						
Palaemonidae						
<i>Periclimenes</i> sp.2				1		
Pasiphaeidae						
<i>Leptochela pugnax</i>		1	1			
Pilumnidae						
<i>Ceratoplax ciliata</i>						
Pilumnidae						
<i>Typhlocarcinops marginata</i>						
Portunidae						
<i>Thalamita admete</i>						
Solenoceridae						
Solenoceridae						
Upogebiidae						
<i>Gebicula</i> sp.4						
<i>Upogebia</i> sp.1						
Isopoda						
Gnathiidae						
<i>Caecognathia andamanensis</i>				1		
Mysidacea						
Mysidae						
<i>Anchialina</i> sp.1	1		1			
<i>Anchialina</i> sp.2		1				
<i>Haplostylus bengalensis</i>	1				1	
<i>Siriella</i> sp.						
<i>Siriella</i> sp.2				2		
Stomatopoda						
Nannosquillidae						
<i>Acanthosquilla derijardi</i>						
Squillidae						
<i>Anchisquilla fasciata</i>						
<i>Cloridina verrucosa</i>						
Tanaidacea						
Apseudidae						
<i>Apseudes</i> sp.1			1			
Apseudidae sp.4						
Leptocheliidae						
<i>Leptochelia</i> sp.2	1					
Pagurapseudidae						
Pagurapseudidae sp.1						
Echinodermata						
Echinoidea						
Spatangoida						
Brissidae						
Brissidae sp.1						
Ophiuroidea						
Ophiurida						



*Sakman P. Hong*



Benthos diversity (individuals per 0.04 square met

TAXA	SRWA- 3B2X-A1	SRWA- 3B2X-B1	SRWA- 3B2X-C1	SRWA- 4B2X-A1	SRWA- 4B2X-B1	SRWA- 4B2X-C1
Amphiuridae						
<i>Amphiura</i> sp.1						
Amphiuridae sp.1					1	
Amphiuridae sp.3						
Mollusca						
Aplacophora						
Cavibelonia						
Simrothiellidae						
<i>Helicoradomenia</i> sp.1						
Bivalvia						
Cardiida						
Cardiidae						
<i>Fulvia</i> sp.1						
Tellinidae						
<i>Tellina</i> sp.4						1
Lucinida						
Lucinidae						
<i>Lucina dentifera</i>		1				
Myoida						
Corbulidae						
<i>Corbula</i> sp.1	1	1				
Nuculoida						
Nuculidae						
<i>Ennucula niponica</i>						
Venerida						
Veneridae						
Veneridae						
Veneroida						
Psammobiidae						
<i>Gari anomala</i>		1				
Unidentified bivalve						
Bivalvia		1				
Total	40	42	25	25	27	9



*Sakamon P. Hong*

Benthos diversity (individuals per 0.04 square met

TAXA	G4/43REF-	G4/43REF-	G4/43REF-
	A1	B1	C1
Nemertea			
Anopla			
Heteronemertea			
Lineidae			
<i>Lineus</i> sp.1			
<i>Micrura</i> sp.1			
Palaeonemertea			
Tubulanidae			
<i>Callinera</i> sp.1		1	
Sipuncula			
Phascolosomatidea			
Aspidosiphoniformes			
Aspidosiphonidae			
<i>Aspidosiphon</i> sp.2			
<i>Aspidosiphon</i> sp.3			
Phascolosomatiformes			
Phascolosomatidae			
<i>Apionsoma</i> sp.2	1		
Sipunculidea			
Golfingiiformes			
Golfingiidae			
<i>Golfingia</i> sp.2			
Phascolionidae			
<i>Phascolion</i> sp.1		1	
<i>Phascolion</i> sp.2			
Annelida			
Polychaeta			
Aciculata			
Eunicidae			
<i>Eunice</i> sp.			
<i>Lysidice</i> sp.6			
Glyceridae			
<i>Glycera</i> sp.		1	
Goniadidae			
<i>Glycinde</i> cf. <i>oligodon</i>			
Hartmaniellidae			
<i>Hartmaniella</i> sp.1			
Lumbrineridae			
<i>Gallardoneris thailandensis</i>			
<i>Geseneris</i> sp.1			
<i>Loboneris</i> sp.1			
<i>Lumbrinerides</i> sp.1	1	1	
<i>Lumbrineris</i> sp.2			
Nephtyidae			
<i>Aglaophamus</i> cf. <i>diciroides</i>			1
<i>Aglaophamus orientalis</i>			1
<i>Aglaophamus tepens</i>			1
Nereididae			
<i>Leonnates persicus</i>			
<i>Tambalagamia fauveli</i>			
<i>Tambalagamia</i> sp.1			
Onuphidae			
<i>Onuphis</i> sp.1		2	2
<i>Paradiopatra</i> sp.3			
Paralacydoniidae			
<i>Paralacydonia</i> sp.1			1
Phyllodocidae			
<i>Phyllodoce</i> sp.1			
<i>Phyllodoce</i> sp.11			
Pilargidae			



Benthos diversity (individuals per 0.04 square met

TAXA	G4/43REF-		
	A1	B1	C1
<i>Hermundura</i> sp.1			
<i>Litocorsa</i> nr. <i>antennata</i>			
<i>Sigambra</i> sp.1			
<i>Synelmis albini</i>		1	
<i>Synelmis rigida</i>		2	
Polynoidae			
<i>Harmothoe</i> sp.			
<i>Harmothoe</i> sp.3			
Sigalionidae			
<i>Sthenolepis japonica</i>			
<i>Sthenolepis</i> sp.2			
Syllidae			
<i>Exogone (Exogone)</i> sp.1			
<i>Sphaerosyllis</i> sp.1		1	
Canalipalpata			
Ampharetidae			
<i>Anobothrus</i> sp.1			
<i>Auchenoplax crinita</i>			
<i>Lysippe labiata</i>			
Chaetopteridae			
<i>Spiochaetopterus</i> sp.1			
Cirratulidae			
<i>Aphelochaeta</i> sp.1			
<i>Aphelochaeta</i> sp.3			
<i>Kirkegaardia</i> sp.1			
<i>Kirkegaardia</i> sp.4	1		
<i>Kirkegaardia</i> sp.5			
<i>Kirkegaardia</i> sp.6			
<i>Kirkegaardia</i> sp.7			
Flabelligeridae			
<i>Diplocirrus</i> sp.1			
Magelonidae			
<i>Magelona</i> sp.13			
Poecilochaetidae			
<i>Poecilochaetus</i> sp.9			
Spionidae			
<i>Prionospio ehlersi</i>			
<i>Prionospio elegantula</i>			
<i>Prionospio</i> sp.			
<i>Spiophanes kroeyeri</i>		1	
<i>Spiophanes malayensis</i>			
<i>Spiophanes</i> sp.3			
<i>Spiophanes</i> sp.4			
Terebellidae			
<i>Pista</i> sp.2			
<i>Streblosoma</i> sp.1			
Trichobranchidae			
<i>Terebellides</i> sp.			
<i>Terebellides</i> sp.1			
<i>Terebellides</i> sp.2		1	
Capitellidae			
<i>Barantolla</i> sp.1			
<i>Capitellethus</i> sp.1			
<i>Capitellethus</i> sp.2			
<i>Mediomastus</i> sp.2	1		
<i>Neomediomastus</i> sp.1			
<i>Rashgua lobatus</i>			
<i>Scyphoproctus</i> nr. <i>oculatus</i>	1		
<i>Scyphoproctus</i> sp.1	1		



*Sakamon P. Hong*

Benthos diversity (individuals per 0.04 square met

TAXA	G4/43REF- A1	G4/43REF- B1	G4/43REF- C1
Cossuridae			
<i>Cossura</i> sp.2			
Maldanidae			
<i>Clymenella</i> sp.1	1		
<i>Praxillella</i> sp.3			1
Opheliidae			
<i>Armandia</i> sp.			
Orbiniidae			
<i>Leitoscoloplos</i> sp.1			
Paraonidae			
<i>Aricidea (Aricidea)</i> sp.			
<i>Levinsenia</i> sp.			
<i>Levinsenia</i> sp.1			
<i>Levinsenia</i> sp.2		1	
<i>Levinsenia</i> sp.5			
<i>Levinsenia</i> sp.9			
Arthropoda			
Crustacea			
Amphipoda			
Ampeliscidae			
<i>Ampelisca chinensis</i>			
<i>Ampelisca cyclops</i>			
<i>Byblis febris</i>			
<i>Byblis</i> sp.			
Aoridae			
Aoridae		1	
Caprellidae			
<i>Caprella</i> sp.1			
Eriopisidae			
<i>Victoriopisa</i> sp.1			
Leucothoidae			
<i>Leucothoe furina</i>			
Oedicerotidae			
<i>Synchelidium</i> sp.1			
Phoxocephalidae			
<i>Harpiopsis vadiculus</i>			
Phoxocephalidae		1	
Synopiidae			
<i>Synopia</i> sp.2			
Synopiidae sp.3			
Tryphosidae			
<i>Tryphosella</i> sp.1			
<i>Tryphosella</i> sp.2			
Tryphosidae sp.1			
Cumacea			
Leuconidae			
<i>Leucon</i> sp.1		1	
Nannastacidae			
<i>Campylaspis</i> sp.2			
Decapoda			
Alpheidae			
Alpheidae sp.4			
<i>Alpheus acutocarinatus</i>	1		
<i>Alpheus malabaricus</i>			
<i>Alpheus paracrinitus</i>			
<i>Alpheus rapacida</i>			
<i>Alpheus</i> sp.		1	
<i>Athanas</i> sp.			
<i>Athanas</i> sp.1			1
<i>Bermudacaris</i> sp.	2	2	



*Sakamon P. Hong*

Benthos diversity (individuals per 0.04 square met

TAXA	G4/43REF-		
	A1	B1	C1
<i>Bermudacaris</i> sp.1		1	
Axiidae			
<i>Calocaris</i> sp.1			
Callianassidae			
<i>Callianassa</i> sp.			
Callianassidae		1	
<i>Jocullianassa matzi</i>	1		
<i>Lipkecallianassa</i> sp.1		2	1
Crangonidae			
<i>Philocheiras</i> sp.1			
Iphiculidae			
<i>Iphiculus</i> sp.			
Paguridae			
<i>Paguridae</i> sp.1			
Palaemonidae			
<i>Periclimenes</i> sp.2			
Pasiphaeidae			
<i>Leptocheila pugnax</i>		1	
Pilumnidae			
<i>Ceratoplax ciliata</i>	2		
Pilumnidae			1
<i>Typhlocarcinops marginata</i>			
Portunidae			
<i>Thalamita admete</i>			
Solenoceridae			
Solenoceridae			
Upogebiidae			
<i>Gebicula</i> sp.4			
<i>Upogebia</i> sp.1			
Isopoda			
Gnathiidae			
<i>Caecognathia andamanensis</i>		2	1
Mysidacea			
Mysidae			
<i>Anchialina</i> sp.1			
<i>Anchialina</i> sp.2			
<i>Haplostylus bengalensis</i>			
<i>Siriella</i> sp.			
<i>Siriella</i> sp.2			
Stomatopoda			
Nannosquillidae			
<i>Acanthosquilla derijardi</i>	1		
Squillidae			
<i>Anchisquilla fasciata</i>			
<i>Cloridina verrucosa</i>			
Tanaidacea			
Apseudidae			
<i>Apseudes</i> sp.1	1		
<i>Apseudidae</i> sp.4		2	1
Leptocheliidae			
<i>Leptochelia</i> sp.2			1
Pagurapseudidae			
<i>Pagurapseudidae</i> sp.1			1
Echinodermata			
Echinoidea			
Spatangoida			
Brissidae			
<i>Brissidae</i> sp.1			1
Ophiuroidea			
Ophiurida			





Benthos diversity (individuals per 0.04 square met

TAXA	G4/43REF-	G4/43REF-	G4/43REF-
	A1	B1	C1
Amphiuridae			
<i>Amphiura</i> sp.1			
Amphiuridae sp.1		1	
Amphiuridae sp.3			
Mollusca			
Aplacophora			
Cavibelonia			
Simrothiellidae			
<i>Helicoradomenia</i> sp.1			
Bivalvia			
Cardiida			
Cardiidae			
<i>Fulvia</i> sp.1			
Tellinidae			
<i>Tellina</i> sp.4			
Lucinida			
Lucinidae			
<i>Lucina dentifera</i>			
Myoida			
Corbulidae			
<i>Corbula</i> sp.1			
Nuculoida			
Nuculidae			
<i>Ennucula niponica</i>		1	
Venerida			
Veneridae			
Veneridae			
Veneroida			
Psammobiidae			
<i>Gari anomala</i>			
Unidentified bivalve			
Bivalvia			
Total	15	30	15



*Sakamon P. Hong*

**APPENDIX C**  
**ANALYTICAL LABORATORY REPORTS:**  
**FISH TISSUE**

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## ANALYTICAL REPORT

Eurofins Seattle  
5755 8th Street East  
Tacoma, WA 98424  
Tel: (253)922-2310

Laboratory Job ID: 580-117256-1

Client Project/Site: Gulf of Thailand - Project T423.01

**For:**

Tetra Tech, Inc.  
3697 Mt. Diablo Blvd.  
Suite 150  
Lafayette, California 94549

Attn: Ted Donn



Authorized for release by:  
9/22/2022 8:43:27 AM

Lilly-Anna LaCount, Project Manager  
(253)922-2310

[Lilly-Anna.Lacount@et.eurofinsus.com](mailto:Lilly-Anna.Lacount@et.eurofinsus.com)

### LINKS

Review your project  
results through



Have a Question?



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[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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## Case Narrative

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Job ID: 580-117256-1**

**Laboratory: Eurofins Seattle**

### Narrative

#### Job Narrative 580-117256-1

#### Receipt

The samples were received on 8/24/2022 2:59 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was -44.0°C

#### Receipt Exceptions

Sample 580-117256-51 (BEPP-1154) was not received. Client was notified.

#### Metals

Method 1632: The matrix spike / matrix spike duplicate (MS/MSD) recoveries and precision for preparation batch 580-403812 and analytical batch 580-404111 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory sample control duplicate (LCS/LCSD) precision was within acceptance limits.

Method 1632: The following samples were diluted due to the nature of the sample matrix: BEFSO-1003 (580-117256-2), BEFSO-1048 (580-117256-15), BEFSO-1049 (580-117256-16), BEFSO-1060 (580-117256-23), BEPP-1150 (580-117256-47), BEPP-1244 (580-117256-56), BEPP-1261 (580-117256-59), BEWK-1341 (580-117256-84), BEWK-1368 (580-117256-93), BNWL-1186 (580-117256-100) and BNWL-1189 (580-117256-102). Elevated reporting limits (RLs) are provided.

Method 1632: The following sample was diluted due to the nature of the sample matrix: BNWL-1223 (580-117256-116). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.



## Definitions/Glossary

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

### Qualifiers

#### Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F1	MS and/or MSD recovery exceeds control limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

### Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1002**

**Lab Sample ID: 580-117256-1**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	29	B	1.9	0.22	ng/g		08/30/22 11:00	08/31/22 15:15	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1003**

**Lab Sample ID: 580-117256-2**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	290	B F1	16	1.8	ng/g		08/30/22 11:00	08/31/22 15:19	400

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND	F1	0.049	0.034	mg/Kg		09/14/22 11:56	09/15/22 13:19	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1005**

**Lab Sample ID: 580-117256-3**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	190	B	16	1.8	ng/g		08/30/22 11:00	08/31/22 17:50	400

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1021**

**Lab Sample ID: 580-117256-4**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	63	B	15	1.7	ng/g		08/30/22 11:00	08/31/22 17:54	400



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1022**

**Lab Sample ID: 580-117256-5**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	38	B	1.8	0.21	ng/g		08/30/22 11:00	09/06/22 20:54	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1026**

**Lab Sample ID: 580-117256-6**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	270	B	16	1.8	ng/g		08/30/22 11:00	08/31/22 18:02	400

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1027**

**Lab Sample ID: 580-117256-7**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	40	B	3.9	0.44	ng/g		08/30/22 11:00	09/07/22 20:51	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1030**

**Lab Sample ID: 580-117256-8**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	24	B	1.8	0.21	ng/g		08/30/22 11:00	09/06/22 21:02	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1033**

**Lab Sample ID: 580-117256-9**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	58	B	1.9	0.21	ng/g		08/30/22 11:00	09/06/22 21:07	50



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1033-DUP**

**Lab Sample ID: 580-117256-10**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	57	B	2.0	0.22	ng/g		08/30/22 11:00	09/06/22 21:11	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1043**

**Lab Sample ID: 580-117256-11**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	70	B	3.9	0.44	ng/g		08/30/22 11:00	09/07/22 20:56	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1045**

**Lab Sample ID: 580-117256-12**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	60	B	2.0	0.22	ng/g		08/30/22 11:00	09/06/22 21:19	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1046**

**Lab Sample ID: 580-117256-13**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	71	B	1.9	0.22	ng/g		08/30/22 11:00	09/06/22 21:23	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1047**

**Lab Sample ID: 580-117256-14**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	54	B	2.0	0.22	ng/g		08/30/22 11:00	09/06/22 21:36	50



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1048**

**Lab Sample ID: 580-117256-15**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	56	B	2.0	0.22	ng/g		08/30/22 11:00	09/06/22 21:40	50

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND	F1	0.050	0.035	mg/Kg		09/14/22 11:56	09/15/22 14:41	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1049**

**Lab Sample ID: 580-117256-16**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	66	B	2.0	0.22	ng/g		08/30/22 11:00	09/06/22 21:44	50

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.035	mg/Kg		09/14/22 11:56	09/15/22 15:57	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1051**

**Lab Sample ID: 580-117256-17**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	60	B	1.9	0.22	ng/g		08/30/22 11:00	09/06/22 21:49	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1052**

**Lab Sample ID: 580-117256-18**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	290	B	16	1.8	ng/g		08/30/22 11:00	08/31/22 19:00	400

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1053**

**Lab Sample ID: 580-117256-19**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	160	B	3.9	0.44	ng/g		08/30/22 11:00	09/06/22 21:53	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1055**

**Lab Sample ID: 580-117256-20**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	240	B	15	1.7	ng/g		08/30/22 11:00	08/31/22 19:09	400

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1057**

**Lab Sample ID: 580-117256-21**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	300	B F1	16	1.8	ng/g		08/30/22 11:10	08/31/22 15:24	400

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1058**

**Lab Sample ID: 580-117256-22**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	520	B	37	4.2	ng/g		08/30/22 11:10	08/31/22 13:56	1000

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1060**

**Lab Sample ID: 580-117256-23**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	150	B	3.9	0.44	ng/g		08/30/22 11:10	09/06/22 21:57	100

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.048	0.034	mg/Kg		09/14/22 11:56	09/15/22 16:03	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1061**

**Lab Sample ID: 580-117256-24**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	150	B	15	1.7	ng/g		08/30/22 11:10	08/31/22 19:25	400



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1062**

**Lab Sample ID: 580-117256-25**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	76	B	2.0	0.22	ng/g		08/30/22 11:10	09/06/22 22:01	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1082**

**Lab Sample ID: 580-117256-26**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	140	B	3.9	0.43	ng/g		08/30/22 11:10	09/06/22 22:05	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1083**

**Lab Sample ID: 580-117256-27**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	46	B	1.8	0.20	ng/g		08/30/22 11:10	09/06/22 22:09	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1084**

**Lab Sample ID: 580-117256-28**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	68	B	1.9	0.21	ng/g		08/30/22 11:10	09/06/22 22:14	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1085**

**Lab Sample ID: 580-117256-29**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	51	B	1.9	0.21	ng/g		08/30/22 11:10	09/06/22 22:26	50



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1086**

**Lab Sample ID: 580-117256-30**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	38	B	1.8	0.21	ng/g		08/30/22 11:10	09/06/22 22:30	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1087**

**Lab Sample ID: 580-117256-31**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	130	B	3.9	0.44	ng/g		08/30/22 11:10	09/06/22 22:34	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1095**

**Lab Sample ID: 580-117256-32**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	290	B	15	1.7	ng/g		08/30/22 11:10	08/31/22 19:59	400

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1096**

**Lab Sample ID: 580-117256-33**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	320	B	15	1.7	ng/g		08/30/22 11:10	08/31/22 20:03	400

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1101**

**Lab Sample ID: 580-117256-34**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	47	B	2.0	0.22	ng/g		08/30/22 11:10	09/06/22 22:39	50



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1102**

**Lab Sample ID: 580-117256-35**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	52	B	1.9	0.21	ng/g		08/30/22 11:10	09/06/22 22:43	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1104**

**Lab Sample ID: 580-117256-36**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	49	B	2.0	0.22	ng/g		08/30/22 11:10	09/06/22 22:47	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1105**

**Lab Sample ID: 580-117256-37**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	45	B	1.9	0.21	ng/g		08/30/22 11:10	09/06/22 22:51	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEFSO-1105-DUP**

**Lab Sample ID: 580-117256-38**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	47	B	2.0	0.22	ng/g		08/30/22 11:10	09/06/22 22:55	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1142**

**Lab Sample ID: 580-117256-39**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	69	B	2.0	0.22	ng/g		08/30/22 11:10	09/06/22 22:59	50



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1142-DUP**

**Lab Sample ID: 580-117256-40**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	63	B	1.9	0.22	ng/g		08/30/22 11:10	09/06/22 23:04	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1143**

**Lab Sample ID: 580-117256-41**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	43	B	4.0	0.45	ng/g		08/30/22 11:20	09/07/22 13:52	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1144**

**Lab Sample ID: 580-117256-42**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	260	B	3.9	0.44	ng/g		08/30/22 11:20	09/07/22 13:56	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1145**

**Lab Sample ID: 580-117256-43**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	83	B	4.0	0.45	ng/g		08/30/22 11:20	09/07/22 17:59	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1146**

**Lab Sample ID: 580-117256-44**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	37	B	3.9	0.44	ng/g		08/30/22 11:20	09/07/22 18:03	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1147**

**Lab Sample ID: 580-117256-45**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	40	B	3.9	0.44	ng/g		08/30/22 11:20	09/07/22 18:07	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1148**

**Lab Sample ID: 580-117256-46**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	58	B	4.0	0.45	ng/g		08/30/22 11:20	09/07/22 18:11	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1150**

**Lab Sample ID: 580-117256-47**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	67	B	3.8	0.43	ng/g		08/30/22 11:20	09/07/22 18:16	100

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.034	mg/Kg		09/14/22 11:56	09/15/22 16:10	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1150-DUP**

**Lab Sample ID: 580-117256-48**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	67	B	3.8	0.43	ng/g		08/30/22 11:20	09/07/22 18:20	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1151**

**Lab Sample ID: 580-117256-49**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	79	B	4.0	0.45	ng/g		08/30/22 11:20	09/07/22 18:24	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1152**

**Lab Sample ID: 580-117256-50**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	54	B	3.8	0.43	ng/g		08/30/22 11:20	09/07/22 18:28	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1155**

**Lab Sample ID: 580-117256-52**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	24	B	0.78	0.088	ng/g		08/30/22 11:20	09/09/22 22:34	20



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1157**

**Lab Sample ID: 580-117256-53**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	120	B	3.9	0.44	ng/g		08/30/22 11:20	09/07/22 18:45	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1241**

**Lab Sample ID: 580-117256-54**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	65	B	3.8	0.43	ng/g		08/30/22 11:20	09/07/22 18:49	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1242**

**Lab Sample ID: 580-117256-55**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	65	B	4.0	0.45	ng/g		08/30/22 11:20	09/07/22 18:53	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1244**

**Lab Sample ID: 580-117256-56**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	280	B	3.8	0.43	ng/g		08/30/22 11:20	09/07/22 18:57	100

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.035	mg/Kg		09/14/22 11:56	09/15/22 16:16	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1245**

**Lab Sample ID: 580-117256-57**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	43	B	3.9	0.44	ng/g		08/30/22 11:20	09/07/22 19:02	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1247**

**Lab Sample ID: 580-117256-58**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	81	B	3.6	0.41	ng/g		08/30/22 11:20	09/07/22 19:06	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1261**

**Lab Sample ID: 580-117256-59**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	75	B	3.7	0.42	ng/g		08/30/22 11:20	09/07/22 19:10	100

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.035	mg/Kg		09/14/22 11:56	09/15/22 16:23	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1263**

**Lab Sample ID: 580-117256-60**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	350	B	3.8	0.43	ng/g		08/30/22 11:20	09/07/22 19:14	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1266**

**Lab Sample ID: 580-117256-61**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	73	B	3.9	0.44	ng/g		08/30/22 11:30	09/07/22 14:01	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1267**

**Lab Sample ID: 580-117256-62**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	85	B	3.9	0.44	ng/g		08/30/22 11:30	09/07/22 14:05	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1268**

**Lab Sample ID: 580-117256-63**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	140	B	3.9	0.43	ng/g		08/30/22 11:30	09/07/22 19:18	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1281**

**Lab Sample ID: 580-117256-64**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	88	B	3.7	0.42	ng/g		08/30/22 11:30	09/07/22 19:23	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1283**

**Lab Sample ID: 580-117256-65**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	160	B	3.8	0.42	ng/g		08/30/22 11:30	09/07/22 19:35	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1284**

**Lab Sample ID: 580-117256-66**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	200	B	3.7	0.42	ng/g		08/30/22 11:30	09/07/22 19:40	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1285**

**Lab Sample ID: 580-117256-67**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	300	B	3.9	0.43	ng/g		08/30/22 11:30	09/07/22 19:44	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1286**

**Lab Sample ID: 580-117256-68**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	33	B	3.8	0.43	ng/g		08/30/22 11:30	09/07/22 19:48	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1287**

**Lab Sample ID: 580-117256-69**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	52	B	3.8	0.43	ng/g		08/30/22 11:30	09/07/22 19:52	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1289**

**Lab Sample ID: 580-117256-70**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	350	B	3.9	0.44	ng/g		08/30/22 11:30	09/07/22 19:57	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1302**

**Lab Sample ID: 580-117256-71**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	170	B	3.8	0.43	ng/g		08/30/22 11:30	09/07/22 20:01	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1303**

**Lab Sample ID: 580-117256-72**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	230	B	3.9	0.43	ng/g		08/30/22 11:30	09/07/22 20:05	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1321**

**Lab Sample ID: 580-117256-73**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	150	B	3.9	0.44	ng/g		08/30/22 11:30	09/07/22 20:09	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1322**

**Lab Sample ID: 580-117256-74**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	52	B	3.8	0.43	ng/g		08/30/22 11:30	09/07/22 20:13	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1324**

**Lab Sample ID: 580-117256-75**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	350	B	3.8	0.42	ng/g		08/30/22 11:30	09/07/22 20:26	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1325**

**Lab Sample ID: 580-117256-76**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	57	B	3.7	0.42	ng/g		08/30/22 11:30	09/07/22 20:30	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEPP-1329**

**Lab Sample ID: 580-117256-77**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	590	B	4.0	0.44	ng/g		08/30/22 11:30	09/07/22 20:35	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1121**

**Lab Sample ID: 580-117256-78**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	26	B	0.77	0.087	ng/g		08/30/22 11:30	09/09/22 22:38	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1123**

**Lab Sample ID: 580-117256-79**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	310	B	3.6	0.41	ng/g		08/30/22 11:30	09/07/22 20:43	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1123-DUP**

**Lab Sample ID: 580-117256-80**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	320	B	3.9	0.44	ng/g		08/30/22 11:30	09/07/22 20:47	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1124**

**Lab Sample ID: 580-117256-81**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	270	B	8.0	0.90	ng/g		08/31/22 10:00	09/09/22 16:05	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1164**

**Lab Sample ID: 580-117256-82**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	340	B	7.8	0.88	ng/g		08/31/22 10:00	09/09/22 16:10	200



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1167**

**Lab Sample ID: 580-117256-83**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	160	B	3.8	0.43	ng/g		08/31/22 10:00	09/09/22 18:43	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1341**

**Lab Sample ID: 580-117256-84**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	23	B	0.75	0.084	ng/g		08/31/22 10:00	09/19/22 17:38	20

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.035	mg/Kg		09/14/22 11:56	09/15/22 16:29	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1342**

**Lab Sample ID: 580-117256-85**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	260	B	4.0	0.45	ng/g		08/31/22 10:00	09/09/22 18:52	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1343**

**Lab Sample ID: 580-117256-86**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	110	B	4.0	0.44	ng/g		08/31/22 10:00	09/09/22 18:56	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1344**

**Lab Sample ID: 580-117256-87**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	150	B	3.6	0.41	ng/g		08/31/22 10:00	09/09/22 19:00	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1345**

**Lab Sample ID: 580-117256-88**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	24	B	0.74	0.083	ng/g		08/31/22 10:00	09/19/22 17:43	20



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1349**

**Lab Sample ID: 580-117256-89**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	150	B	3.8	0.43	ng/g		08/31/22 10:00	09/09/22 19:08	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1361**

**Lab Sample ID: 580-117256-90**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	86	B	3.6	0.41	ng/g		08/31/22 10:00	09/09/22 19:13	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1363**

**Lab Sample ID: 580-117256-91**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	18	B	0.78	0.088	ng/g		08/31/22 10:00	09/19/22 17:47	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1364**

**Lab Sample ID: 580-117256-92**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	23	B	0.78	0.088	ng/g		08/31/22 10:00	09/19/22 17:51	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1368**

**Lab Sample ID: 580-117256-93**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

### Method: 1631B - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	240	B	3.8	0.43	ng/g		08/31/22 10:00	09/09/22 19:33	100

### Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.034	mg/Kg		09/14/22 11:56	09/15/22 16:36	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BEWK-1383**

**Lab Sample ID: 580-117256-94**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	390	B	3.6	0.41	ng/g		08/31/22 10:00	09/09/22 19:38	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1181**

**Lab Sample ID: 580-117256-95**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	96	B	4.0	0.45	ng/g		08/31/22 10:00	09/09/22 19:42	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1182**

**Lab Sample ID: 580-117256-96**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	89	B	3.5	0.40	ng/g		08/31/22 10:00	09/09/22 19:46	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1184**

**Lab Sample ID: 580-117256-97**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	24	B	0.79	0.088	ng/g		08/31/22 10:00	09/19/22 17:55	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1185**

**Lab Sample ID: 580-117256-98**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	30	B	0.74	0.083	ng/g		08/31/22 10:00	09/19/22 17:59	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1185-DUP**

**Lab Sample ID: 580-117256-99**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	31	B	0.78	0.088	ng/g		08/31/22 10:00	09/19/22 18:03	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1186**

**Lab Sample ID: 580-117256-100**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	47	B	3.6	0.41	ng/g		08/31/22 10:00	09/09/22 20:03	100

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.050	0.035	mg/Kg		09/14/22 11:56	09/15/22 16:42	50



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1187**

**Lab Sample ID: 580-117256-101**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	68	B	3.7	0.41	ng/g		08/31/22 10:10	09/09/22 14:58	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1189**

**Lab Sample ID: 580-117256-102**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	38	B	3.9	0.43	ng/g		08/31/22 10:10	09/09/22 15:11	100

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.034	mg/Kg		09/14/22 11:56	09/15/22 16:49	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1190**

**Lab Sample ID: 580-117256-103**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	29	B	0.74	0.083	ng/g		08/31/22 10:10	09/19/22 18:08	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1191**

**Lab Sample ID: 580-117256-104**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	56	B	3.6	0.41	ng/g		08/31/22 10:10	09/09/22 20:19	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1193**

**Lab Sample ID: 580-117256-105**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	49	B	3.5	0.40	ng/g		08/31/22 10:10	09/09/22 20:24	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1196**

**Lab Sample ID: 580-117256-106**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	90	B	3.7	0.42	ng/g		08/31/22 10:10	09/09/22 20:28	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1197**

**Lab Sample ID: 580-117256-107**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	57	B	3.9	0.43	ng/g		08/31/22 10:10	09/09/22 20:32	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1198**

**Lab Sample ID: 580-117256-108**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	42	B	3.7	0.42	ng/g		08/31/22 10:10	09/09/22 20:36	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1199**

**Lab Sample ID: 580-117256-109**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	31	B	0.75	0.084	ng/g		08/31/22 10:10	09/19/22 18:12	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1200**

**Lab Sample ID: 580-117256-110**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	13	B	0.78	0.088	ng/g		08/31/22 10:10	09/20/22 16:53	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1201**

**Lab Sample ID: 580-117256-111**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	65	B	1.9	0.21	ng/g		08/31/22 10:10	09/19/22 18:33	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1202**

**Lab Sample ID: 580-117256-112**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	44	B	1.9	0.21	ng/g		08/31/22 10:10	09/19/22 18:37	50



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1203**

**Lab Sample ID: 580-117256-113**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	46	B	3.6	0.40	ng/g		08/31/22 10:10	09/09/22 20:57	100

# Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1204**

**Lab Sample ID: 580-117256-114**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	59	B	3.7	0.41	ng/g		08/31/22 10:10	09/09/22 21:10	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1222**

**Lab Sample ID: 580-117256-115**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	68	B	3.7	0.41	ng/g		08/31/22 10:10	09/09/22 21:14	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1223**

**Lab Sample ID: 580-117256-116**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	51	B	3.9	0.43	ng/g		08/31/22 10:10	09/09/22 21:19	100

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.035	mg/Kg		09/14/22 11:56	09/19/22 12:10	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1224**

**Lab Sample ID: 580-117256-117**

**Date Collected: 07/08/22 00:00**

**Matrix: Tissue**

**Date Received: 08/24/22 14:59**

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	51	B	3.6	0.41	ng/g		08/31/22 10:10	09/09/22 21:23	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1225**

**Lab Sample ID: 580-117256-118**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	26	B	0.75	0.085	ng/g		08/31/22 10:10	09/19/22 18:24	20



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1226**

**Lab Sample ID: 580-117256-119**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	60	B	3.6	0.41	ng/g		08/31/22 10:10	09/09/22 21:31	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1229**

**Lab Sample ID: 580-117256-120**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	36	B	4.0	0.45	ng/g		08/31/22 10:10	09/09/22 21:35	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

**Client Sample ID: BNWL-1230**

**Lab Sample ID: 580-117256-121**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	17		2.0	0.22	ng/g		08/31/22 10:18	09/13/22 15:13	50

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: MB 580-402168/1-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402168

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.233	J	0.80	0.090	ng/g		08/30/22 11:00	08/31/22 13:13	20

Lab Sample ID: MB 580-402168/2-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402168

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.110	J	0.80	0.090	ng/g		08/30/22 11:00	08/31/22 13:17	20

Lab Sample ID: MB 580-402168/3-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402168

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.152	J	0.80	0.090	ng/g		08/30/22 11:00	08/31/22 13:22	20

Lab Sample ID: LCS 580-402168/4-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402168

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	411		ng/g		102	75 - 125

Lab Sample ID: LCSD 580-402168/5-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402168

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	409		ng/g		102	75 - 125	1	24

Lab Sample ID: 580-117256-1 MS

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: BEFSO-1002

Prep Type: Total/NA

Prep Batch: 402168

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	29	B	371	403		ng/g		101	71 - 125

Lab Sample ID: 580-117256-1 MSD

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: BEFSO-1002

Prep Type: Total/NA

Prep Batch: 402168

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	29	B	382	432		ng/g		105	71 - 125	7	24

Lab Sample ID: 580-117256-2 MS

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: BEFSO-1003

Prep Type: Total/NA

Prep Batch: 402168

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	290	B F1	378	650		ng/g		94	71 - 125

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: 580-117256-2 MSD

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: BEFSO-1003

Prep Type: Total/NA

Prep Batch: 402168

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	290	B F1	383	780	F1	ng/g		127	71 - 125	18	24

Lab Sample ID: MB 580-402169/1-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402169

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.331	J	0.80	0.090	ng/g		08/30/22 11:10	08/31/22 14:09	20

Lab Sample ID: MB 580-402169/2-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402169

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.208	J	0.80	0.090	ng/g		08/30/22 11:10	08/31/22 14:13	20

Lab Sample ID: MB 580-402169/3-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402169

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.300	J	0.80	0.090	ng/g		08/30/22 11:10	08/31/22 14:42	20

Lab Sample ID: LCS 580-402169/4-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402169

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	415		ng/g		103	75 - 125

Lab Sample ID: LCSD 580-402169/5-A

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402169

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	420		ng/g		105	75 - 125	1	24

Lab Sample ID: 580-117256-21 MS

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: BEFSO-1057

Prep Type: Total/NA

Prep Batch: 402169

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	300	B F1	370	757		ng/g		125	71 - 125

Lab Sample ID: 580-117256-21 MSD

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: BEFSO-1057

Prep Type: Total/NA

Prep Batch: 402169

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	300	B F1	392	798	F1	ng/g		128	71 - 125	5	24

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: 580-117256-22 MS

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: BEFSO-1058

Prep Type: Total/NA

Prep Batch: 402169

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	520	B	380	897		ng/g		100	71 - 125

Lab Sample ID: 580-117256-22 MSD

Matrix: Tissue

Analysis Batch: 402670

Client Sample ID: BEFSO-1058

Prep Type: Total/NA

Prep Batch: 402169

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	520	B	399	993		ng/g		120	71 - 125	10	24

Lab Sample ID: MB 580-402170/1-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402170

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.170	J	0.80	0.090	ng/g		08/30/22 11:20	09/07/22 14:38	20

Lab Sample ID: MB 580-402170/2-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402170

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.115	J	0.80	0.090	ng/g		08/30/22 11:20	09/07/22 14:42	20

Lab Sample ID: MB 580-402170/3-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402170

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.126	J	0.80	0.090	ng/g		08/30/22 11:20	09/07/22 14:47	20

Lab Sample ID: LCS 580-402170/4-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402170

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	387		ng/g		96	75 - 125

Lab Sample ID: LCSD 580-402170/5-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402170

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	404		ng/g		101	75 - 125	4	24

Lab Sample ID: 580-117256-41 MS

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: BEPP-1143

Prep Type: Total/NA

Prep Batch: 402170

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	43	B	394	402		ng/g		91	71 - 125

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: 580-117256-41 MSD

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: BEPP-1143

Prep Type: Total/NA

Prep Batch: 402170

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	43	B	382	388		ng/g		90	71 - 125	4	24

Lab Sample ID: 580-117256-42 MS

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: BEPP-1144

Prep Type: Total/NA

Prep Batch: 402170

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Mercury	260	B	393	636		ng/g		95	71 - 125		

Lab Sample ID: 580-117256-42 MSD

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: BEPP-1144

Prep Type: Total/NA

Prep Batch: 402170

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	260	B	393	629		ng/g		93	71 - 125	1	24

Lab Sample ID: MB 580-402171/1-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402171

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.260	J	0.80	0.090	ng/g		08/30/22 11:30	09/07/22 14:59	20

Lab Sample ID: MB 580-402171/2-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402171

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.225	J	0.80	0.090	ng/g		08/30/22 11:30	09/07/22 15:03	20

Lab Sample ID: MB 580-402171/3-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402171

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.129	J	0.80	0.090	ng/g		08/30/22 11:30	09/07/22 15:07	20

Lab Sample ID: LCS 580-402171/4-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402171

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Mercury	402	382		ng/g		95	75 - 125		

Lab Sample ID: LCSD 580-402171/5-A

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402171

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	388		ng/g		97	75 - 125	1	24

Eurofins Seattle



# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: 580-117256-61 MS

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: BEPP-1266

Prep Type: Total/NA

Prep Batch: 402171

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	73	B	396	444		ng/g		94	71 - 125

Lab Sample ID: 580-117256-61 MSD

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: BEPP-1266

Prep Type: Total/NA

Prep Batch: 402171

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	73	B	387	429		ng/g		92	71 - 125	3	24

Lab Sample ID: 580-117256-62 MS

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: BEPP-1267

Prep Type: Total/NA

Prep Batch: 402171

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	85	B	387	424		ng/g		88	71 - 125

Lab Sample ID: 580-117256-62 MSD

Matrix: Tissue

Analysis Batch: 403282

Client Sample ID: BEPP-1267

Prep Type: Total/NA

Prep Batch: 402171

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	85	B	387	422		ng/g		87	71 - 125	0	24

Lab Sample ID: MB 580-402314/1-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402314

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.198	J	0.80	0.090	ng/g		08/31/22 10:00	09/09/22 15:15	20

Lab Sample ID: MB 580-402314/1-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402314

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.156	J	0.80	0.090	ng/g		08/31/22 10:00	09/09/22 15:19	20

Lab Sample ID: MB 580-402314/3-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402314

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.111	J	0.80	0.090	ng/g		08/31/22 10:00	09/09/22 15:24	20

Lab Sample ID: LCS 580-402314/4-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402314

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	422		ng/g		105	75 - 125

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: LCSD 580-402314/5-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402314

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	425		ng/g		106	75 - 125	1	24

Lab Sample ID: 580-117256-81 MS

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: BEWK-1124

Prep Type: Total/NA

Prep Batch: 402314

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	270	B	376	643		ng/g		99	71 - 125		

Lab Sample ID: 580-117256-81 MSD

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: BEWK-1124

Prep Type: Total/NA

Prep Batch: 402314

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	270	B	356	612		ng/g		96	71 - 125	5	24

Lab Sample ID: 580-117256-82 MS

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: BEWK-1164

Prep Type: Total/NA

Prep Batch: 402314

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	340	B	363	693		ng/g		98	71 - 125		

Lab Sample ID: 580-117256-82 MSD

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: BEWK-1164

Prep Type: Total/NA

Prep Batch: 402314

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	340	B	399	723		ng/g		97	71 - 125	4	24

Lab Sample ID: MB 580-402347/1-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402347

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.240	J	0.80	0.090	ng/g		08/31/22 10:10	09/09/22 15:36	20

Lab Sample ID: MB 580-402347/2-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402347

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.218	J	0.80	0.090	ng/g		08/31/22 10:10	09/09/22 15:40	20

Lab Sample ID: MB 580-402347/3-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402347

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.124	J	0.80	0.090	ng/g		08/31/22 10:10	09/09/22 15:45	20

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: LCS 580-402347/4-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402347

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	417		ng/g		104	75 - 125

Lab Sample ID: LCSD 580-402347/5-A

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402347

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	419		ng/g		104	75 - 125	0	24

Lab Sample ID: 580-117256-101 MS

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: BNWL-1187

Prep Type: Total/NA

Prep Batch: 402347

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	68	B	384	473		ng/g		106	71 - 125

Lab Sample ID: 580-117256-101 MSD

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: BNWL-1187

Prep Type: Total/NA

Prep Batch: 402347

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	68	B	377	458		ng/g		103	71 - 125	3	24

Lab Sample ID: 580-117256-102 MS

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: BNWL-1189

Prep Type: Total/NA

Prep Batch: 402347

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	38	B	388	436		ng/g		102	71 - 125

Lab Sample ID: 580-117256-102 MSD

Matrix: Tissue

Analysis Batch: 403548

Client Sample ID: BNWL-1189

Prep Type: Total/NA

Prep Batch: 402347

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	38	B	362	412		ng/g		103	71 - 125	6	24

Lab Sample ID: MB 580-402367/1-A

Matrix: Tissue

Analysis Batch: 403832

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402367

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.80	0.090	ng/g		08/31/22 10:18	09/13/22 14:52	20

Lab Sample ID: MB 580-402367/2-A

Matrix: Tissue

Analysis Batch: 403832

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402367

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.80	0.090	ng/g		08/31/22 10:18	09/13/22 14:57	20

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: MB 580-402367/3-A

Matrix: Tissue

Analysis Batch: 403832

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402367

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.80	0.090	ng/g		08/31/22 10:18	09/13/22 15:01	20

Lab Sample ID: LCS 580-402367/4-A

Matrix: Tissue

Analysis Batch: 403832

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402367

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	357		ng/g		89	75 - 125

Lab Sample ID: LCSD 580-402367/5-A

Matrix: Tissue

Analysis Batch: 403832

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402367

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	393		ng/g		98	75 - 125	10	24

Lab Sample ID: 580-117256-121 MS

Matrix: Tissue

Analysis Batch: 403832

Client Sample ID: BNWL-1230

Prep Type: Total/NA

Prep Batch: 402367

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	17		377	373		ng/g		94	71 - 125

Lab Sample ID: 580-117256-121 MSD

Matrix: Tissue

Analysis Batch: 403832

Client Sample ID: BNWL-1230

Prep Type: Total/NA

Prep Batch: 402367

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	17		384	357		ng/g		89	71 - 125	4	24

## Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS

Lab Sample ID: MB 580-403812/1-A

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 403812

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.010	0.0070	mg/Kg		09/14/22 11:56	09/15/22 11:56	10

Lab Sample ID: MB 580-403812/2-A

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 403812

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.010	0.0070	mg/Kg		09/14/22 11:56	09/15/22 12:02	10

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS (Continued)

Lab Sample ID: LCS 580-403812/3-A

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 403812

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Inorganic Arsenic	0.100	0.102		mg/Kg		102	50 - 150

Lab Sample ID: LCSD 580-403812/4-A

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 403812

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Inorganic Arsenic	0.100	0.101		mg/Kg		101	50 - 150	1	35

Lab Sample ID: 580-117256-2 MS

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: BEFSO-1003

Prep Type: Total/NA

Prep Batch: 403812

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Inorganic Arsenic	ND	F1	0.0989	0.0437	J F1	mg/Kg		44	50 - 150

Lab Sample ID: 580-117256-2 MSD

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: BEFSO-1003

Prep Type: Total/NA

Prep Batch: 403812

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Inorganic Arsenic	ND	F1	0.0978	0.0524		mg/Kg		54	50 - 150	18	35

Lab Sample ID: 580-117256-15 MS

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: BEFSO-1048

Prep Type: Total/NA

Prep Batch: 403812

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Inorganic Arsenic	ND	F1	0.0983	0.0485	J F1	mg/Kg		49	50 - 150

Lab Sample ID: 580-117256-15 MSD

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: BEFSO-1048

Prep Type: Total/NA

Prep Batch: 403812

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Inorganic Arsenic	ND	F1	0.0996	0.0496	J	mg/Kg		50	50 - 150	2	35

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEFSO-1002**

**Lab Sample ID: 580-117256-1**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	402670	COW	EET SEA	08/31/22 15:15

**Client Sample ID: BEFSO-1003**

**Lab Sample ID: 580-117256-2**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 15:19
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 13:19

**Client Sample ID: BEFSO-1005**

**Lab Sample ID: 580-117256-3**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 17:50

**Client Sample ID: BEFSO-1021**

**Lab Sample ID: 580-117256-4**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 17:54

**Client Sample ID: BEFSO-1022**

**Lab Sample ID: 580-117256-5**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 20:54

**Client Sample ID: BEFSO-1026**

**Lab Sample ID: 580-117256-6**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 18:02

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEFSO-1027**

**Lab Sample ID: 580-117256-7**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:51

**Client Sample ID: BEFSO-1030**

**Lab Sample ID: 580-117256-8**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:02

**Client Sample ID: BEFSO-1033**

**Lab Sample ID: 580-117256-9**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:07

**Client Sample ID: BEFSO-1033-DUP**

**Lab Sample ID: 580-117256-10**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:11

**Client Sample ID: BEFSO-1043**

**Lab Sample ID: 580-117256-11**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:56

**Client Sample ID: BEFSO-1045**

**Lab Sample ID: 580-117256-12**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:19



# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEFSO-1046**

**Lab Sample ID: 580-117256-13**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:23

**Client Sample ID: BEFSO-1047**

**Lab Sample ID: 580-117256-14**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:36

**Client Sample ID: BEFSO-1048**

**Lab Sample ID: 580-117256-15**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:40
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 14:41

**Client Sample ID: BEFSO-1049**

**Lab Sample ID: 580-117256-16**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:44
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 15:57

**Client Sample ID: BEFSO-1051**

**Lab Sample ID: 580-117256-17**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 21:49

**Client Sample ID: BEFSO-1052**

**Lab Sample ID: 580-117256-18**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 19:00

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEFSO-1053**

**Lab Sample ID: 580-117256-19**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		100	403125	COW	EET SEA	09/06/22 21:53

**Client Sample ID: BEFSO-1055**

**Lab Sample ID: 580-117256-20**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402168	M1R	EET SEA	08/30/22 11:00
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 19:09

**Client Sample ID: BEFSO-1057**

**Lab Sample ID: 580-117256-21**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 15:24

**Client Sample ID: BEFSO-1058**

**Lab Sample ID: 580-117256-22**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		1000	402670	COW	EET SEA	08/31/22 13:56

**Client Sample ID: BEFSO-1060**

**Lab Sample ID: 580-117256-23**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		100	403125	COW	EET SEA	09/06/22 21:57
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 16:03

**Client Sample ID: BEFSO-1061**

**Lab Sample ID: 580-117256-24**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 19:25

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEFSO-1062**

**Lab Sample ID: 580-117256-25**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:01

**Client Sample ID: BEFSO-1082**

**Lab Sample ID: 580-117256-26**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		100	403125	COW	EET SEA	09/06/22 22:05

**Client Sample ID: BEFSO-1083**

**Lab Sample ID: 580-117256-27**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:09

**Client Sample ID: BEFSO-1084**

**Lab Sample ID: 580-117256-28**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:14

**Client Sample ID: BEFSO-1085**

**Lab Sample ID: 580-117256-29**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:26

**Client Sample ID: BEFSO-1086**

**Lab Sample ID: 580-117256-30**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:30

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEFSO-1087**

**Lab Sample ID: 580-117256-31**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		100	403125	COW	EET SEA	09/06/22 22:34

**Client Sample ID: BEFSO-1095**

**Lab Sample ID: 580-117256-32**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 19:59

**Client Sample ID: BEFSO-1096**

**Lab Sample ID: 580-117256-33**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		400	402670	COW	EET SEA	08/31/22 20:03

**Client Sample ID: BEFSO-1101**

**Lab Sample ID: 580-117256-34**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:39

**Client Sample ID: BEFSO-1102**

**Lab Sample ID: 580-117256-35**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:43

**Client Sample ID: BEFSO-1104**

**Lab Sample ID: 580-117256-36**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:47

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEFSO-1105**

**Lab Sample ID: 580-117256-37**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:51

**Client Sample ID: BEFSO-1105-DUP**

**Lab Sample ID: 580-117256-38**

Date Collected: 07/03/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:55

**Client Sample ID: BEPP-1142**

**Lab Sample ID: 580-117256-39**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 22:59

**Client Sample ID: BEPP-1142-DUP**

**Lab Sample ID: 580-117256-40**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402169	M1R	EET SEA	08/30/22 11:10
Total/NA	Analysis	1631B		50	403125	COW	EET SEA	09/06/22 23:04

**Client Sample ID: BEPP-1143**

**Lab Sample ID: 580-117256-41**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 13:52

**Client Sample ID: BEPP-1144**

**Lab Sample ID: 580-117256-42**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 13:56

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEPP-1145**

**Lab Sample ID: 580-117256-43**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 17:59

**Client Sample ID: BEPP-1146**

**Lab Sample ID: 580-117256-44**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:03

**Client Sample ID: BEPP-1147**

**Lab Sample ID: 580-117256-45**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:07

**Client Sample ID: BEPP-1148**

**Lab Sample ID: 580-117256-46**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:11

**Client Sample ID: BEPP-1150**

**Lab Sample ID: 580-117256-47**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:16
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 16:10

**Client Sample ID: BEPP-1150-DUP**

**Lab Sample ID: 580-117256-48**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:20

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEPP-1151**

**Lab Sample ID: 580-117256-49**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:24

**Client Sample ID: BEPP-1152**

**Lab Sample ID: 580-117256-50**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:28

**Client Sample ID: BEPP-1155**

**Lab Sample ID: 580-117256-52**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		20	403548	COW	EET SEA	09/09/22 22:34

**Client Sample ID: BEPP-1157**

**Lab Sample ID: 580-117256-53**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:45

**Client Sample ID: BEPP-1241**

**Lab Sample ID: 580-117256-54**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:49

**Client Sample ID: BEPP-1242**

**Lab Sample ID: 580-117256-55**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:53



# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEPP-1244**

**Lab Sample ID: 580-117256-56**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 18:57
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 16:16

**Client Sample ID: BEPP-1245**

**Lab Sample ID: 580-117256-57**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:02

**Client Sample ID: BEPP-1247**

**Lab Sample ID: 580-117256-58**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:06

**Client Sample ID: BEPP-1261**

**Lab Sample ID: 580-117256-59**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:10
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 16:23

**Client Sample ID: BEPP-1263**

**Lab Sample ID: 580-117256-60**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402170	M1R	EET SEA	08/30/22 11:20
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:14

**Client Sample ID: BEPP-1266**

**Lab Sample ID: 580-117256-61**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 14:01

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEPP-1267**

**Lab Sample ID: 580-117256-62**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 14:05

**Client Sample ID: BEPP-1268**

**Lab Sample ID: 580-117256-63**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:18

**Client Sample ID: BEPP-1281**

**Lab Sample ID: 580-117256-64**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:23

**Client Sample ID: BEPP-1283**

**Lab Sample ID: 580-117256-65**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:35

**Client Sample ID: BEPP-1284**

**Lab Sample ID: 580-117256-66**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:40

**Client Sample ID: BEPP-1285**

**Lab Sample ID: 580-117256-67**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:44

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEPP-1286**

**Lab Sample ID: 580-117256-68**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:48

**Client Sample ID: BEPP-1287**

**Lab Sample ID: 580-117256-69**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:52

**Client Sample ID: BEPP-1289**

**Lab Sample ID: 580-117256-70**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 19:57

**Client Sample ID: BEPP-1302**

**Lab Sample ID: 580-117256-71**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:01

**Client Sample ID: BEPP-1303**

**Lab Sample ID: 580-117256-72**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:05

**Client Sample ID: BEPP-1321**

**Lab Sample ID: 580-117256-73**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:09

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEPP-1322**

**Lab Sample ID: 580-117256-74**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:13

**Client Sample ID: BEPP-1324**

**Lab Sample ID: 580-117256-75**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:26

**Client Sample ID: BEPP-1325**

**Lab Sample ID: 580-117256-76**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:30

**Client Sample ID: BEPP-1329**

**Lab Sample ID: 580-117256-77**

Date Collected: 07/13/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:35

**Client Sample ID: BEWK-1121**

**Lab Sample ID: 580-117256-78**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		20	403548	COW	EET SEA	09/09/22 22:38

**Client Sample ID: BEWK-1123**

**Lab Sample ID: 580-117256-79**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:43

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEWK-1123-DUP**

**Lab Sample ID: 580-117256-80**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402171	M1R	EET SEA	08/30/22 11:30
Total/NA	Analysis	1631B		100	403282	COW	EET SEA	09/07/22 20:47

**Client Sample ID: BEWK-1124**

**Lab Sample ID: 580-117256-81**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		200	403548	COW	EET SEA	09/09/22 16:05

**Client Sample ID: BEWK-1164**

**Lab Sample ID: 580-117256-82**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		200	403548	COW	EET SEA	09/09/22 16:10

**Client Sample ID: BEWK-1167**

**Lab Sample ID: 580-117256-83**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 18:43

**Client Sample ID: BEWK-1341**

**Lab Sample ID: 580-117256-84**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 17:38
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 16:29

**Client Sample ID: BEWK-1342**

**Lab Sample ID: 580-117256-85**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 18:52

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEWK-1343**

**Lab Sample ID: 580-117256-86**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 18:56

**Client Sample ID: BEWK-1344**

**Lab Sample ID: 580-117256-87**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 19:00

**Client Sample ID: BEWK-1345**

**Lab Sample ID: 580-117256-88**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 17:43

**Client Sample ID: BEWK-1349**

**Lab Sample ID: 580-117256-89**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 19:08

**Client Sample ID: BEWK-1361**

**Lab Sample ID: 580-117256-90**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 19:13

**Client Sample ID: BEWK-1363**

**Lab Sample ID: 580-117256-91**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 17:47

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BEWK-1364**

**Lab Sample ID: 580-117256-92**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 17:51

**Client Sample ID: BEWK-1368**

**Lab Sample ID: 580-117256-93**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 19:33
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 16:36

**Client Sample ID: BEWK-1383**

**Lab Sample ID: 580-117256-94**

Date Collected: 07/17/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 19:38

**Client Sample ID: BNWL-1181**

**Lab Sample ID: 580-117256-95**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 19:42

**Client Sample ID: BNWL-1182**

**Lab Sample ID: 580-117256-96**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 19:46

**Client Sample ID: BNWL-1184**

**Lab Sample ID: 580-117256-97**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 17:55



# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BNWL-1185**

**Lab Sample ID: 580-117256-98**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 17:59

**Client Sample ID: BNWL-1185-DUP**

**Lab Sample ID: 580-117256-99**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 18:03

**Client Sample ID: BNWL-1186**

**Lab Sample ID: 580-117256-100**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402314	D1C	EET SEA	08/31/22 10:00
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 20:03
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 16:42

**Client Sample ID: BNWL-1187**

**Lab Sample ID: 580-117256-101**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 14:58

**Client Sample ID: BNWL-1189**

**Lab Sample ID: 580-117256-102**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 15:11
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404111	D1C	EET SEA	09/15/22 16:49

**Client Sample ID: BNWL-1190**

**Lab Sample ID: 580-117256-103**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 18:08

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BNWL-1191**

**Lab Sample ID: 580-117256-104**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 20:19

**Client Sample ID: BNWL-1193**

**Lab Sample ID: 580-117256-105**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 20:24

**Client Sample ID: BNWL-1196**

**Lab Sample ID: 580-117256-106**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 20:28

**Client Sample ID: BNWL-1197**

**Lab Sample ID: 580-117256-107**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 20:32

**Client Sample ID: BNWL-1198**

**Lab Sample ID: 580-117256-108**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 20:36

**Client Sample ID: BNWL-1199**

**Lab Sample ID: 580-117256-109**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 18:12

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BNWL-1200**

**Lab Sample ID: 580-117256-110**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		20	404493	COW	EET SEA	09/20/22 16:53

**Client Sample ID: BNWL-1201**

**Lab Sample ID: 580-117256-111**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		50	404373	COW	EET SEA	09/19/22 18:33

**Client Sample ID: BNWL-1202**

**Lab Sample ID: 580-117256-112**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		50	404373	COW	EET SEA	09/19/22 18:37

**Client Sample ID: BNWL-1203**

**Lab Sample ID: 580-117256-113**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 20:57

**Client Sample ID: BNWL-1204**

**Lab Sample ID: 580-117256-114**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 21:10

**Client Sample ID: BNWL-1222**

**Lab Sample ID: 580-117256-115**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 21:14

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

**Client Sample ID: BNWL-1223**

**Lab Sample ID: 580-117256-116**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 21:19
Total/NA	Prep	1632			403812	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 12:10

**Client Sample ID: BNWL-1224**

**Lab Sample ID: 580-117256-117**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 21:23

**Client Sample ID: BNWL-1225**

**Lab Sample ID: 580-117256-118**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		20	404373	COW	EET SEA	09/19/22 18:24

**Client Sample ID: BNWL-1226**

**Lab Sample ID: 580-117256-119**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 21:31

**Client Sample ID: BNWL-1229**

**Lab Sample ID: 580-117256-120**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402347	D1C	EET SEA	08/31/22 10:10
Total/NA	Analysis	1631B		100	403548	COW	EET SEA	09/09/22 21:35

**Client Sample ID: BNWL-1230**

**Lab Sample ID: 580-117256-121**

Date Collected: 07/08/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402367	M1R	EET SEA	08/31/22 10:18
Total/NA	Analysis	1631B		50	403832	AJR	EET SEA	09/13/22 15:13

## Laboratory References:

EET SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Eurofins Seattle

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Laboratory: Eurofins Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-004	02-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
ANAB	Dept. of Defense ELAP	L2236	01-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic
ANAB	Dept. of Energy	L2236	01-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic
ANAB	ISO/IEC 17025	L2236	01-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic
California	State	2954	07-07-22 *
Florida	NELAP	E87575	06-30-23
Louisiana	NELAP	03073	06-30-23
Maine	State	WA01273	05-02-24
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
Montana (UST)	State	NA	04-14-27
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
New Jersey	NELAP	WA014	06-30-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
New York	NELAP	11662	04-01-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Seattle

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

## Laboratory: Eurofins Seattle (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
Oregon	NELAP	4167	07-08-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic
US Fish & Wildlife	US Federal Programs	A20571	06-30-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
USDA	US Federal Programs	P330-20-00031	02-10-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
Washington	State	C788	07-13-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
Wisconsin	State	399133460	08-31-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic

## Sample Summary

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-117256-1	BEFSO-1002	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-2	BEFSO-1003	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-3	BEFSO-1005	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-4	BEFSO-1021	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-5	BEFSO-1022	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-6	BEFSO-1026	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-7	BEFSO-1027	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-8	BEFSO-1030	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-9	BEFSO-1033	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-10	BEFSO-1033-DUP	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-11	BEFSO-1043	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-12	BEFSO-1045	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-13	BEFSO-1046	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-14	BEFSO-1047	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-15	BEFSO-1048	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-16	BEFSO-1049	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-17	BEFSO-1051	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-18	BEFSO-1052	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-19	BEFSO-1053	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-20	BEFSO-1055	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-21	BEFSO-1057	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-22	BEFSO-1058	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-23	BEFSO-1060	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-24	BEFSO-1061	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-25	BEFSO-1062	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-26	BEFSO-1082	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-27	BEFSO-1083	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-28	BEFSO-1084	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-29	BEFSO-1085	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-30	BEFSO-1086	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-31	BEFSO-1087	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-32	BEFSO-1095	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-33	BEFSO-1096	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-34	BEFSO-1101	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-35	BEFSO-1102	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-36	BEFSO-1104	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-37	BEFSO-1105	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-38	BEFSO-1105-DUP	Tissue	07/03/22 00:00	08/24/22 14:59
580-117256-39	BEPP-1142	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-40	BEPP-1142-DUP	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-41	BEPP-1143	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-42	BEPP-1144	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-43	BEPP-1145	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-44	BEPP-1146	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-45	BEPP-1147	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-46	BEPP-1148	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-47	BEPP-1150	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-48	BEPP-1150-DUP	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-49	BEPP-1151	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-50	BEPP-1152	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-52	BEPP-1155	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-53	BEPP-1157	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-54	BEPP-1241	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-55	BEPP-1242	Tissue	07/13/22 00:00	08/24/22 14:59



## Sample Summary

Client: Tetra Tech, Inc.

Job ID: 580-117256-1

Project/Site: Gulf of Thailand - Project T423.01

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-117256-56	BEPP-1244	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-57	BEPP-1245	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-58	BEPP-1247	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-59	BEPP-1261	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-60	BEPP-1263	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-61	BEPP-1266	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-62	BEPP-1267	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-63	BEPP-1268	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-64	BEPP-1281	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-65	BEPP-1283	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-66	BEPP-1284	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-67	BEPP-1285	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-68	BEPP-1286	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-69	BEPP-1287	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-70	BEPP-1289	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-71	BEPP-1302	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-72	BEPP-1303	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-73	BEPP-1321	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-74	BEPP-1322	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-75	BEPP-1324	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-76	BEPP-1325	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-77	BEPP-1329	Tissue	07/13/22 00:00	08/24/22 14:59
580-117256-78	BEWK-1121	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-79	BEWK-1123	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-80	BEWK-1123-DUP	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-81	BEWK-1124	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-82	BEWK-1164	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-83	BEWK-1167	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-84	BEWK-1341	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-85	BEWK-1342	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-86	BEWK-1343	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-87	BEWK-1344	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-88	BEWK-1345	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-89	BEWK-1349	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-90	BEWK-1361	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-91	BEWK-1363	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-92	BEWK-1364	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-93	BEWK-1368	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-94	BEWK-1383	Tissue	07/17/22 00:00	08/24/22 14:59
580-117256-95	BNWL-1181	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-96	BNWL-1182	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-97	BNWL-1184	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-98	BNWL-1185	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-99	BNWL-1185-DUP	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-100	BNWL-1186	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-101	BNWL-1187	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-102	BNWL-1189	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-103	BNWL-1190	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-104	BNWL-1191	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-105	BNWL-1193	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-106	BNWL-1196	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-107	BNWL-1197	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-108	BNWL-1198	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-109	BNWL-1199	Tissue	07/08/22 00:00	08/24/22 14:59



## Sample Summary

Client: Tetra Tech, Inc.

Project/Site: Gulf of Thailand - Project T423.01

Job ID: 580-117256-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-117256-110	BNWL-1200	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-111	BNWL-1201	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-112	BNWL-1202	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-113	BNWL-1203	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-114	BNWL-1204	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-115	BNWL-1222	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-116	BNWL-1223	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-117	BNWL-1224	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-118	BNWL-1225	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-119	BNWL-1226	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-120	BNWL-1229	Tissue	07/08/22 00:00	08/24/22 14:59
580-117256-121	BNWL-1230	Tissue	07/08/22 00:00	08/24/22 14:59

Ship to:

Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

## CHAIN OF CUSTODY

3697 Mt.

ted.



580-117256 Chain of Custody

### General Notes:

Please report results separately for each Project ID  
Please report all results to the MDL. J-flag results between MDL and RL  
Please report results in PDF format with Excel EDD deliverable  
Please INVOICE separately for each Project ID

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.01	BEFSO-1002	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1003	3-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEFSO-1005	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1021	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1022	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1026	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1027	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1030	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1033	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1033-DUP	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1043	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1045	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1046	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1047	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1048	3-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEFSO-1049	3-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEFSO-1051	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1052	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1063	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1055	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1057	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1058	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1060	3-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEFSO-1061	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1062	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1082	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1083	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1084	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1085	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1086	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1087	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1095	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1096	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1101	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1102	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1104	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1105	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1105-DUP	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1142	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1142-DUP	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1143	13-Jul-2022	FISH TISSUE	FROZEN	1	

Relinquished by:

Patipham P.

Received by:

15-08-22  
D. V. Miller  
8/25/22 9:30

Relinquished by:

-44.9 D-32 -44.0  
SD 4513

Received by:

7777 4513 9600

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.01	BEPP-1144	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1145	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1146	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1147	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1148	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1150	13-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEPP-1150-DUP	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1151	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1152	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1154	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1155	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1157	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1241	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1242	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1244	13-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEPP-1245	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1247	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1261	13-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEPP-1263	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1266	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1267	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1268	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1281	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1283	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1284	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1285	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1286	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1287	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1289	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1302	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1303	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1321	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1322	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1324	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1325	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1329	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1121	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1123	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1123-DUP	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1124	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1164	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1167	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1341	17-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEWK-1342	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1343	17-Jul-2022	FISH TISSUE	FROZEN	1	

Relinquished by: Patipham P.

Relinquished by:

Received by:   
15-08-22  
8/25/22 5:30

Received by:

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.01	BEWK-1344	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1345	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1349	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1361	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1363	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1364	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1368	17-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEWK-1383	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1181	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1182	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1184	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1185	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1185-DUP	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1186	8-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BNWL-1187	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1189	8-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BNWL-1190	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1191	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1193	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1196	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1197	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1198	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1199	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1200	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1201	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1202	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1203	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1204	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1222	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1223	8-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BNWL-1224	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1225	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1226	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1229	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1230	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1301	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1301-DUP	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1302	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1303	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1304	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1321	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1321-DUP	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1322	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1323	27-Jul-22	FISH TISSUE	FROZEN	1	

Relinquished by: *Patipham P.*

Relinquished by:

Received by:

Received by:

*15-08-22*  
*8/25/22 9:30*



# CHAIN OF CUSTODY


Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-1 (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.10	MGWA-1325	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1341	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1361	27-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	MGWA-1362	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1363	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1364	27-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	MGWA-1383	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1384	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1401	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1403	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1404	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1405	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1406	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1408	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1001	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1001-DUP	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1002	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1003	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1004	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1021	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1022	1-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	NPCPP-1023	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1024	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1026	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1029	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1029-DUP	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1041	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1042	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1043	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1044	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1045	1-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	NPCPP-1046	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1047	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1048	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1050	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1061	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1062	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1063	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1064	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1065	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1081	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1083	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1102	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1103	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1104	1-Jun-22	FISH TISSUE	FROZEN	1	1

Relinquished by: Patiphan P.

Relinquished by:

Received by:  15-08-22  
8/26/22 2:30 PM

Received by:

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-1 (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.10	NPCPP-1105	1-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	NPCPP-1106	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1107	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1108	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1109	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1111	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1112	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1113	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1121	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1122	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1426	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1426-DUP	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1441	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1442	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1443	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1444	31-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	NPWB-1445	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1446	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1448	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1448-DUP	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1449	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1450	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1451	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1453	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1455	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1461	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1462	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1470	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1471	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1472	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1473	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1477	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1481	31-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	NPWB-1482	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1485	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1486	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1501	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1503	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1504	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1516	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1516-DUP	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1521	31-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	NPWB-1525	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1281	8-Jun-22	FISH TISSUE	FROZEN	1	

Relinquished by: *Patiphan P.*  
 Relinquished by: *15-08-22*  
 Received by: *8/25/22*  
 Received by: *9/3/22*

Relinquished by:

Received by:



Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

## CHAIN OF CUSTODY

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.10	PACPP-1282	8-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PACPP-1282-DUP	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1283	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1284	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1285	8-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PACPP-1286	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1287	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1288	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1289	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1290	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1141	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1142	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1142-DUP	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1144	7-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PAWE-1145	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1146	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1155	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1157	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1158	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1185	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1187	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1189	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1190	7-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PAWE-1192	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1200	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1203	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1204	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1205	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1221	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1222	7-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PAWE-1222-DUP	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1224	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1227	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1229	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1241	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1242	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1243	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1244	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1262	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1264	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1266	7-Jun-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1001	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1001-DUP	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1003	11-Aug-22	FISH TISSUE	FROZEN	1	

Relinquished by: **Patiphan P.**

Relinquished by:

Received by:

Received by:

15-08-22  
8/25/22 9:30

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
RANMKT	RANMKT-1006	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1005-DUP	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1006	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1007	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1008	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1009	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1010	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1011	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1012	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1013	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1014	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1015	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1016	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1017	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1018	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1019	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1020	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1021	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1024	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1025	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1026	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1030	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1031	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1033	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1034	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1035	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1038	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1041	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1043	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1044	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1045	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1046	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1047	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1049	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1052	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1055	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1055-DUP	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1056	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1058	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1059	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1060	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1061	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1062	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1063	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1063-DUP	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1064	11-Aug-22	FISH TISSUE	FROZEN	1	

Relinquished by: *Patiphan P.*

Relinquished by:

Received by:

*15-08-22*  
*8/25/22 4:30*

Received by:

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
RANMKT	RANMKT-1065	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1066	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1067	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1068	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1069	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1070	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1071	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1074	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1075	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1076	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1077	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1078	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1079	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1081	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1083	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1084	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1085	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1087	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1090	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1091	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1092	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1093	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1094	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1095	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1096	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1097	11-Aug-22	FISH TISSUE	FROZEN	1	

Relinquished by: *Patiphan P.*

Relinquished by:

Received by: *[Signature]*  
*8/25/22 9:30*

Received by:

## Login Sample Receipt Checklist

Client: Tetra Tech, Inc.

Job Number: 580-117256-1

**Login Number: 117256**

**List Source: Eurofins Seattle**

**List Number: 1**

**Creator: LaCount, Lilly-Anna E**

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	N/A	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## ANALYTICAL REPORT

Eurofins Seattle  
5755 8th Street East  
Tacoma, WA 98424  
Tel: (253)922-2310

Laboratory Job ID: 580-117256-3

Client Project/Site: Gulf of Thailand - Project RANMKT

**For:**

Tetra Tech, Inc.  
3697 Mt. Diablo Blvd.  
Suite 150  
Lafayette, California 94549

Attn: Ted Donn



*Authorized for release by:*

9/22/2022 3:06:07 PM

Lilly-Anna LaCount, Project Manager  
(253)922-2310

[Lilly-Anna.Lacount@et.eurofinsus.com](mailto:Lilly-Anna.Lacount@et.eurofinsus.com)

### LINKS

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results through



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[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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## Case Narrative

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Job ID: 580-117256-3**

**Laboratory: Eurofins Seattle**

### Narrative

#### Job Narrative 580-117256-3

#### Receipt

The samples were received on 8/24/2022 2:59 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was -44.0°C

#### Receipt Exceptions

Sample 580-117256-51 (BEPP-1154) was not received. Client was notified.

#### Metals

Method 1632: The following samples were diluted due to the nature of the sample matrix: RANMKT-1008 (580-117256-268), RANMKT-1018 (580-117256-278), RANMKT-1030 (580-117256-285), RANMKT-1044 (580-117256-293), RANMKT-1052 (580-117256-298), RANMKT-1066 (580-117256-311), RANMKT-1074 (580-117256-317) and RANMKT-1092 (580-117256-330). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.



## Definitions/Glossary

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

### Qualifiers

#### Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

### Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1001**

**Lab Sample ID: 580-117256-261**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	110	B	5.9	0.67	ng/g		09/01/22 17:15	09/15/22 15:20	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1001-DUP**

**Lab Sample ID: 580-117256-262**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	90	B	5.6	0.63	ng/g		09/01/22 17:15	09/15/22 15:33	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1003**

**Lab Sample ID: 580-117256-263**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	270	B	5.8	0.65	ng/g		09/01/22 17:15	09/15/22 15:53	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1005**

**Lab Sample ID: 580-117256-264**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	640	B	5.9	0.66	ng/g		09/01/22 17:15	09/15/22 15:57	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1005-DUP**

**Lab Sample ID: 580-117256-265**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	650	B	5.9	0.66	ng/g		09/01/22 17:15	09/15/22 16:02	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1006**

**Lab Sample ID: 580-117256-266**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	430	B	5.9	0.67	ng/g		09/01/22 17:15	09/15/22 16:06	150



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1007**

**Lab Sample ID: 580-117256-267**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	430	B	5.5	0.62	ng/g		09/01/22 17:15	09/15/22 16:10	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1008**

**Lab Sample ID: 580-117256-268**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	240	B	5.4	0.61	ng/g		09/01/22 17:15	09/15/22 16:14	150

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.034	mg/Kg		09/14/22 11:56	09/19/22 14:35	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1009**

**Lab Sample ID: 580-117256-269**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	480	B	6.0	0.67	ng/g		09/01/22 17:15	09/15/22 16:18	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1010**

**Lab Sample ID: 580-117256-270**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	460	B	6.0	0.67	ng/g		09/01/22 17:15	09/15/22 16:22	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1011**

**Lab Sample ID: 580-117256-271**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	170	B	5.9	0.66	ng/g		09/01/22 17:15	09/15/22 16:26	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1012**

**Lab Sample ID: 580-117256-272**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	820	B	5.8	0.66	ng/g		09/01/22 17:15	09/15/22 16:39	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1013**

**Lab Sample ID: 580-117256-273**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	660	B	5.6	0.63	ng/g		09/01/22 17:15	09/15/22 16:43	150



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1014**

**Lab Sample ID: 580-117256-274**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	410	B	5.5	0.62	ng/g		09/01/22 17:15	09/15/22 16:47	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1015**

**Lab Sample ID: 580-117256-275**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	490	B	5.9	0.67	ng/g		09/01/22 17:15	09/15/22 16:51	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1016**

**Lab Sample ID: 580-117256-276**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	300	B	5.9	0.66	ng/g		09/01/22 17:15	09/15/22 16:56	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1017**

**Lab Sample ID: 580-117256-277**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	220	B	5.5	0.62	ng/g		09/01/22 17:15	09/15/22 17:00	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1018**

**Lab Sample ID: 580-117256-278**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	230	B	5.4	0.61	ng/g		09/01/22 17:15	09/15/22 17:04	150

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.050	0.035	mg/Kg		09/14/22 11:56	09/19/22 14:42	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1019**

**Lab Sample ID: 580-117256-279**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	22	B	1.9	0.21	ng/g		09/01/22 17:15	09/21/22 20:45	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1020**

**Lab Sample ID: 580-117256-280**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	80	B	5.5	0.61	ng/g		09/01/22 17:15	09/15/22 17:12	150



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1021**

**Lab Sample ID: 580-117256-281**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	48	B	5.8	0.65	ng/g		09/02/22 14:03	09/15/22 18:02	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1024**

**Lab Sample ID: 580-117256-282**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	52	B	5.6	0.63	ng/g		09/02/22 14:03	09/15/22 18:23	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1025**

**Lab Sample ID: 580-117256-283**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	290	B	5.7	0.64	ng/g		09/02/22 14:03	09/15/22 18:35	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1026**

**Lab Sample ID: 580-117256-284**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	74	B	5.6	0.63	ng/g		09/02/22 14:03	09/15/22 18:39	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1030**

**Lab Sample ID: 580-117256-285**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	37	B	1.9	0.21	ng/g		09/02/22 14:03	09/21/22 20:49	50

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.050	0.035	mg/Kg		09/14/22 11:56	09/19/22 14:49	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1031**

**Lab Sample ID: 580-117256-286**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	27	B	1.9	0.21	ng/g		09/02/22 14:03	09/21/22 20:54	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1033**

**Lab Sample ID: 580-117256-287**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	38	B	2.0	0.22	ng/g		09/02/22 14:03	09/21/22 20:58	50



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1034**

**Lab Sample ID: 580-117256-288**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	40	B	1.9	0.22	ng/g		09/02/22 14:03	09/21/22 21:02	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1035**

**Lab Sample ID: 580-117256-289**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	36	B	1.8	0.20	ng/g		09/02/22 14:03	09/21/22 21:06	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1038**

**Lab Sample ID: 580-117256-290**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	89	B	5.6	0.63	ng/g		09/02/22 14:03	09/15/22 19:12	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1041**

**Lab Sample ID: 580-117256-291**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	89	B	5.6	0.63	ng/g		09/02/22 14:03	09/15/22 19:17	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1043**

**Lab Sample ID: 580-117256-292**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	180	B	5.4	0.61	ng/g		09/02/22 14:03	09/15/22 19:21	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1044**

**Lab Sample ID: 580-117256-293**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	39	B	2.0	0.22	ng/g		09/02/22 14:03	09/21/22 21:10	50

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.034	mg/Kg		09/14/22 11:56	09/19/22 14:55	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1045**

**Lab Sample ID: 580-117256-294**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	58	B	5.5	0.62	ng/g		09/02/22 14:03	09/15/22 19:29	150



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1046**

**Lab Sample ID: 580-117256-295**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	60	B	5.4	0.61	ng/g		09/02/22 14:03	09/15/22 19:33	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1047**

**Lab Sample ID: 580-117256-296**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	76	B	5.5	0.62	ng/g		09/02/22 14:03	09/15/22 19:37	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1049**

**Lab Sample ID: 580-117256-297**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	130	B	5.6	0.63	ng/g		09/02/22 14:03	09/15/22 19:41	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1052**

**Lab Sample ID: 580-117256-298**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	37	B	1.8	0.20	ng/g		09/02/22 14:03	09/21/22 21:14	50

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.034	mg/Kg		09/14/22 11:56	09/19/22 15:02	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1055**

**Lab Sample ID: 580-117256-299**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	490	B	5.9	0.67	ng/g		09/02/22 14:03	09/15/22 19:58	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1055-DUP**

**Lab Sample ID: 580-117256-300**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	460	B	5.5	0.62	ng/g		09/02/22 14:03	09/15/22 20:02	150

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1056**

**Lab Sample ID: 580-117256-301**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	56	B	3.8	0.43	ng/g		09/02/22 16:12	09/19/22 14:01	100



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1058**

**Lab Sample ID: 580-117256-302**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	60	B	3.7	0.42	ng/g		09/02/22 16:12	09/19/22 14:22	100

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1059**

**Lab Sample ID: 580-117256-303**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	62	B	5.7	0.64	ng/g		09/02/22 16:12	09/19/22 16:06	150.001 500015

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1060**

**Lab Sample ID: 580-117256-304**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	54	B	1.9	0.22	ng/g		09/02/22 16:12	09/20/22 19:23	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1061**

**Lab Sample ID: 580-117256-305**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	39	B	1.8	0.21	ng/g		09/02/22 16:12	09/20/22 19:28	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1062**

**Lab Sample ID: 580-117256-306**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	200	B	5.8	0.65	ng/g		09/02/22 16:12	09/19/22 16:19	150.001 500015

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1063**

**Lab Sample ID: 580-117256-307**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	95	B	5.9	0.66	ng/g		09/02/22 16:12	09/19/22 16:23	150.001 500015

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1063-DUP**

**Lab Sample ID: 580-117256-308**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	87	B	6.0	0.67	ng/g		09/02/22 16:12	09/19/22 16:27	150.001 500015



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1064**

**Lab Sample ID: 580-117256-309**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	44	B	1.9	0.21	ng/g		09/02/22 16:12	09/20/22 19:32	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1065**

**Lab Sample ID: 580-117256-310**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	37	B	2.0	0.22	ng/g		09/02/22 16:12	09/20/22 19:36	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1066**

**Lab Sample ID: 580-117256-311**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	34	B	1.9	0.22	ng/g		09/02/22 16:12	09/20/22 19:40	50

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.049	0.034	mg/Kg		09/14/22 11:56	09/19/22 15:08	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1067**

**Lab Sample ID: 580-117256-312**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	68	B	5.7	0.64	ng/g		09/02/22 16:12	09/19/22 16:52	150.001 500015

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1068**

**Lab Sample ID: 580-117256-313**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	32	B	0.76	0.086	ng/g		09/02/22 16:12	09/20/22 19:53	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1069**

**Lab Sample ID: 580-117256-314**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	36	B	0.74	0.083	ng/g		09/02/22 16:12	09/20/22 19:57	20

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1070**

**Lab Sample ID: 580-117256-315**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	140	B	5.9	0.67	ng/g		09/02/22 16:12	09/19/22 17:05	150.001 500015



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1071**

**Lab Sample ID: 580-117256-316**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	250	B	5.9	0.66	ng/g		09/02/22 16:12	09/19/22 17:09	150.001 500015

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1074**

**Lab Sample ID: 580-117256-317**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	47	B	1.9	0.22	ng/g		09/02/22 16:12	09/20/22 20:01	50

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.050	0.035	mg/Kg		09/14/22 11:56	09/19/22 15:47	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1075**

**Lab Sample ID: 580-117256-318**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	44	B	1.9	0.22	ng/g		09/02/22 16:12	09/20/22 20:05	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1076**

**Lab Sample ID: 580-117256-319**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	540	B	5.7	0.64	ng/g		09/02/22 16:12	09/19/22 17:22	150.001 500015

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1077**

**Lab Sample ID: 580-117256-320**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	320	B	6.0	0.67	ng/g		09/02/22 16:12	09/19/22 17:34	150.001 500015

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1078**

**Lab Sample ID: 580-117256-321**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	620	B	7.8	0.88	ng/g		09/02/22 15:30	09/15/22 12:55	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1079**

**Lab Sample ID: 580-117256-322**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	470	B	7.6	0.86	ng/g		09/02/22 15:30	09/15/22 13:00	200



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1081**

**Lab Sample ID: 580-117256-323**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	570	B	7.7	0.87	ng/g		09/02/22 15:30	09/15/22 16:41	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1083**

**Lab Sample ID: 580-117256-324**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	120	B	7.2	0.81	ng/g		09/02/22 15:30	09/15/22 16:46	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1084**

**Lab Sample ID: 580-117256-325**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	77	B	8.0	0.90	ng/g		09/02/22 15:30	09/15/22 16:25	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1085**

**Lab Sample ID: 580-117256-326**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	110	B	7.9	0.89	ng/g		09/02/22 15:30	09/15/22 17:02	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1087**

**Lab Sample ID: 580-117256-327**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	170	B	7.9	0.89	ng/g		09/02/22 15:30	09/15/22 17:07	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1090**

**Lab Sample ID: 580-117256-328**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	51	B	1.8	0.21	ng/g		09/02/22 15:30	09/20/22 19:07	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1091**

**Lab Sample ID: 580-117256-329**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	180	B	7.5	0.85	ng/g		09/02/22 15:30	09/15/22 17:15	200



## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1092**

**Lab Sample ID: 580-117256-330**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	42	B	1.9	0.22	ng/g		09/02/22 15:30	09/20/22 19:11	50

**Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.050	0.035	mg/Kg		09/14/22 11:56	09/19/22 15:54	50

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1093**

**Lab Sample ID: 580-117256-331**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	160	B	7.8	0.87	ng/g		09/02/22 15:30	09/15/22 17:23	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1094**

**Lab Sample ID: 580-117256-332**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	570	B	7.2	0.81	ng/g		09/02/22 15:30	09/15/22 17:27	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1095**

**Lab Sample ID: 580-117256-333**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	210	B	7.1	0.80	ng/g		09/02/22 15:30	09/15/22 17:32	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1096**

**Lab Sample ID: 580-117256-334**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	200	B	7.7	0.87	ng/g		09/02/22 15:30	09/15/22 17:36	200

## Client Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

**Client Sample ID: RANMKT-1097**

**Lab Sample ID: 580-117256-335**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

**Method: 1631B - Mercury, Low Level (CVAFS)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	300	B	7.5	0.85	ng/g		09/02/22 15:30	09/15/22 17:48	200

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: MB 580-402720/1-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402720

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.263	J	0.80	0.090	ng/g		09/01/22 17:15	09/15/22 14:59	20

Lab Sample ID: MB 580-402720/2-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402720

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.280	J	0.80	0.090	ng/g		09/01/22 17:15	09/15/22 15:03	20

Lab Sample ID: MB 580-402720/3-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402720

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.168	J	0.80	0.090	ng/g		09/01/22 17:15	09/15/22 15:08	20

Lab Sample ID: LCS 580-402720/4-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402720

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	417		ng/g		104	75 - 125

Lab Sample ID: LCSD 580-402720/5-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402720

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	424		ng/g		105	75 - 125	2	24

Lab Sample ID: 580-117256-261 MS

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: RANMKT-1001

Prep Type: Total/NA

Prep Batch: 402720

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	110	B	368	441		ng/g		91	71 - 125

Lab Sample ID: 580-117256-261 MSD

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: RANMKT-1001

Prep Type: Total/NA

Prep Batch: 402720

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	110	B	369	442		ng/g		91	71 - 125	0	24

Lab Sample ID: 580-117256-262 MS

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: RANMKT-1001-DUP

Prep Type: Total/NA

Prep Batch: 402720

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	90	B	360	433		ng/g		95	71 - 125

Eurofins Seattle



# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: 580-117256-262 MSD

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: RANMKT-1001-DUP

Prep Type: Total/NA

Prep Batch: 402720

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	90	B	371	444		ng/g		96	71 - 125	3	24

Lab Sample ID: MB 580-402736/1-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402736

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.151	J	0.80	0.090	ng/g		09/02/22 14:03	09/15/22 17:41	20

Lab Sample ID: MB 580-402736/2-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402736

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.306	J	0.80	0.090	ng/g		09/02/22 14:03	09/15/22 17:45	20

Lab Sample ID: MB 580-402736/3-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402736

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.207	J	0.80	0.090	ng/g		09/02/22 14:03	09/15/22 17:49	20

Lab Sample ID: LCS 580-402736/4-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402736

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	362		ng/g		90	75 - 125

Lab Sample ID: LCSD 580-402736/5-A

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402736

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	377		ng/g		94	75 - 125	4	24

Lab Sample ID: 580-117256-281 MS

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: RANMKT-1021

Prep Type: Total/NA

Prep Batch: 402736

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	48	B	366	391		ng/g		94	71 - 125

Lab Sample ID: 580-117256-281 MSD

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: RANMKT-1021

Prep Type: Total/NA

Prep Batch: 402736

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	48	B	375	413		ng/g		97	71 - 125	5	24

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: 580-117256-282 MS

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: RANMKT-1024

Prep Type: Total/NA

Prep Batch: 402736

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	52	B	386	390		ng/g		88	71 - 125

Lab Sample ID: 580-117256-282 MSD

Matrix: Tissue

Analysis Batch: 404109

Client Sample ID: RANMKT-1024

Prep Type: Total/NA

Prep Batch: 402736

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	52	B	379	398		ng/g		91	71 - 125	2	24

Lab Sample ID: MB 580-402831/1-A

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402831

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.169	J	0.80	0.090	ng/g		09/02/22 16:12	09/19/22 12:54	20

Lab Sample ID: MB 580-402831/2-A

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402831

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.108	J	0.80	0.090	ng/g		09/02/22 16:12	09/19/22 12:58	20

Lab Sample ID: MB 580-402831/3-A

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402831

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.80	0.090	ng/g		09/02/22 16:12	09/19/22 13:02	20

Lab Sample ID: LCS 580-402831/4-A

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402831

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	402	384		ng/g		96	75 - 125

Lab Sample ID: LCSD 580-402831/5-A

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402831

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	397		ng/g		99	75 - 125	3	24

Lab Sample ID: 580-117256-301 MS

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: RANMKT-1056

Prep Type: Total/NA

Prep Batch: 402831

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	56	B	359	371		ng/g		88	71 - 125

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: 580-117256-301 MSD

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: RANMKT-1056

Prep Type: Total/NA

Prep Batch: 402831

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	56	B	388	398		ng/g		88	71 - 125	7	24

Lab Sample ID: 580-117256-302 MS

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: RANMKT-1058

Prep Type: Total/NA

Prep Batch: 402831

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Mercury	60	B	387	402		ng/g		88	71 - 125		

Lab Sample ID: 580-117256-302 MSD

Matrix: Tissue

Analysis Batch: 404373

Client Sample ID: RANMKT-1058

Prep Type: Total/NA

Prep Batch: 402831

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	60	B	392	413		ng/g		90	71 - 125	3	24

Lab Sample ID: MB 580-402832/1-A

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402832

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.107	J	0.80	0.090	ng/g		09/02/22 15:30	09/15/22 13:25	20

Lab Sample ID: MB 580-402832/2-A

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402832

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.343	J	0.80	0.090	ng/g		09/02/22 15:30	09/15/22 13:41	20

Lab Sample ID: MB 580-402832/3-A

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 402832

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.173	J	0.80	0.090	ng/g		09/02/22 15:30	09/15/22 13:45	20

Lab Sample ID: LCS 580-402832/4-A

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 402832

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Mercury	402	414		ng/g		103	75 - 125		

Lab Sample ID: LCSD 580-402832/5-A

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 402832

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	402	436		ng/g		108	75 - 125	5	24

Eurofins Seattle

# QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

## Method: 1631B - Mercury, Low Level (CVAFS)

Lab Sample ID: 580-117256-321 MS

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: RANMKT-1078

Prep Type: Total/NA

Prep Batch: 402832

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	620	B	385	960		ng/g		89	71 - 125

Lab Sample ID: 580-117256-321 MSD

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: RANMKT-1078

Prep Type: Total/NA

Prep Batch: 402832

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	620	B	375	926		ng/g		83	71 - 125	4	24

Lab Sample ID: 580-117256-322 MS

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: RANMKT-1079

Prep Type: Total/NA

Prep Batch: 402832

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	470	B	383	898		ng/g		111	71 - 125

Lab Sample ID: 580-117256-322 MSD

Matrix: Tissue

Analysis Batch: 404098

Client Sample ID: RANMKT-1079

Prep Type: Total/NA

Prep Batch: 402832

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Mercury	470	B	382	834		ng/g		94	71 - 125	7	24

## Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS

Lab Sample ID: MB 580-403815/1-A

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 403815

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.010	0.0070	mg/Kg		09/14/22 11:56	09/15/22 12:08	10

Lab Sample ID: MB 580-403815/2-A

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 403815

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Inorganic Arsenic	ND		0.010	0.0070	mg/Kg		09/14/22 11:56	09/15/22 12:14	10

Lab Sample ID: LCS 580-403815/3-A

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 403815

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Inorganic Arsenic	0.100	0.0970		mg/Kg		97	50 - 150

Eurofins Seattle

## QC Sample Results

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

### Method: 1632 - Arsenic Speciation by Hydride- Generation Cryo-Trapping GC-AAS (Continued)

Lab Sample ID: LCSD 580-403815/4-A

Matrix: Tissue

Analysis Batch: 404111

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 403815

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Inorganic Arsenic	0.100	0.102		mg/Kg		102	50 - 150	5	35

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1001**

**Lab Sample ID: 580-117256-261**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 15:20

**Client Sample ID: RANMKT-1001-DUP**

**Lab Sample ID: 580-117256-262**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 15:33

**Client Sample ID: RANMKT-1003**

**Lab Sample ID: 580-117256-263**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 15:53

**Client Sample ID: RANMKT-1005**

**Lab Sample ID: 580-117256-264**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 15:57

**Client Sample ID: RANMKT-1005-DUP**

**Lab Sample ID: 580-117256-265**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:02

**Client Sample ID: RANMKT-1006**

**Lab Sample ID: 580-117256-266**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:06

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1007**

**Lab Sample ID: 580-117256-267**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:10

**Client Sample ID: RANMKT-1008**

**Lab Sample ID: 580-117256-268**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:14
Total/NA	Prep	1632			403815	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 14:35

**Client Sample ID: RANMKT-1009**

**Lab Sample ID: 580-117256-269**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:18

**Client Sample ID: RANMKT-1010**

**Lab Sample ID: 580-117256-270**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:22

**Client Sample ID: RANMKT-1011**

**Lab Sample ID: 580-117256-271**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:26

**Client Sample ID: RANMKT-1012**

**Lab Sample ID: 580-117256-272**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:39

Eurofins Seattle



# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1013**

**Lab Sample ID: 580-117256-273**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:43

**Client Sample ID: RANMKT-1014**

**Lab Sample ID: 580-117256-274**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:47

**Client Sample ID: RANMKT-1015**

**Lab Sample ID: 580-117256-275**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:51

**Client Sample ID: RANMKT-1016**

**Lab Sample ID: 580-117256-276**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 16:56

**Client Sample ID: RANMKT-1017**

**Lab Sample ID: 580-117256-277**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 17:00

**Client Sample ID: RANMKT-1018**

**Lab Sample ID: 580-117256-278**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 17:04
Total/NA	Prep	1632			403815	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 14:42

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1019**

**Lab Sample ID: 580-117256-279**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		50	404638	COW	EET SEA	09/21/22 20:45

**Client Sample ID: RANMKT-1020**

**Lab Sample ID: 580-117256-280**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402720	V1R	EET SEA	09/01/22 17:15
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 17:12

**Client Sample ID: RANMKT-1021**

**Lab Sample ID: 580-117256-281**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 18:02

**Client Sample ID: RANMKT-1024**

**Lab Sample ID: 580-117256-282**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 18:23

**Client Sample ID: RANMKT-1025**

**Lab Sample ID: 580-117256-283**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 18:35

**Client Sample ID: RANMKT-1026**

**Lab Sample ID: 580-117256-284**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 18:39

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1030**

**Lab Sample ID: 580-117256-285**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		50	404638	COW	EET SEA	09/21/22 20:49
Total/NA	Prep	1632			403815	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 14:49

**Client Sample ID: RANMKT-1031**

**Lab Sample ID: 580-117256-286**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		50	404638	COW	EET SEA	09/21/22 20:54

**Client Sample ID: RANMKT-1033**

**Lab Sample ID: 580-117256-287**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		50	404638	COW	EET SEA	09/21/22 20:58

**Client Sample ID: RANMKT-1034**

**Lab Sample ID: 580-117256-288**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		50	404638	COW	EET SEA	09/21/22 21:02

**Client Sample ID: RANMKT-1035**

**Lab Sample ID: 580-117256-289**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		50	404638	COW	EET SEA	09/21/22 21:06

**Client Sample ID: RANMKT-1038**

**Lab Sample ID: 580-117256-290**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 19:12

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1041**

**Lab Sample ID: 580-117256-291**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 19:17

**Client Sample ID: RANMKT-1043**

**Lab Sample ID: 580-117256-292**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 19:21

**Client Sample ID: RANMKT-1044**

**Lab Sample ID: 580-117256-293**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		50	404638	COW	EET SEA	09/21/22 21:10
Total/NA	Prep	1632			403815	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 14:55

**Client Sample ID: RANMKT-1045**

**Lab Sample ID: 580-117256-294**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 19:29

**Client Sample ID: RANMKT-1046**

**Lab Sample ID: 580-117256-295**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 19:33

**Client Sample ID: RANMKT-1047**

**Lab Sample ID: 580-117256-296**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 19:37

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

## Client Sample ID: RANMKT-1049

Lab Sample ID: 580-117256-297

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 19:41

## Client Sample ID: RANMKT-1052

Lab Sample ID: 580-117256-298

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		50	404638	COW	EET SEA	09/21/22 21:14
Total/NA	Prep	1632			403815	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 15:02

## Client Sample ID: RANMKT-1055

Lab Sample ID: 580-117256-299

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 19:58

## Client Sample ID: RANMKT-1055-DUP

Lab Sample ID: 580-117256-300

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402736	V1R	EET SEA	09/02/22 14:03
Total/NA	Analysis	1631B		150	404109	AJR	EET SEA	09/15/22 20:02

## Client Sample ID: RANMKT-1056

Lab Sample ID: 580-117256-301

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		100	404373	COW	EET SEA	09/19/22 14:01

## Client Sample ID: RANMKT-1058

Lab Sample ID: 580-117256-302

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		100	404373	COW	EET SEA	09/19/22 14:22

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1059**

**Lab Sample ID: 580-117256-303**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 16:06

**Client Sample ID: RANMKT-1060**

**Lab Sample ID: 580-117256-304**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 19:23

**Client Sample ID: RANMKT-1061**

**Lab Sample ID: 580-117256-305**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 19:28

**Client Sample ID: RANMKT-1062**

**Lab Sample ID: 580-117256-306**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 16:19

**Client Sample ID: RANMKT-1063**

**Lab Sample ID: 580-117256-307**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 16:23

**Client Sample ID: RANMKT-1063-DUP**

**Lab Sample ID: 580-117256-308**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 16:27

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1064**

**Lab Sample ID: 580-117256-309**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 19:32

**Client Sample ID: RANMKT-1065**

**Lab Sample ID: 580-117256-310**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 19:36

**Client Sample ID: RANMKT-1066**

**Lab Sample ID: 580-117256-311**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 19:40
Total/NA	Prep	1632			403815	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 15:08

**Client Sample ID: RANMKT-1067**

**Lab Sample ID: 580-117256-312**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 16:52

**Client Sample ID: RANMKT-1068**

**Lab Sample ID: 580-117256-313**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		20	404493	COW	EET SEA	09/20/22 19:53

**Client Sample ID: RANMKT-1069**

**Lab Sample ID: 580-117256-314**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		20	404493	COW	EET SEA	09/20/22 19:57

Eurofins Seattle



# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1070**

**Lab Sample ID: 580-117256-315**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 17:05

**Client Sample ID: RANMKT-1071**

**Lab Sample ID: 580-117256-316**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 17:09

**Client Sample ID: RANMKT-1074**

**Lab Sample ID: 580-117256-317**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 20:01
Total/NA	Prep	1632			403815	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 15:47

**Client Sample ID: RANMKT-1075**

**Lab Sample ID: 580-117256-318**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 20:05

**Client Sample ID: RANMKT-1076**

**Lab Sample ID: 580-117256-319**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 17:22

**Client Sample ID: RANMKT-1077**

**Lab Sample ID: 580-117256-320**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402831	M1R	EET SEA	09/02/22 16:12
Total/NA	Analysis	1631B		150.001 500015	404373	COW	EET SEA	09/19/22 17:34

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1078**

**Lab Sample ID: 580-117256-321**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 12:55

**Client Sample ID: RANMKT-1079**

**Lab Sample ID: 580-117256-322**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 13:00

**Client Sample ID: RANMKT-1081**

**Lab Sample ID: 580-117256-323**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 16:41

**Client Sample ID: RANMKT-1083**

**Lab Sample ID: 580-117256-324**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 16:46

**Client Sample ID: RANMKT-1084**

**Lab Sample ID: 580-117256-325**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 16:25

**Client Sample ID: RANMKT-1085**

**Lab Sample ID: 580-117256-326**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 17:02

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1087**

**Lab Sample ID: 580-117256-327**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 17:07

**Client Sample ID: RANMKT-1090**

**Lab Sample ID: 580-117256-328**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 19:07

**Client Sample ID: RANMKT-1091**

**Lab Sample ID: 580-117256-329**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 17:15

**Client Sample ID: RANMKT-1092**

**Lab Sample ID: 580-117256-330**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		50	404493	COW	EET SEA	09/20/22 19:11
Total/NA	Prep	1632			403815	D1C	EET SEA	09/14/22 11:56
Total/NA	Analysis	1632		50	404445	D1C	EET SEA	09/19/22 15:54

**Client Sample ID: RANMKT-1093**

**Lab Sample ID: 580-117256-331**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 17:23

**Client Sample ID: RANMKT-1094**

**Lab Sample ID: 580-117256-332**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 17:27

Eurofins Seattle

# Lab Chronicle

Client: Tetra Tech, Inc.  
Project/Site: Gulf of Thailand - Project RANMKT

Job ID: 580-117256-3

**Client Sample ID: RANMKT-1095**

**Lab Sample ID: 580-117256-333**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 17:32

**Client Sample ID: RANMKT-1096**

**Lab Sample ID: 580-117256-334**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 17:36

**Client Sample ID: RANMKT-1097**

**Lab Sample ID: 580-117256-335**

Date Collected: 08/11/22 00:00

Matrix: Tissue

Date Received: 08/24/22 14:59

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	70:30 Acid Prep			402832	M1R	EET SEA	09/02/22 15:30
Total/NA	Analysis	1631B		200	404098	COW	EET SEA	09/15/22 17:48

## Laboratory References:

EET SEA = Eurofins Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

## Laboratory: Eurofins Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-004	02-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
ANAB	Dept. of Defense ELAP	L2236	01-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic
ANAB	Dept. of Energy	L2236	01-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic
ANAB	ISO/IEC 17025	L2236	01-19-25
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic
California	State	2954	07-07-22 *
Florida	NELAP	E87575	06-30-23
Louisiana	NELAP	03073	06-30-23
Maine	State	WA01273	05-02-24
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
Montana (UST)	State	NA	04-14-27
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
New Jersey	NELAP	WA014	06-30-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
New York	NELAP	11662	04-01-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte

\* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Seattle

# Accreditation/Certification Summary

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

## Laboratory: Eurofins Seattle (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
Oregon	NELAP	4167	07-08-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic
US Fish & Wildlife	US Federal Programs	A20571	06-30-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
USDA	US Federal Programs	P330-20-00031	02-10-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
Washington	State	C788	07-13-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1631B	70:30 Acid Prep	Tissue	Mercury
1632	1632	Tissue	Inorganic Arsenic
Wisconsin	State	399133460	08-31-23
The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.			
Analysis Method	Prep Method	Matrix	Analyte
1632	1632	Tissue	Inorganic Arsenic

## Sample Summary

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-117256-261	RANMKT-1001	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-262	RANMKT-1001-DUP	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-263	RANMKT-1003	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-264	RANMKT-1005	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-265	RANMKT-1005-DUP	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-266	RANMKT-1006	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-267	RANMKT-1007	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-268	RANMKT-1008	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-269	RANMKT-1009	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-270	RANMKT-1010	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-271	RANMKT-1011	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-272	RANMKT-1012	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-273	RANMKT-1013	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-274	RANMKT-1014	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-275	RANMKT-1015	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-276	RANMKT-1016	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-277	RANMKT-1017	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-278	RANMKT-1018	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-279	RANMKT-1019	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-280	RANMKT-1020	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-281	RANMKT-1021	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-282	RANMKT-1024	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-283	RANMKT-1025	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-284	RANMKT-1026	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-285	RANMKT-1030	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-286	RANMKT-1031	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-287	RANMKT-1033	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-288	RANMKT-1034	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-289	RANMKT-1035	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-290	RANMKT-1038	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-291	RANMKT-1041	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-292	RANMKT-1043	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-293	RANMKT-1044	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-294	RANMKT-1045	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-295	RANMKT-1046	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-296	RANMKT-1047	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-297	RANMKT-1049	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-298	RANMKT-1052	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-299	RANMKT-1055	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-300	RANMKT-1055-DUP	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-301	RANMKT-1056	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-302	RANMKT-1058	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-303	RANMKT-1059	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-304	RANMKT-1060	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-305	RANMKT-1061	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-306	RANMKT-1062	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-307	RANMKT-1063	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-308	RANMKT-1063-DUP	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-309	RANMKT-1064	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-310	RANMKT-1065	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-311	RANMKT-1066	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-312	RANMKT-1067	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-313	RANMKT-1068	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-314	RANMKT-1069	Tissue	08/11/22 00:00	08/24/22 14:59



## Sample Summary

Client: Tetra Tech, Inc.

Job ID: 580-117256-3

Project/Site: Gulf of Thailand - Project RANMKT

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-117256-315	RANMKT-1070	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-316	RANMKT-1071	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-317	RANMKT-1074	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-318	RANMKT-1075	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-319	RANMKT-1076	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-320	RANMKT-1077	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-321	RANMKT-1078	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-322	RANMKT-1079	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-323	RANMKT-1081	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-324	RANMKT-1083	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-325	RANMKT-1084	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-326	RANMKT-1085	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-327	RANMKT-1087	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-328	RANMKT-1090	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-329	RANMKT-1091	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-330	RANMKT-1092	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-331	RANMKT-1093	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-332	RANMKT-1094	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-333	RANMKT-1095	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-334	RANMKT-1096	Tissue	08/11/22 00:00	08/24/22 14:59
580-117256-335	RANMKT-1097	Tissue	08/11/22 00:00	08/24/22 14:59

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

3697 Mt.

ted.



580-117256 Chain of Custody

## General Notes:

Please report results separately for each Project ID  
Please report all results to the MDL. J-flag results between MDL and RL  
Please report results in PDF format with Excel EDD deliverable  
Please INVOICE separately for each Project ID

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.01	BEFSO-1002	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1003	3-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEFSO-1005	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1021	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1022	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1026	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1027	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1030	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1033	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1033-DUP	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1043	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1045	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1046	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1047	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1048	3-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEFSO-1049	3-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEFSO-1051	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1052	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1063	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1055	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1057	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1058	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1060	3-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEFSO-1061	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1062	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1082	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1083	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1084	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1085	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1086	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1087	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1085	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1096	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1101	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1102	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1104	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1105	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEFSO-1105-DUP	3-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1142	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1142-DUP	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1143	13-Jul-2022	FISH TISSUE	FROZEN	1	

Relinquished by:

Patipham P.

Relinquished by:

Received by:

15-08-22  
D. V. Miller  
8/25/22 9:30

Received by:

-44.9 D-32 -44.0  
SD 4513  
7777 4513 9600

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.01	BEPP-1144	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1145	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1146	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1147	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1148	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1150	13-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEPP-1150-DUP	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1151	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1152	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1154	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1155	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1157	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1241	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1242	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1244	13-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEPP-1245	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1247	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1261	13-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEPP-1263	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1266	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1267	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1268	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1281	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1283	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1284	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1285	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1286	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1287	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1289	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1302	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1303	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1321	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1322	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1324	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1325	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEPP-1329	13-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1121	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1123	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1123-DUP	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1124	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1164	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1167	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1341	17-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEWK-1342	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1343	17-Jul-2022	FISH TISSUE	FROZEN	1	

Relinquished by: Patipham P.

Relinquished by:

Received by:   
15-08-22  
8/25/22 5:30

Received by:

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.01	BEWK-1344	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1345	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1349	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1361	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1363	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1364	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BEWK-1368	17-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BEWK-1383	17-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1181	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1182	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1184	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1185	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1185-DUP	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1186	8-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BNWL-1187	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1189	8-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BNWL-1190	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1191	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1193	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1196	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1197	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1198	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1199	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1200	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1201	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1202	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1203	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1204	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1222	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1223	8-Jul-2022	FISH TISSUE	FROZEN	1	1
T423.01	BNWL-1224	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1225	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1226	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1229	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.01	BNWL-1230	8-Jul-2022	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1301	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1301-DUP	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1302	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1303	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1304	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1321	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1321-DUP	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1322	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1323	27-Jul-22	FISH TISSUE	FROZEN	1	

Relinquished by: *Patipham P.*

Relinquished by:

Received by:

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*15-08-22*  
*8/25/22 9:30*

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ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.10	MGWA-1325	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1341	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1361	27-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	MGWA-1362	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1363	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1364	27-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	MGWA-1383	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1384	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1401	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1403	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1404	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1405	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1406	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	MGWA-1408	27-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1001	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1001-DUP	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1002	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1003	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1004	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1021	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1022	1-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	NPCPP-1023	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1024	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1026	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1029	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1029-DUP	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1041	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1042	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1043	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1044	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1045	1-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	NPCPP-1046	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1047	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1048	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1050	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1061	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1062	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1063	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1064	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1065	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1081	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1083	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1102	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1103	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1104	1-Jun-22	FISH TISSUE	FROZEN	1	1

Relinquished by: Patiphan P.

Relinquished by:

Received by:   
15-08-22  
8/26/22

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PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-1 (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.10	NPCPP-1105	1-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	NPCPP-1106	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1107	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1108	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1109	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1111	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1112	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1113	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1121	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPCPP-1122	1-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1426	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1426-DUP	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1441	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1442	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1443	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1444	31-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	NPWB-1445	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1446	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1448	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1448-DUP	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1449	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1450	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1451	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1453	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1455	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1461	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1462	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1470	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1471	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1472	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1473	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1477	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1481	31-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	NPWB-1482	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1485	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1486	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1501	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1503	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1504	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1516	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1516-DUP	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	NPWB-1521	31-Jul-22	FISH TISSUE	FROZEN	1	1
T423.10	NPWB-1525	31-Jul-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1281	8-Jun-22	FISH TISSUE	FROZEN	1	

Relinquished by: *Patiphan P.*

Relinquished by:

Received by: *8/25/22 9:30*

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Dr. Ted Donn  
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PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
T423.10	PACPP-1282	8-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PACPP-1282-DUP	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1283	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1284	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1285	8-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PACPP-1286	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1287	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1288	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1289	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PACPP-1290	8-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1141	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1142	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1142-DUP	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1144	7-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PAWE-1145	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1146	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1155	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1157	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1158	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1185	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1187	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1189	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1190	7-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PAWE-1192	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1200	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1203	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1204	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1205	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1221	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1222	7-Jun-22	FISH TISSUE	FROZEN	1	1
T423.10	PAWE-1222-DUP	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1224	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1227	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1229	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1241	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1242	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1243	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1244	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1262	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1264	7-Jun-22	FISH TISSUE	FROZEN	1	
T423.10	PAWE-1266	7-Jun-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1001	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1001-DUP	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1003	11-Aug-22	FISH TISSUE	FROZEN	1	

Relinquished by: **Patiphan P.**

Relinquished by:

Received by: **15-08-22**

Received by:

*Signature*  
8/25/22 9:30



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RANMKT	RANMKT-1006	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1005-DUP	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1006	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1007	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1008	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1009	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1010	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1011	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1012	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1013	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1014	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1015	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1016	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1017	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1018	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1019	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1020	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1021	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1024	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1025	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1026	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1030	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1031	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1033	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1034	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1035	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1038	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1041	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1043	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1044	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1045	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1046	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1047	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1049	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1052	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1055	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1055-DUP	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1056	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1058	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1059	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1060	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1061	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1062	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1063	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1063-DUP	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1064	11-Aug-22	FISH TISSUE	FROZEN	1	

Relinquished by: *Patiphan P.*

Relinquished by:

Received by:

*15-08-22*  
*8/25/22 4:30*

Received by:

# CHAIN OF CUSTODY

Ship to:  
Patrick Garcia-Strickland  
Eurofins - Frontier Global Sci.  
5755 8th St. E  
Fife, WA 98424  
USA

Report to:  
Dr. Ted Donn  
Tetra Tech  
3697 Mt. Diablo Blvd., Ste. 150  
Lafayette, CA  
ted.donn@tetratech.com

PROJECT	SampleID	DATE	MEDIUM	PRESERVATION	Hg-t (Tissue, EPA 1631B)	Total Inorganic Arsenic (Tissue, EPA 1632)
RANMKT	RANMKT-1065	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1066	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1067	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1068	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1069	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1070	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1071	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1074	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1075	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1076	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1077	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1078	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1079	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1081	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1083	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1084	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1085	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1087	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1090	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1091	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1092	11-Aug-22	FISH TISSUE	FROZEN	1	1
RANMKT	RANMKT-1093	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1094	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1095	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1096	11-Aug-22	FISH TISSUE	FROZEN	1	
RANMKT	RANMKT-1097	11-Aug-22	FISH TISSUE	FROZEN	1	

Relinquished by: *Patiphan P.*

Relinquished by:

Received by: *[Signature]*  
*8/25/22 9:30*

Received by:

## Login Sample Receipt Checklist

Client: Tetra Tech, Inc.

Job Number: 580-117256-3

**Login Number: 117256**

**List Source: Eurofins Seattle**

**List Number: 1**

**Creator: LaCount, Lilly-Anna E**

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	N/A	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

**ภาคผนวก 27**

**บันทึกการประเมินการปฏิบัติงานของเรือที่ใช้ในโครงการฯ (SUPO)**



# Chevron Upstream (CU) Upstream Marine Standard OVID Supplement R14

# SUPO

SUPO INSPECTION DATE	17 <sup>th</sup> August 2022	OVID DETAILS	
VESSEL NAME	UNITHAI SAMUI	LAST OVIQ INSPECTION DATE	21 <sup>st</sup> September 2021
INSPECTORS NAME	Capt. Nopporn Khempongphun	LAST OVIQ PORT OF INSPECTION	Songkhla, Thailand
MASTERS NAME	Capt.Sophon Chantarakul	LAST OVIQ INSPECTION COMMISSIONING COMPANY	Chevron
PORT OF INSPECTION	Sattahip, Thailand	DATE OF OVPQ LAST UPDATED	17 <sup>th</sup> August 2022

<b>Risk Management</b>	Annual OVIQ Supplement	X	Pre-Mobilization OVIQ Supplement	
<b>Processes or tasks undertaken</b> <i>Inspector to tick any applicable activity undertaken during inspection visit</i>	Promote / conduct BBS training or observation		Random Fuel Check	
	Safety Equipment Condition Observations	X	JSA and / or PTW	X
	OE & tenets of operation or Stop Work Authority		II&R Investigation	
	Toolbox talks or pre-Ops or regular Safety Meeting		Masters Briefing or Crew training	
	Follow Up / Confirm Close Out of CARs / OVIS	X	Overall Vessel Random inspection	X
	Marine Expert engagement visit		Management engagement visit	

<b>Vessel Particulars (complete all sections for all scope vessels)</b>			
Maximum transit speed	13.0 knots.	Fuel consumption. @ Maximum Transit speed (m3/24 hrs)	22.0 MT.
Economical transit speed	7.0 knots.	Fuel consumption. @ economic Transit speed (m3/24 hrs)	7.50 MT.
Fuel consumption @ DP operations moderate met conditions (m3/24 hrs)	N/A	Fuel consumption. @ Port stand-by (m3/24 hrs) Port standby	1.20 MT.
Certified Bollard Pull (if applicable)	Sustained. Ahead 77.61t / Astern 72.12t. Max. Ahead 80.90t / Astern 73.97t.	Date & place of last dry dock	New build/Delivery 27 Sept 2018.

<b>Anchor Handling (AHTS) Vessels ONLY</b>			
Sharks jaws or Karm forks fitted Yes/No?	Yes – 1 Set Shark Jaw	<i>Note: Pelican hooks NOT permitted under any circumstances No towing hooks and soft line towing permitted</i>	
Length of tow wire: (m)	Bow 54mm x 320m. Stern 54mm x 1,000m.	Tow wire acceptable condition?	Yes
Length of spare tow wire: (m)	54mm x 500m.	Spare tow wire acceptable condition and terminated?	Yes
Length of work wire: (m)	54mm x 250m.	Work wire acceptable condition? Certification in order?	Yes
Tow pin SWL: (MT)	200t.	Stern roller SWL and condition	424t / Good condition
Karm Forks in good order?	N/A	Sharks jaws in good order?	Yes
Winches MUST be fitted with Tension Meters Confirm (Y/N)	Yes	All wires fitted with Pee-Wee sockets – Confirm (Y/N)	Yes (Gold nose socket)

<b>Standards</b> Marine Safety, Reliability & Efficiency (MSRE) Standards Applicable. CUG Upstream Marine Standard (V3.0) U&G Approved: 14/11/12 MSRE Standardized OE Process Ref 1.4.4, 1.4.5 Competency Management Table 1 Ref. 2.1.2 Marine Vessel Inspections Periodically issued CUG (Global) CUG Marine Notices for Upstream Marine Standard execution & management policies
<b>Application</b> This Supplement shall be completed by a CVX inspector a Supplement to the standard OVID Annual Inspection for in-scope vessels & units. All applicable vessels/units are required to hold a valid Annual OVIQ & SUPO. This checklist provides assurance against specific Marine requirements contained within the Chevron Upstream Marine Standard. This checklist includes the latest developments in standards. <b>Inspection Note:</b> Inspectors must complete Pages 1 and 2 initially. If any Negative findings in TABLES1 OR 2 (Hard Stops) are observed, vessel is not permitted to Operate. Inspectors should contact the SBU Marine Expert in any instances of Hard Stops.

**SUPO TABLE 1 CUG Hard-Stop Marine requirements** (Section to be completed for All Vessels of any size)

ITEM	YES	NO
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# Chevron Upstream (CU) Upstream Marine Standard OVID Supplement R14

# SUPO

Certificate of Registry or Certificate of Survey	Y	
Safe Manning Certificate or Certificate Annual Survey	Y	
Certificate of Class	Y	
OVID. All Vessels <i>working to offshore locations</i> (>1NM from shore) shall be required to hold a valid Annual OVIQ inspection lodged in the OVID system	Y	
SMS - All Vessels <i>working to offshore locations</i> (>1NM from shore) shall be required to hold a functionally appropriate SMS. The Safety management system shall be equivalent in scope to ISM Code (International Management Code for the Safe Operation of Ships and for Pollution Prevention) and suitable for size of vessel.	Y	
Crew Certificates (may be included in Survey Certificate)	Y	
SRC Safety Radio Certificate (for vessels >300 GT only)	Y	
Approved plans - GA. Must reflect current fit/design of vessel	Y	
Approved plans - LSA-FFA Plan. Must reflect current fit/design of vessel	Y	
Inspector to verify Master holds CUG Upstream Marine Standard and ALL in-force Marine Notices on bridge (Applicable to vessels already on-hire or have been on-hire. NOT Hard stop for vessels new to Chevron)	Y	

**SUPO TABLE 2 CUG Hard-Stop Marine requirements** (In addition to TABLE 1, TABLE 2 to be completed for ALL Vessels >500 GT)

ITEM	YES	NO
SMS (Safety Management Certificate)	Y	
DOC (Document of Compliance)	Y	
Load Line Certificate	Y	
SCC Safety Construction Certificate (for vessels >500 GT only)	Y	
SEC Safety Equipment Certificate	Y	
SRC Safety Radio Certificate	Y	
IOPP Cert	Y	
IAPP Cert (vessels >400 GT)	Y	
ISPS Cert	Y	
Safe Manning Certificate	Y	
Port health certificate	Y	
First Aid / Medicine Chest certification and validity	Y	
Is there a qualified medic on board and do they have sufficient equipment and facilities for the intended POB	N/A	
Approved tank calibration tables and approved stability information booklet (must be Class/Flag approved)	Y	
Vessel holds checks of all navigational equipment and holds a critical equipment inventory list	Y	
Fire extinguishers and fixed firefighting systems certificates	Y	
EPIRB Cert or in date stamp on unit	Y	
SART Cert or in date stamp on unit	Y	
Life Rafts Servicing Certificates	Y	
FRC Certification, maintenance, training and launching and recovery arrangements (Rescue boat was fitted)	Y	
Marine crew STCW Certificates (all vessels) & all DP operational personnel certification (See DP items)	Y	
Instruction Manuals and evidence of procedures of all key equipment	Y	
Functional PMS Planned Maintenance System in operation & verified including engine room PMS records	Y	
Valid Insurance Cover Certificates P&I and H&M & Employers Liability Insurance Cover	Y	
Physical Check of close-out items from all previous inspections (OVIQ and/or SUPO / RDM inspections)	Y	
Is the vessel >20 years of age (hull age, <u>not</u> rebuilt year/age)? If YES, does the Master hold a Chevron SBU approved vessel specific integrity assessment which is produced within the last 12 months (Annually)?	N/A	
Special Purpose Ship Certification (SPS) for Offshore Support Vessels carrying Special Purpose Crew e.g. DSVs, Offshore Construction Vessels. If no SPS, then Dispensation Notification issued by Flag state	N/A	
International Energy Efficiency Certificate (IEEC) and Shipboard Energy Efficiency Management Plan (SEEMP) (for vessels>400GRT)	Y	
Drills for Enclosed Space Entry as per new SOLAS requirements-(Drills-minimum once every 2 months)-IMO A (1051(27)	Y	
Plans and procedures for the recovery of persons from the water as per requirements of MSC.1/Circ.1447	Y	
Wreck Removal Liability Insurance Certificate (WRC).	Y	
Maritime Labour Certificate (MLC 2006) and Document of Maritime Labour Compliance	Y	
Written Black-Out Procedure- Start-up Instructions of Critical Equipment following power black-out	Y	
No Conditions of Class in Class Survey Status Report		No

**SUPO TABLE 1 & TABLE 2 Application Note:** The above requirements must be checked at the beginning of any marine inspection. Inspectors shall use the Section applicable for the size of vessel being inspected ONLY. Any failure (NO) in the above shall mean halt of operations/rejection and/or SWA. No vessel shall be acceptable where basic trading, flag or port state safety certification is deficient. All items shall be confirmed YES, prior to ANY Operations.

## S1.1 Transfer of Fuel Oil and Hazardous Liquids / Waste Management Plan

Comments:



1. Floatation collars "Jacket Type" X 10 sets were provided on board.
2. All fuel transfer hose complied with MSN 013.
3. All wastes properly segregated and disposed.
4. MSDS datasheet for last bunker fuel supply as per SOLAS Annex VI was available on board.
5. The Realtime Main Engine Flow meter and Generator were installed on board. Installed on 29/10/2018.
6. Flow meter for main engine consumption was installed on board.
7. Last fuel transfer flow meter was calibrated on 07/08/2017.
8. TODO tank unit and TODO hose unit certificate were available on board.
9. Breakaway coupling was available on board. (With original bolt & nuts)
10. Hose size 2" (25m+25m+25m), Last pressure test was conducted on 05/06/2022. However, some section getting poor and began to see deterioration. Recommended to be inspect prior to use.
11. Several chemical drums and grease oil drums were not stored in proper area.

Does the vessel have quick dry disconnect fittings (i.e., TODO fittings) for use in hazardous liquid transfers? If not, what types of fittings are used?

Appropriate fittings are used for hazardous liquid transfers over water?

Inspector to ask for MSDS Datasheet for last bunker fuel supply as per SOLAS Annex VI

Are there adequate labelling systems for all the chemicals used on board?

Are all hoses fitted with sufficient floatation collars as per Chevron Upstream Marine Standard 9.3?

Ensure all bulk hoses are supplied and make use of self-sealing couplings for pollutants

Ensure that all hoses have breakaway (weak link) couplings for pollutants and use them when the unmoored vessel is engaged in bulk liquid transfer to or from an installation. An example of an acceptable system is the IMO Hose Management System which along with other reference material is available through the SBU Marine Expert

Are any CUG or SBU Marine Notices relating to hose transfer operations held aboard the vessel bridge? Inspector to positively verify

Are all wastes properly segregated and disposed?

Fuel flow meters for supply/transfer and engine consumption fitted and calibrated annually

## S1.2 Safety Management / Personal Protective Equipment

Comments:

1. There were 3(three) SSE on board (Tr. Second Officer, Tr. Second Engineer and AB), Mentor plan was in placed.
2. The Lifting ring (long link) for rescue boat with hand holds attached to prevent hand injury.
3. Rotating machineries in engine room were fitted with adequate guards.
4. Crew were aware of new safety programs such as Start Work Checks, Error Traps/Am I Ready.
5. BBS system in operation and being used by all personnel.
6. Stop work had been implemented on board.
7. Proper & adequate Personal Protective Equipment provided for all crew members & few reserves for replacement & visitors.

Have all crew received an SBU specific Chevron Safety Orientation, OE and SWA familiarization?

Are Behaviour Based Safety observations recorded and feedback provided? Note on board BBS system in use

Is the Behaviour Based Safety process actively led by Supervisors?

Is there evidence of knowledge of Stop Work Authority on board? Ensure awareness of the ethos.

When was the last date Stop Work Authority used and re-enforced by Supervisors?

Is all rotating machinery as installed fitted with adequate guards?

Are proper & adequate Personal Protective Equipment provided for all crew members & few reserves for replacement & visitors?





### S1.3 Hazard Identification / Standards of management & Culture

Comments:

1. JSA's completed prior to work.
2. PTW includes SWA statement.
3. Permits to Work completed when required.
4. An incident report (lesson learnt) with particularly root cause analysis available to inspection and reviewed.
5. The accident/incident investigation (II&R) OE Process was understood by Master and crew.
6. Health Environment and Safety (HES) Bridging Document between CTEP and UWO/MEO was available on board.

Is the Master holding a work or chart specific bridging document which clearly explains which operating Standards are in place and effectively clarifies marine interface and Standards between all stakeholders (SBU, Operator and subcontractor(s)) with personnel active aboard the vessel?

JSA is completed before start of any work?

Did the whole crew participate in filling out the JSA and sign off?

New JSA filled out when a change occurred (weather, people, work tasks)?

Task steps written out (not pre-filled in) to perform the job? Include site specific considerations? Procedure use?

Hazards identified and addressed & evidence all POB observed following the written steps or procedures?

Are all crew and subcontractors aboard aware of the "Stop Work Authority" principles?

Has the last 12 months accident incident statistics, particularly root cause analysis available to Inspector and reviewed? Note: The OVID should give a clear indication of the adequacy of the systems and implementation on board.

Is the accident/incident investigation (II&R) OE Process understood by Master and all crew.

Are the procedures for isolations followed?

### S1.4 Safety management & crew involvement

Comments:

1. Safety induction had been conducted at shore prior joining vessel for all personnel.
2. Chief Officer elected as Safety Officer.
3. Chevron Marine Notices were available on board.
4. The Emergency Response Plan relates to the risks relevant to the vessel's operations.
5. Vessel Crew Marine, Passengers. Shore side Contractors and Visitors receive Safety Induction /Familiarisation Briefing.

If the vessel has more than 5 workers are safety reps elected? And if safety reps are elected, do they hold regular safety committee meetings Does the vessel have a copy of the CUG Upstream Marine Standard and any in-force CUG or SBU Marine Notices aboard?

CUG Upstream Marine Standard Requirements are:

6-15 Crew 1 elected by officers & ratings together.

16+ Crew 1 elected by officer, 1 by ratings.

>30 ratings 1 elected by officers + 3 elected by rating, from deck, engine room & catering.

COSWP 3.6.2 It is desirable that there should be a safety committee on every ship with more than five workers

Is there a Safety Induction System in place?

Does the Emergency Response Plan relate to the risks relevant to the vessel's operations?

### S1.5 Mooring system design review & Safety re-enforcement

Comments:

1. Mooring ropes appear in good condition.
2. Snap back zones are clearly marked.
3. Hazardous zones and trip areas clearly marked.
4. Bollards indicate SWL. Snap Back areas highlighted in way of mooring bits,
5. Checked and maintenance of equipment/ mooring ropes recorded in planned maintenance system.
6. Two (4) Intrinsically safe VHF's were provided for emergency on board.

Marine Inspector shall undertake a review of the mooring arrangements & procedures in place in each vessel:

Vessel specific procedures shall be in place to address all towing contingencies and should include such items as; equipment available, towage arrangements, stowage positions, connection arrangements, securing points and training of personnel in particular with regard to line throwing appliances and instructions to those receiving.

Are Chevron SBU Marine Notices relating to offshore Mooring located on board and contents known to crew?



Check maintenance of equipment. Condition of mooring ropes, stoppers, greasing of deck machinery & fairleads.  
Ensure effective supervision is provided during mooring, particularly for inexperienced seamen.  
Ensure comprehensive JSAs are implemented prior to any mooring activity. Ensure Stop Work Authority is reinforced  
Are hazardous zones, trip hazards clearly marked? Check and ensure snapback zones are clearly marked in YELLOW.  
Check effective means of communication with bridge  
Assess design of capstans or windlasses for potential weakness e.g. slips, trip hazards, hand injuries, bights, line of fire. Suggest alternatives where applicable.

**S1.6 Competency Management (Qualification of Officers) Requirements in CUG Upstream Marine Standard 3.0 Competency**

DECK OFFICERS	Master	Chief Officer / SDPO	Second Mate / DPO	Third Mate / DPO
Nationality	Thai	Thai	Thai	N/A
STCW Certificate Current (Yes/No)	Yes	Yes	Yes	N/A
Years with company	11 Years	10 Years	7 Months	N/A
Years in rank	3 Years	10 Years	7 Months	N/A
Years on this type of vessel	11 Years	10 Years	1 Months	N/A
DP Vessels (if applicable): Full DPO Certification (Yes/No)	No	No	No	N/A
<b>Anchor Handling</b> Vessels ONLY: Min Experience as Master	3 Years			
<b>Anchor Handling</b> Vessels ONLY: Years' Experience as Chief Mate		2 Years		
ENGINEERING OFFICERS	Chief Engineer	Second Engineer	Training Second Engineer	Third Engineer
Nationality	Thai	Thai	Thai	Thai
STCW Certificate Current (Yes/No)	Yes	Yes	Yes	Yes
Years with company	12 Years	5 Years	9 Years	11 Years
Years in rank	7 Years	7 Years	1 Month	9 Years
Years on this type of vessel	11 Years	3 Years	1 Month	2 Years
Years on DP Vessels (if applicable)	No	No	No	No
<b>Anchor Handling</b> Vessels ONLY: Years' Experience as Chief Engineer	2 Years			
<b>Anchor Handling</b> Vessels ONLY: Years' Experience as Engineer		2 Years		

**S1.7 DP System Verification**

Comments:

N/A – Vessel was not a DP class.

**Chevron Upstream and Gas (CUG) Global Upstream Marine Standard §11.1**

**11.2** All DP (dynamically positioned) vessels or units in scope of this Standard shall comply with the current version MTS (Marine Technology Society) DP Operations Guidance (2010) and Appendices which shall be the Chevron Upstream and Gas (U&G) Global DP operating requirements.

Marine Inspector shall undertake a review of the DP System & operation using an SBU DP Verification process (Standard MTS 2010):  
Is there an Electronic Technician or Engineer on board with approved training on the DP system? If answer NO, issue HARD STOP and contact SBU Marine Expert (SCM)  
Are DP footprints regularly recorded and compared against previous footprints and the DP Capability Plots?  
Are project related factors such as pipelay loads considered?  
Does the vessel/unit use the IMCA Incident reporting system?  
Have all personnel involved in DP operations read and understood the FME©A?  
FMEA details and last revision should be noted. Is FMEA < 5 years old?  
Check most recent Annual trials details  
Is ASOG or WSOG (MODU) limit setting agreement in place for current or intended operations? If answer NO, issue HARD STOP and contact SBU Marine Expert (SCM)  
Check operations manuals, maintenance and guidance materials using MTS 2010 template.

**S1.8 Vessel Access / Work Practices & personnel transfer**

Comments:



1. All walkways are clear of obstructions and tripping hazards.
2. During boarding the vessel, the gangway angle of inclination was less than 30 degrees from the horizontal.
3. At the inboard end of the gangway was flush with the gangway rest and a life ring with a self-activating light and buoyant safety line was available adjacent to the gangway location.
4. Safe landing stage on vessel for Mooring Master transfer to Pilot ladder were in satisfactory condition.
5. Adequate fender arrangement to facilitate personal transfer operations in satisfactory condition.
6. Vessel specific approaching and manoeuvring (use of engine to maintain idle position) procedure for personal transfer operations was available on board.

For personnel Transfer, does the vessel have a safe loading/landing zone clearly marked?

The angles of inclination of a gangway or accommodation ladder shall be kept within the limits for which it is designed, is the angle of inclination less than 30 degrees from the horizontal?

When the inboard end of the gangway rests on or is flush with the top of the bulwark, is a bulwark ladder provided? (Gangway shall not rest on ship rails unless it has been reinforced for that purpose)?

Is the gangway adequately secured on board the vessel?

Is a life ring with a self-activating light and buoyant safety line attached and available adjacent to the gangway location?

Are both ends of the gangway suitably lighted to reduce falling and tripping hazards?

Are PFDs used when using gangways?

Walkways clear? Proper lighting? Walkways clear of tripping hazards? Appropriate trash cans? Designated smoking areas? Electronic communications devices in use intrinsically safe? Control of entry/exit on the work site?

#### **S1.9 Cargo Handling / Crane Operations / Electrical / Tools / lifesaving appliances**

Comments:

1. 6 X 440 Volt and 2 X 220 Volt reefer sockets are available on board.
2. Webbing sling used for securing cargo.
3. Cargo securing manual was available on board and approved by Flag.
4. Load test and 3<sup>rd</sup> party inspection of deck crane (Stbd, Fixed Boom Crane) was conducted on 28/06/2019. Last loaded test was conducted on 24/07/2018. (Crane was not certified for personnel transfer operation)
5. Load test and 3<sup>rd</sup> party inspection of deck crane (Port, KNUCKLE) was conducted on 24/10/2018. (Crane was not certified for personnel transfer operation)
6. Lifesaving appliances and firefighting equipment were maintained in good condition and kept annual inspection by approved third party service company.
7. The correct tools are used on board appropriate for the job being carried out.
8. Protection guards are in place for moving parts on machinery and tools.
9. Emergency drills schedule was posted and carried out; record of drills was kept in file.
10. The Attestation for "Witness of Calibration Tension Meter (FWD. & AFT winch) issued by BV Class on 23/08/2018.



Does the vessel utilize ratchet type chain binders for securing of cargo (this is the type allowed)?  
Does vessel have boomer / stored energy type chain binders (this type of chain is not allowed for cargo securing)?  
Has a JSA been completed and are the use of taglines included?  
Are tag lines of ¼" natural fibre material and 15 to 20 feet in length?  
Is cargo loaded with adequate access lanes for crew members to pass?  
Does the vessel have all slings stored on racks when not in use?  
Do cranes and other lifting equipment on board the vessel have current certification?  
Is movement warning devices installed for cranes  
Launching and Recovery system (LARS) where applicable – Davit, tackles, winches and wires – is this equipment being properly surveyed and inspected and included in the vessels survey system?  
Is load limit visibly identifiable on the crane?  
Crane Logbooks available and current?  
Are power tools grounded or double insulated?  
Are appropriate tools used for each job?  
Guards in place for energized moving parts?  
Vessel complies with lifesaving appliance Standards.  
Do on board policies and procedures state clearly that "Personnel shall not be placed in lifeboats, rescue boats or liferafts during a drill while these are being raised or lowered."  
**Minimum 6 X 440V Reefer Sockets on deck for reefer containers (AHTS and PSVs):**  
Are survival craft / FRC and/or boats tested and drills held in accordance with ISM Manual, SOLAS, LSA Code and all applicable flag and port state regulations?  
Does evidence exist that survival craft and other FRCs or support boats aboard are operated in accordance with manufacturers manuals including the evidence of safety alerts and manufacturers updates:  
Check validity and accuracy of the training manuals in use on the vessel/unit  
Check maintenance records of all support boats or lifeboats including wire falls, release mechanisms. Examine last test and test frequency:

#### S1.10 Special Focus Areas – Towing and Anchor Handling Operations

##### Comments:

1. Forward tow wire size 54mm with Dia x 320m in length (6 x 36) IWRC EEIPS galvanized steel wire rope with one end G517, Gold nose termination, M-Line Mooring Socket, MBL 221T.
2. **FWD** Tow wire original certificate issued date 24/08/2021, MBL 221T, Size 54mm x 320m (Gold nose socket) Installed 26/10/2021.
  - 1<sup>st</sup> Used on 28/10/2021.
  - End to end was on 15/03/2022. (Every 6 months)
  - Re-socket was on 15/03/2022.
3. Pennant wire (**Fwd.**), 52mm X 16m, SWL 40.2t, MBL 212t. 6XWS (36) + IWRC, RHOL, Galvanized. Installed 15/03/2022.
4. Spare main tow wire (Fwd.), 1 X 54mm X 320m, MBL 221t, 6x36 IWRC RHOL Galvd.
5. **AFT** Tow wire original certificate issued date 28/09/2017, 6X36WS, IWRC, RHOL, Breaking load 204.2T, Size 54mm x 989m with gold nose socket.
  - Aft Tow wire certificate was available on board. Installed 02/08/2018.
  - 1<sup>st</sup> Used 12/08/2019, End to End was on 05/06/2022, Re-socket was on 05/06/2022.
  - Fitted with wire tension monitor, pay out counter and tow wire remotely operated quick release from both bow and astern arrangements. Both forward and aft winches have three-speed and Sharks Jaws provided.
  - Last breaking test was conducted on 10/06/2022.
6. Spare Tow Wire (**Aft**), 54mm X 500m with MBL 204.2t, 6X36WS, IWRC, RHOL, Keep in storage reel winch 02/08/2018.
7. Towing stretchers, Length 20m, 12" Circ X 1, 8 STRAND Superflex Euro mixed rope stretcher c/w both end thimble eye, both ends fitted with 1,3/4" Crosby A342 master link. Install on board 15/03/2022.
8. Towing Gog Chains X 1 Set, 2" Dia. With 2 meters in length, MBL 205T, GOG Stopper, Grade U3 Stud Link Anchor Chain all common links with both ends original enlarged links & end links. Supplied on board 30/10/2018.
9. Bollard pulls test was conducted on 29/10/2018 (Fwd. & Aft winch), and certificate available on board.
  - Sustained Bollard Pull Ahead 77.61 / Astern 72.12 Tons (761.09/707.25 kN).
  - Maximum Static Bollard Pull Ahead 80.90 / Astern 73.97 Tons (793.36/725.40 kN).
10. Vessel specific towing procedures and emergency contingency plans were available on board.
11. Emergency release for tow and work wire and forward winch had been tested and found satisfactory working condition. (Forward & Aft winches)
12. Break slip test were conducted for anchor handling winch, Fwd. towing winch and stern towing winch – satisfactory condition.

Bollard Pull Certificate within 5 years

Stern Bollard Pull Certificate (Bow Towing for Terminal Support Vessels)

Main tow wire less than 1-year service life at start of contract (Terminal Support vessels will require bow tow wire renewed every year)

Main tow wire in compliance to IMO Guidance for safe Ocean Towing MSC 884 with respect to length and Maximum Breaking Load

Yes



Annual re-termination and destruct test of tow wire

Main Tow wire end for ended every 2.5 years

Tow wire Maintenance Logs

Tow wire log records as per MSC 884

Condition and age of spare tow wire

Tow Operations Manual to contain reference to wire handling

No towing from hook (if fitted)

No use of polypropylene ropes for towing allowed

Condition and operation of remote securing devices

Conduct brake slip test for towing and work winches.

- Ensure the Dog is disengaged
- Place winch in the lowest gear
- Set brake to full
- Power winch to full

Test Emergency Release for Tow and AH drums:

Sufficient manning such as additional Master or additional deck crew for 24 hours AH operations:



**S2.1 OBSERVATIONS (INCLUDING NOTES OF ANY HARD STOPS and any SWA ISSUED)**

OBSERVATION CONSEQ No.	DETAILS	CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE
<b>Items</b>	<b>Observations from SUPO check list</b>	
S 1.1	Hose size 2" (25m+25m+25m), Last pressure test was conducted on 05/06/2022. However, some section getting poor and began to see deterioration. Recommended to be inspect prior to use.	
S 1.1	Several chemical drums and grease oil drums were not stored in proper area.	
S 1.1	Total 10 sets of floatation collars were provided on board.	Information
S1.1	Real time fuel monitoring was installed on board. Calibrated 12/05/2021.	Information
S 1.1	Flow meter for main engine consumption was installed on board.	Information
S 1.1	Last flow meter for diesel transfer was calibrated on 08/09/2020.	Information
S1.1	TODD tank unit and TODD hose unit certificate were available on board.	Information
S 1.1	Breakaway coupling was available on board. (With original bolt & nuts)	Information
S 1.2	There were 3(three) SSEs assigned on board at the time of survey on board.	Information
S 1.9	6 x 440V, 2 x 220V - reefer sockets available on board.	Information
S 1.10	Emergency release for tow and work wire and forward winch had been tested and found satisfactory working condition. (Forward & Aft winches)	Information
S 1.10	Break slip test were conducted for anchor handling winch, Fwd. towing winch and stern towing winch - satisfactory condition.	Information
	<b>Inspection Focus Area</b>	
	<b>Anchor Handling, Towing Equipment and Certification</b>	
1	<b>FORWARD</b> - Forward tow wire size 54mm with Dia x 320m in length (6 x 36) IWRC EEIPS galvanized steel wire rope with one end G517, Gold nose termination, M-Line Mooring Socket, MBL 221T. - FWD Tow wire original certificate issued date 24/08/2021, MBL 221T, Size 54mm x 320m (Gold nose socket) Installed 26/10/2021. - 1 <sup>st</sup> Used on 28/10/2021. - End to end was on 15/03/2022. - Re-socket was on 15/03/2022.	Information
2	<b>Pennant wire</b> (Fwd.), 52mm X 16m, SWL 40.2t, MBL 212t. 6XWS (36) +IWRC, RHOL, Galvanized. Installed 15/03/2022.	Information
3	<b>Tow Stretcher # 1</b> (FWD), 1 X 12" Cir with 20m, MBL 226t 12" Circ, 8 STRAND Superflex Euro mixed rope stretcher c/w both end thimble eye, both ends fitted with 1,3/4" Crosby A342 master link. Installed 15/03/2022.	Information
4	<b>Spare main tow wire</b> (Fwd.), 1 X 54mm X 320m, MBL 221t, 6x36 IWRC RHOL Galvd.	Information
5	<b>AFT</b> - AFT Tow wire original certificate issued date 28/09/2017, 6X36WS, IWRC, RHOL, Breaking load 204.2T, Size 54mm x 989m with gold nose socket. Last breaking test was conducted on 10/06/2022. - Aft Tow wire certificate was available on board. Installed 02/08/2018 - 1 <sup>st</sup> Used 12/08/2019, End to End was on 05/06/2022, Re-socket was on 05/06/2022. - Fitted with wire tension monitor, pay out counter and tow wire remotely operated quick release from both bow and astern arrangements. Both forward and aft winches have three-speed and Sharks Jaws provided.	Information
6	<b>Spare Tow Wire</b> (Aft), 54mm X 500m with MBL 204.2t, 6X36WS, IWRC, RHOL, Keep in storage reel winch 02/08/2018.	Information
7	Last <b>BP (Bollard Pull)</b> tested was conducted on 29/10/2018. - Ahead pull: Sustained :77.61 tons/Max: 80.90 tons. - Astern pull: Sustained :72.12 tons/Max: 73.97 tons.	Information





OBSERVATION CONSEQ No.	DETAILS	CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE
8	<b>Towing stretchers</b> , Length 20m, 12" Circ X 1, 8 STRAND Superflex Euro mixed rope stretcher c/w both end thimble eye, both ends fitted with 1,3/4" Crosby A342 master link. Install on board 15/03/2022.	Information
9	<b>Towing Pin</b> , capacity 200t SWL with pin height 600mm. The operation test was conducted and all found satisfactory.	Information
10	<b>Shark Jaw</b> , capacity 200t SWL for rope size 48-88mm and chain size 48-88mm.	Information
11	<b>Spare Tow wire</b> certificate was available on board.	Information
12	<b>Work wire</b> certificate was available on board. 54mm x 237m, 6X36WS, IWRC, RHOLInstalled - 02/08/2018.	Information
13	Towing logs and PMS records are available on board.	Information
14	Emergency release for tow and work wires are available on board. Last test on 17/08/2022.	Information
15	Remote securing devices operations were in satisfactory condition.	Information
16	Vessel specific towing procedures and emergency contingency plans were available on board.	Information
17	Capstans and winch drum ends and tugger winches were in working condition.	Information
18	Tension meter - last calibration 18/07/2022.	Information
19	Last MPI test of shackle was conducted on 11/02/2022.	Information
20	Spare tow wire, spare stretcher was available on board.	Information
21	Spare pennant wire was available on board.	Information
	<b>Static Tow Procedures</b>	
22	Vessel specific procedures and specific JSA for side-by-side tethering, Tandem berthing static Tow, line, hose handling and personal transfer to offtake tanker operations were available on board.	Information
23	Record of completed pre-tow checklist and JSAs for previous static tow, line, hose handling and personal transfer operations were available on board.	Information
24	Statement of attestation of fitness for terminal support vessel was available on board.	Information
	<b>Personnel Transfer Operations</b>	
25	Safe landing stage on vessel for Mooring Master transfer to Pilot ladder were in satisfactory condition.	Information
26	Adequate fender arrangement to facilitate personal transfer operations in satisfactory condition.	Information
27	Vessel specific approaching and manoeuvring (use of engine to maintain idle position) procedure for personal transfer operations was available on board.	Information
	<b>Documentation</b>	
28	Attestation for witness of calibration tension meter (FWD & AFT winch) was issued by BV class on 23/08/2018.	Information
29	Attestation, periodic servicing of launching appliances and on-load release gear was issued by BV class on 29/10/2018 and valid until 28/10/2023.	Information
30	The SOC for anti-fouling system certificate was available on board, issued by DNV-GL on 29/09/2019.	Information
31	The Towing contingency plan was provided on board (No class approve)	Information
32	The Oil recovery operation manual was approved by DNV-GL on 28/09/2019.	Information
33	The Cargo securing manual was approved by TG on 25/10/2018.	Information
34	The Stowage and securing of non-standardized and semi-standardized cargo was approved by TG on 25/10/2018.	Information
35	The GLM GHS load monitor was approved by BV and class has changed to DNV-GL on 28/09/2019.	Information





OBSERVATION CONSEQ No.	DETAILS	CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE
36	Maritime Labour Certificate was available on board.	Information
37	International Energy Efficiency Certificate (IEEC) was available on board.	Information
38	Ship-specific plans and procedures for the recovery of persons from the water was available on board, Approved by TG on 25/10/2018.	Information
39	Chevron marine standard non-tankers (Corporate OE standard Chevron shipping January 2022, version 3.0) was available on board.	Information
	<b>Lifting Equipment</b>	
40	Crane (STBS Side), Hydraulic fix boom crane was fitted with maximum reach is approx. 150cm to centre of stern roller. (Not reach to edge of stern roller)	Information
	- Last annual inspection was conducted on 28/04/2022.	
	- Last 5 years loaded test was done on 21/03/2018.	
41	Crane, Knuckle boom crane was fitted at port side, 5T SWL with 6T max load outreach at 6m.	Information
	- Load 3 <sup>rd</sup> party inspection of deck crane (PORT) was conducted on 29/04/2022. (Crane was not certified for personnel transfer operation)	
	- Last 5 years loaded test was done on 24/07/2018.	
42	Load 3 <sup>rd</sup> party annual inspection of rescue boat davit was conducted on 21/09/2021.	Information
43	Release hook certificate (off-load) for rescue boat was available on board. Handle was fitted on the rescue boat release hook. The certification for off-load release mechanism was available on board.	Information
	<b>Cargo Securing Equipment</b>	
44	Cargo securing manual was available on board and approved by Flag.	Information
45	Cargo lashing equipment register was available on board.	Information
46	PMS recorded for cargo lashing equipment was update.	Information
47	Cargo lashing equipment were in satisfactory condition.	Information
	<b>Hose Management</b>	
48	The end fittings for all bunker hoses and bunker connections is dry brake type (TODO).	Information
49	Bunker hoses with floatation collars (10 pcs.) and TODO couplings were available on board.	Information
50	There were 2(two) size of fuel transfer hoses were available on board with certificate issued on board. - Hose size 3" (30m+25m+30m), Last pressure test was conducted on 05/06/2022. - Hose size 2" (25m+25m+25m), Last pressure test was conducted on 05/06/2022. <b>However, some section getting poor and began to see deterioration. Recommended to be inspect prior to use.</b> - Diesel hose certificate issued date FO hose 2"Cert.20-05-076 Revd. 05/06/2020 Issue 05/05/2020. FO hose 2" Cert.OSD250-0200-001-21 Revd. 14/05/2021 Issue 08/04/2021. FO hose 2" Cert.OSD250-0200-002-21 Revd. 14/05/2021 Issue 08/04/2021. FO hose 3"Cert. PTR 191225-1 Revd. 05/09/2020 Issue 25/12/2019. FO hose 3"Cert. 20-08-153 Rcvd.05/0/2020 Issue 18/08/2020. FO TX hose 3-inch Cert.OSD 250-0300-001-21 Revd. 20/06/2021 Issue 23/04/2020.	Information
51	Confirmed - All fuel transfer hose complied with MSN 013.	Information
52	Hydrostatic test for 3" TODO hose unit & tank unit were conducted on 05/06/2022.	Information
	<b>Power Management Systems and Testing of Black Out Recovery Procedure (Learnings from Recent Incident)</b>	
53	Black Out Recovery Procedures was available on board.	Information



Chevron Upstream (CU)  
Upstream Marine Standard  
OVID Supplement R14

**SUPO**

OBSERVATION CONSEQ No.	DETAILS	CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE
54	Start-up auto synchronization and start up procedures for Generator available on board.	Information
55	Start-up procedures for Emergency battery available on board.	Information
56	Emergency Generator was fitted. DC Supply when main generator was tripped (Vessel can use emergency steering gear during black out situation).	Information
57	Generator Power configuration drawings for various operating modes was available on board.	Information
	<b>Safe Navigation practice (Learnings from Recent Incident)</b>	
58	The vessel was fitted with ECDIS unit on board. The licensed user of the ADMINALTY vector chart service for the period to 31/07/2023, supplied by "Storage AS".	Information
59	Confirmed - deck officers fully understand safe navigation practice.	Information
60	Confirmed - ARPA was fitted on board.	Information
61	Last annual service of Gyro compass was conducted on 04/06/2022.	Information
62	Chart corrections were up to date. (NM #33/2022)	Information
63	Update Chevron field chart was available on board.	Information
64	Notice to Mariner week no. 33/2022.	Information
65	STCW certification and Flag sates COEs for officer and crew are valid.	Information
66	BNWAS procedures and instructions was available on board, operation test in satisfactory condition.	Information
67	CCTV are installed on board with 10 channels (on bridge 2, forward 1, aft station 1, portside 1, starboard 1, engine room 4).	Information
68	Deck searchlight on aft deck (1) and bow (2) were in satisfactory condition.	Information
	<b>Other</b>	
69	New revision of Marine Operations Procedure - CTEP Marine Safety and Operations Procedures Manual (CMSOPM Rev.05/2022) was available on board.	Information
70	Grapnel was not available on board. J hook was available on board.	Observation
71	There were 7 shackles of anchor chains (Port & Starboard) fitted on board. Vessel could not anchor in Chevron field. (depth 70 m)	Observation
72	With reference to DNV Class status report, the vessel annual survey was in open period. (28/07/2022 to 28/01/2023)	Information



CONCLUDING STATEMENT	
<p>MSRE RATING</p> <p>The Marine Inspector shall make an overall assessment of the vessel and choose a rating based upon his overall impression of the contractor's safety management systems, procedures and practices witnessed.</p> <p>Inspector shall (type either A, B, C or D in the right-hand box) using the following scale as guidance: -</p> <p>D= Less than 70%    C= 70-79%    B= 80-89%    A= 90% or above</p>	
Inspector Name	Nopporn Khempongphun
Department / Inspecting Company	ABL Consultant

MSRE RATING GIVEN  <b>A</b>
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Chevron Upstream & Gas is fully committed to Operational Excellence in maritime safety, reliability and efficiency (MSRE) and the global Upstream Marine Standard. Please use the contact details above at any time for guidance or advice relating to maritime safety, operational standards or compliance issues. Chevron Upstream & Gas (CUG) fully support use of OVID the Offshore Vessel Inspection Database (OCIMF) and encourage Operators use of OVMSA, Offshore Vessel Management and Self Assessment (OCIMF).

One Upstream Marine Standard | One risk management process | Zero incidents

## APPENDIX 1- CHESM/MSW FIELD VERIFICATION

CHESM/MSW Field Verification		
Instructions: All information in sections A, B and C must be completed. Information in section B related to subcontractors should be obtained from the work crew if possible. If info is unavailable, leave blank. In section C, only items applicable to the work being performed must be completed. For example, if you are observing a confined space entry job, you will complete items Confined Space Entry, IHE and Portable Gas Detection at a minimum.		
General Information		
A. Person Conducting Verification		
Name: Nopporn Khempongphun	CAI:	
Functional Group (circle): Other		
B. Verification Information		
Engagement Location: Sattahip port #5, Thailand.	Date of Engagement: 17/08/2022	
Specific Location: Juksamet port berth no.5	Time of Day (Day/Night): Day	
Workforce Type (circle): Employee Crew		
Company Name: Uniwise Offshore		
Is the Work Crew a subcontractor of a primary contractor (circle): No		
If yes, name of primary company:		
Check all specialized activity that was being conducted during the verification:		
<input type="checkbox"/> Confined Space <input type="checkbox"/> Diving <input type="checkbox"/> Electrical <input type="checkbox"/>	<input checked="" type="checkbox"/> Hot Work <input type="checkbox"/> IHE <input type="checkbox"/> Lifting and Rigging <input type="checkbox"/> Portable Gas Detection	<input type="checkbox"/> Work at Height <input type="checkbox"/> Other: _____

Verification Questions		
C. Behavior - Check 'Yes' or 'No' for each item listed. If 'No' document reason.		
<b>Job Safety Analysis (JSA):</b> <i>The task scope was discussed and documented in the following detail:</i> 1. All steps associated with the work task were identified and documented. <i>Hazards &amp; Mitigations were identified, discussed and documented in the following detail:</i> 2. Hazards associated with each task step were documented. 3. Each mitigation was assigned a responsible person.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Comments: JSA were available on board for review. All the working crew discussed and signed the JSA prior commence the work.  If condition is change. Stop work and re conduct another JSA prior resume the work.



4. Hazards & mitigations were identified based on consequence potential (i.e. with the potential to cause serious injury or fatality death) were documented.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
5. Hazards & mitigations identified were appropriate for the work task.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Mitigations were completed and documented in the following detail:		
6. Each mitigation was verified and individually documented on the JSA prior to starting work.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Stop work authority:		
7. Stop work situations were discussed and documented on the JSA. SWA policy was communicated to work crew.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Human Performance		
8. Worker has the training / knowledge to conduct work	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
9. Actions to take if conditions change or unplanned events occur (e.g. stop and seek assistance)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

<b>Short Service Employee Management:</b> 1. Did work crew contain SSEs? ( <i>If 'no', skip questions 2-7.</i> ) 2. Was a SSE Risk Reduction Plan in place? ( <i>If 'yes', skip questions 3-7.</i> ) 3. SSEs were visibly identifiable. 4A. Was crew size less than 5 workers? ( <i>If 'no', skip question 4B.</i> ) 4B. Crew does not contain more than 1 SSE. 5A. Was crew size in excess of 5 workers? ( <i>If 'no', skip question 5B.</i> ) 5B. Crew does not contain more than 20% SSEs. 6. SSEs were assigned mentors. 7. Mentors were on site.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments: There were 3 SSE on board. (Tr. 2/O, Tr. 2/E and AB)
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<b>Emergency Management:</b> <i>Work crews were:</i> 1. Knowledgeable about facility alarms and muster points. 2. Able to explain emergency evacuation procedures.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Comments: Officer & crew are known for the alarm and muster point.
<b>Permit to Work:</b> <i>Work was permitted in accordance with Chevron permitting requirements:</i> 1. Permits were issued by Authorized Permit Issuer. 2. The task scope was defined on the work permit (and on any specialty permits/certificates). 3. The work conditions under which the permit is <i>valid</i> were discussed and understood by the work crew. 4. A crew member was designated responsibility to monitor and verify work is performed safely and is consistent with the permit conditions.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Comments: PTW system is set up and implemented on board. PTW register is available on board for review.

<b>D. Supplemental Items – Complete ONLY items applicable to the work being performed during verification.</b>		
<b>Confined Space Work:</b> <i>Confined space work was conducted in accordance with Chevron requirements:</i> 1. Entry to the confined space was controlled at all times by an entry attendant and entry logs were maintained. 2. Initial gas testing was conducted & documented in accordance with the special permit/certificate conditions. 3. Gas monitoring was conducted & documented in accordance with the special permit/certificate conditions.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments: No work had been carried out during the time of inspection.



4. All permits were documented and kept onsite with the work package.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5A. Did the confined space contain special hazardous characteristics? (If 'no', skip questions 5B & 5C.)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5B. Rescue teams and equipment were readily available.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5C. Rescue plans were documented and communicated to the work crew.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

D. Supplemental Items – Complete ONLY items applicable to the work being performed during verification.

<b>Commercial Diving Work:</b> <i>Commercial diving work was conducted in accordance with Chevron requirements:</i> 1. A dedicated dive supervisor, working diver, stand-by diver, tender for the working diver and tender for the stand-by diver were onsite at a minimum. 2. All diving equipment was inspected prior to use; inspections were documented. 3. Rescue plans were developed, documented and communicated to the work crew. 4. Conditions under which the dive must be terminated were documented and discussed with the work crew. 5. The diving was conducted in accordance with the special permit/certificate conditions. 6. All permits were documented and kept onsite with the work package.	<input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments:
<b>Electrical Work:</b> <i>Electrical work was conducted in accordance with Chevron requirements:</i> 1. Electrical systems, power lines, equipment and parts were placed in an electrically safe work condition prior to starting work (e.g. de-energized, isolated, etc.) 2. Access to the electrical work area was restricted and safe work zones were visibly identifiable. 3. Grounding and bonding was in place to prevent static accumulation and discharge during transfer activity. 4. Electrical work was conducted in accordance with all permitted conditions. 5. All permits and hazard analyses (e.g. shock & arc flash, JSA, etc.) were documented and kept onsite with the work package. 6A. Was electrical work conducted inside the limited approach boundary? (If 'no', skip questions 6B & 6C.) 6B. Only qualified electrical personnel worked inside the limited approach boundary. 6C. A qualified electrical stand-by person was onsite. 7A. Was electrical work conducted on or around overhead power lines? (If 'no', skip question 7B.) 7B. Equipment (including mobile equipment) maintained minimum clearance distances from overhead power lines.	<input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments:



D. Supplemental Items – Complete ONLY items applicable to the work being performed during verification.

<b>Hot Work</b> <i>Hot work was conducted in accordance with Chevron requirements:</i> <ol style="list-style-type: none"><li>1. Hot work was conducted in accordance with the special permit/certificate conditions (if not conducted in a designated safe hot work area).</li><li>2. Initial gas testing was conducted &amp; documented in accordance with the special permit/certificate conditions.</li><li>3. Gas monitoring was conducted &amp; documented in accordance with the special permit/certificate conditions.</li><li>4. A dedicated fire watch was onsite to monitor work conditions.</li><li>5. Access to the hot work area was controlled and visible barriers/warning displays were erected.</li><li>6. Dedicated fire-fighting equipment (e.g. fire extinguishers, hoses, etc.) was onsite and available for immediate response.</li><li>7. All permits were documented and kept onsite with the work package.</li></ol>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Comments: The hot work was conducted at back deck area while vessel in port for maintenance.
<b>Isolation of Hazardous Energy:</b> <i>Potentially hazardous energy (including electrical, mechanical, hydraulic, pneumatic, kinetic, thermal, chemical, etc.) was isolated in accordance with Chevron requirements:</i> <ol style="list-style-type: none"><li>1. Locks and tags used for isolations indicated the identity of the individual who applied the device.</li><li>2. Lockout devices were used to place equipment in a safe working condition or off position.</li><li>3. Isolations were visibly verified and isolation points were documented in an isolation log, checklist or special permit/certificate prior to starting work.</li><li>4. Isolations were communicated to the work crew and all other impacted work crews.</li><li>5. All permits were documented and kept onsite with the work package.</li></ol>	<input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments:
<b>Lifting and Rigging:</b> <i>Lifting and rigging work was performed in accordance with Chevron requirements:</i> <ol style="list-style-type: none"><li>1. Non-certified fabricated or modified lifting and rigging equipment was not used.</li><li>2. Lifting and rigging equipment was inspected prior to use; inspections were documented.</li><li>3. Pick up and lay down zones were established and visible and free of obstructions, debris and personnel.</li><li>4. Lifting and rigging work was conducted by qualified/certified operators, riggers and signalmen.</li><li>5A. Was the lift a critical and/or non-routine lift (including complicated, complex, heavy, blind and personnel lifts)? <i>(If 'no' skip question 5B.)</i></li><li>5B. A lift plan was documented and kept onsite with the work package.</li><li>6A. Was the lift being conducted around/near overhead power lines? <i>(If 'no', skip question 6B.)</i></li><li>6B. Lifting and rigging equipment maintained minimum clearance distances from overhead power lines.</li></ol>	<input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments:

D. Supplemental Items – Complete ONLY items applicable to the work being performed during verification.

<b>Portable Gas Detection:</b>		Comments:
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<p><i>Gas detection was conducted in accordance with Chevron requirements:</i></p> <ol style="list-style-type: none"><li>1. Gas testing was conducted; results were documented and within acceptable limits prior to starting work activity.</li><li>2. Portable gas detection equipment was functional/bump tested prior to use (daily).</li><li>3. Gas testing was performed by a qualified gas tester.</li></ol>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p><b>Work at Heights:</b> <i>Work at height was conducted in accordance with Chevron requirements:</i></p> <ol style="list-style-type: none"><li>1. Crew members working at height wore fall prevention gear.</li><li>2. Rescue teams and equipment were readily available to respond to work at height emergencies.</li><li>3. Rescue plans for work at height were documented and communicated to the work crew.</li><li>4. A safety standby was onsite while work was performed at height to monitor work conditions and notify rescue personnel in the event of a fall.</li><li>5. All permits were documented and kept onsite with the work package.</li><li>6A. Did the work at height involve the erecting, modifying and/or dismantling of scaffolding? <i>(If 'no', skip question 6B.)</i></li><li>6B. Scaffolding was inspected prior to use; inspections were documented.</li><li>7A. Did the work at height take place around/near overhead power lines? <i>(If 'no', skip question 7B.)</i></li><li>7B. Equipment (e.g. scaffolds, MEWPS, etc.) maintained minimum clearance distances from overhead power lines.</li></ol>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	Comments:

Was feedback provided to the work team during the close-out of this engagement? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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Chevron Upstream & Gas is fully committed to Operational Excellence in maritime safety, reliability and efficiency (MSRE) and the global Upstream Marine Standard. Please use the contact details above at any time for guidance or advice relating to maritime safety, operational standards or compliance issues. Chevron Upstream & Gas (CUG) fully support use of **OVID** the Offshore Vessel Inspection Database (OCIMF) and encourage Operators use of **OVMSA**, Offshore Vessel Management and Self Assessment (OCIMF).

One Upstream Marine Standard | One risk management process | Zero incidents



# Chevron Upstream (CU) Upstream Marine Standard OVID Supplement R14

# SUPO

SUPO INSPECTION DATE	14 September 2022	OVID DETAILS	
VESSEL NAME	"MICLYN ENERGY"	LAST OVIQ INSPECTION DATE	20 Sept 2021
INSPECTORS NAME	Chatchai Arunrat	LAST OVIQ PORT OF INSPECTION	Songkhla Port
MASTERS NAME	Capt. Toni Boroni	LAST OVIQ INSPECTION COMMISSIONING COMPANY	Chevron Thailand
PORT OF INSPECTION	Songkhla port	DATE OF OVPQ LAST UPDATED	06 September 2022

<b>Risk Management</b>	Annual OVIQ Supplement		Pre-Mobilization OVIQ Supplement	
<b>Processes or tasks undertaken</b> <i>Inspector to tick any applicable activity undertaken during inspection visit</i>	Promote / conduct BBS training or observation		Random Fuel Check	
	Safety Equipment Condition Observations	X	JSA and / or PTW	X
	OE & tenets of operation or Stop Work Authority		II&R Investigation	
	Toolbox talks or pre-Ops or regular Safety Meeting		Masters Briefing or Crew training	
	Follow Up / Confirm Close Out of CARs / OVIS	X	Overall Vessel Random inspection	X
	Marine Expert engagement visit		Management engagement visit	

<b>Vessel Particulars (complete all sections for all scope vessels)</b>			
Maximum transit speed	12.5 kts.	Fuel consumption. @ Maximum Transit speed (m3/24 hrs)	13 m <sup>3</sup> /day.
Economical transit speed	11 kts.	Fuel consumption. @ Econ Transit speed (m3/24 hrs)	9.24 m <sup>3</sup> /day.
Fuel consumption @ DP operations moderate met conditions (m3/24 hrs)	N/A.	Fuel consumption. @ Port stand-by (m3/24 hrs) Port standby	1,080 Litres/day.
Certified Bollard Pull (if applicable)	N/A.	Date & place of last dry dock	02/11/2021 UWILD at Songkhla Anchorage

<b>Anchor Handling (AHTS) Vessels ONLY – Vessel has taken out AH &amp; towing operation from Class notation</b>			
Sharks jaws or Karm forks fitted Yes/No?	No	<i>Note: Pelican hooks NOT permitted under any circumstances No towing hooks and soft line towing permitted</i>	
Length of tow wire: (m)	N/A.	Tow wire acceptable condition?	N/A.
Length of spare tow wire: (m)	N/A.	Spare tow wire acceptable condition and terminated?	N/A.
Length of work wire: (m)	N/A.	Work wire acceptable condition? Certification in order?	N/A.
Tow pin SWL: (MT)	N/A.	Stern roller SWL and condition	N/A. – Fitted with fenders.
Karm Forks in good order?	N/A.	Sharks jaws in good order?	N/A.
Winches MUST be fitted with Tension meters Confirm (Y/N)	N/A.	All wires fitted with Pee-Wee sockets – Confirm (Y/N)	N/A.

**SUPO TABLE 1 CUG Hard-Stop Marine requirements** (Section to be completed for All Vessels of any size)

ITEM	YES	NO
Certificate of Registry or Certificate of Survey	Yes	
Safe Manning Certificate or Certificate Annual Survey	Yes	
Certificate of Class	Yes	



# Chevron Upstream (CU) Upstream Marine Standard OVID Supplement R14

# SUPO

OVID. All Vessels working to <u>offshore locations</u> (>1NM from shore) shall be required to hold a valid Annual OVIQ inspection lodged in the OVID system	Yes	
SMS - All Vessels working to <u>offshore locations</u> (>1NM from shore) shall be required to hold a functionally appropriate SMS. The Safety management system shall be equivalent in scope to ISM Code (International Management Code for the Safe Operation of Ships and for Pollution Prevention) and suitable for size of vessel.	Yes	
Crew Certificates (may be included in Survey Certificate)	Yes	
SRC Safety Radio Certificate (for vessels >300 GT only)	Yes	
Approved plans - GA. Must reflect current fit/design of vessel	Yes	
Approved plans - LSA-FFA Plan. Must reflect current fit/design of vessel	Yes	
Inspector to verify Master holds CUG Upstream Marine Standard and ALL in-force Marine Notices on bridge (Applicable to vessels already on-hire or have been on-hire. NOT Hard stop for vessels new to Chevron)	Yes	

**SUPO TABLE 2 CUG Hard-Stop Marine requirements** (In addition to TABLE 1, TABLE 2 to be completed for ALL Vessels >500 GT)

ITEM	YES	NO
SMS (Safety Management Certificate)	Yes	
DOC (Document of Compliance)	Yes	
Load Line Certificate	Yes	
SCC Safety Construction Certificate (for vessels >500 GT only)	Yes	
SEC Safety Equipment Certificate	Yes	
SRC Safety Radio Certificate	Yes	
IOPP Cert	Yes	
IAPP Cert (vessels >400 GT)	Yes	
ISPS Cert	Yes	
Safe Manning Certificate	Yes	
Port health certificate	Yes	
First Aid / Medicine Chest certification and validity	Yes	
Is there a qualified medic on board and do they have sufficient equipment and facilities for the intended POB		N/A.
Approved tank calibration tables and approved stability information booklet (must be Class/Flag approved)	Yes	
Vessel holds checks of all navigational equipment and holds a critical equipment inventory list	Yes	
Fire extinguishers and fixed firefighting systems certificates	Yes	
EPIRB Cert or in date stamp on unit	Yes	
SART Cert or in date stamp on unit	Yes	
Life Rafts Servicing Certificates	Yes	
FRC Certification, maintenance, training and launching and recovery arrangements (Rescue boat fitted)	Yes	
Marine crew STCW Certificates (all vessels) & all DP operational personnel certification (DP was not fitted on board)	Yes	
Instruction Manuals and evidence of procedures of all key equipment	Yes	
Functional PMS Planned Maintenance System in operation & verified including engine room PMS records	Yes	
Valid Insurance Cover Certificates P&I and H&M & Employers Liability Insurance Cover	Yes	
Physical Check of close-out items from all previous inspections (OVIQ and/or SUPO / RDM inspections)	Yes	
Is the vessel >20 years of age (hull age, <u>not</u> rebuilt year/age)? If YES, does the Master hold a Chevron SBU approved vessel specific integrity assessment which is produced within the last 12 months (Annually)?		N/A.
Special Purpose Ship Certification (SPS) for Offshore Support Vessels carrying Special Purpose Crew e.g., DSVs, Offshore Construction Vessels. If no SPS, then Dispensation Notification issued by Flag state	Yes	
International Energy Efficiency Certificate (IEEC) and Shipboard Energy Efficiency Management Plan (SEEMP) (for vessels>400GRT)	Yes	
Drills for Enclosed Space Entry as per new SOLAS requirements-(Drills-minimum once every 2 months)-IMO A (1051(27))	Yes	
Plans and procedures for the recovery of persons from the water as per requirements of MSC.1/Circ.1447	Yes	
Wreck Removal Liability Insurance Certificate (WRC).	Yes	
Maritime Labour Certificate (MLC 2006) and Document of Maritime Labour Compliance	Yes	
Written Black-Out Procedure- Start-up Instructions of Critical Equipment following power black-out	Yes	
No Conditions of Class in Class Survey Status Report		No

**SUPO TABLE1 & TABLE2 Application Note:** The above requirements must be checked at the beginning of any marine inspection. Inspectors shall use the Section applicable for the size of vessel being inspected ONLY. Any failure (NO) in the above shall mean halt of operations/rejection and/or SWA. No vessel shall be acceptable where basic trading, flag or port state safety certification is deficient. All items shall be confirmed YES, prior to ANY Operations.

## S1.1 Transfer of Fuel Oil and Hazardous Liquids / Waste Management Plan

Comments:



1. MSDS Datasheet for last bunker fuel supply as per SOLAS Annex VI was available on board.
2. 8 pcs of floatation collars were provided on board.
3. All wastes were properly segregated and disposed.
4. TODO tank's unit were available on board.
5. TODO tank unit and TODO hose unit certificates were available on board.
6. SBU Marine Notices relating to hose transfer operations and other instructions were available on board the vessel.
7. Flow meter for main engine/auxiliary consumption were installed on board.
8. Real-time flow meters "Power Instrument" was installed on board.

Does the vessel have quick dry disconnect fittings (i.e., TODO fittings) for use in hazardous liquid transfers? If not, what types of fittings are used?

Appropriate fittings are used for hazardous liquid transfers over water?

Inspector to ask for MSDS Datasheet for last bunker fuel supply as per SOLAS Annex VI

Are there adequate labelling systems for all the chemicals used on board?

Are all hoses fitted with sufficient floatation collars as per Chevron Upstream Marine Standard 9.3?

Ensure all bulk hoses are supplied and make use of self-sealing couplings for pollutants

Ensure that all hoses have breakaway (weak link) couplings for pollutants and use them when the unmoored vessel is engaged in bulk liquid transfer to or from an installation. An example of an acceptable system is the IMO Hose Management System which along with other reference material is available through the SBU Marine Expert

Are any CUG or SBU Marine Notices relating to hose transfer operations held aboard the vessel bridge? Inspector to positively verify

Are all wastes properly segregated and disposed?

Fuel flow meters for supply/transfer and engine consumption fitted and calibrated annually

## S1.2 Safety Management / Personal Protective Equipment

Comments:

1. All crew have received an SBU specific Chevron Safety Orientation, OE and SWA familiarization.
2. Stop work authority had been implemented on board.
3. Proper & adequate Personal Protective Equipment provided for all crew members & few reserves for replacement & visitors.
4. BBS system in operation and being used by all personnel.
5. Rotating machineries in engine room were fitted with adequate guards.

Have all crew received an SBU specific Chevron Safety Orientation, OE and SWA familiarization?

Are Behaviour Based Safety observations recorded and feedback provided? Note on board BBS system in use

Is the Behaviour Based Safety process actively led by Supervisors?

Is there evidence of knowledge of Stop Work Authority on board? Ensure awareness of the ethos.

When was the last date Stop Work Authority used and re-enforced by Supervisors?

Is all rotating machinery as installed fitted with adequate guards?

Are proper & adequate Personal Protective Equipment provided for all crew members & few reserves for replacement & visitors?



### S1.3 Hazard Identification / Standards of management & Culture

Comments:

1. Bridging document between UWO and Chevron was available on board.
2. JSA's completed prior to work.
3. Permits to Work completed when required.
4. PTW includes SWA statement.
5. The accident/incident investigation (II&R) OE Process was understood by Master and crew.
6. An incident report with particularly root cause analysis available to inspection and reviewed.
7. Certificate of Fitness or Document of Compliance for the carriage of dangerous Goods was available on board.

Is the Master holding a work or chart specific bridging document which clearly explains which operating Standards are in place and effectively clarifies marine interface and Standards between all stakeholders (SBU, Operator and subcontractor(s)) with personnel active aboard the vessel?

JSA is completed before start of any work?

Did the whole crew participate in filling out the JSA and sign off?

New JSA filled out when a change occurred (weather, people, work tasks)?

Task steps written out (not pre-filled in) to perform the job? Include site specific considerations? Procedure use?

Hazards identified and addressed & evidence all POB observed following the written steps or procedures?

Are all crew and subcontractors aboard aware of the "Stop Work Authority" principles?

Has the last 12 months accident incident statistics, particularly root cause analysis available to Inspector and reviewed? Note: The OVID should give a clear indication of the adequacy of the systems and implementation on board.

Is the accident/incident investigation (II&R) OE Process understood by Master and all crew.

Are the procedures for isolations followed?

### S1.4 Safety management & crew involvement

Comments:

1. Safety induction had been conducted at shore prior to joining vessel for all personnel.
2. Chief Officer elected as Safety Officer.
3. Chevron Marine Notices were available on board.
4. Vessel Crew Marine, Passengers. Shore side Contractors and Visitors receive Safety Induction /Familiarisation Briefing.
5. The Emergency Response Plan relates to the risks relevant to the vessel operations available on board.

If the vessel has more than 5 workers are safety reps elected? and if safety reps are elected, do they hold regular safety committee meetings Does the vessel have a copy of the CUG Upstream Marine Standard and any in-force CUG or SBU Marine Notices aboard?

CUG Upstream Marine Standard Requirements are:

6-15 Crew 1 elected by officers & ratings together.

16+ Crew 1 elected by officer, 1 by ratings.

>30 ratings 1 elected by officers + 3 elected by rating, from deck, engine room & catering.

COSWP 3.6.2 It is desirable that there should be a safety committee on every ship with more than five workers

Is there a Safety Induction System in place?

Does the Emergency Response Plan relate to the risks relevant to the vessel's operations?

### S1.5 Mooring system design review & Safety re-enforcement

Comments:

1. Hazardous zones and trip areas clearly marked.
2. Intrinsically safe VHF's were provided for each mooring station.
3. Snap back zones were clearly marked.
4. Mooring ropes appeared in good condition.
5. Deck crane wire was last inspection on 01 Nov 2021.

Marine Inspector shall undertake a review of the mooring arrangements & procedures in place in each vessel:

Vessel specific procedures shall be in place to address all towing contingencies and should include such items as; equipment available, towage arrangements, stowage positions, connection arrangements, securing points and training of personnel in particular with regard to line throwing appliances and instructions to those receiving.

Are Chevron SBU Marine Notices relating to offshore Mooring located on board and contents known to crew?

Check maintenance of equipment. Condition of mooring ropes, stoppers, greasing of deck machinery & fairleads.



Ensure effective supervision is provided during mooring, particularly for inexperienced seamen.

Ensure comprehensive JSAs are implemented prior to any mooring activity. Ensure Stop Work Authority is reinforced  
Are hazardous zones, trip hazards clearly marked? Check and ensure snapback zones are clearly marked in YELLOW.

Check effective means of communication with bridge

Assess design of capstans or windlasses for potential weakness e.g., slips, trip hazards, hand injuries, bights, line of fire. Suggest alternatives where applicable.

**S1.6 Competency Management (Qualification of Officers) Requirements in CUG Upstream Marine Standard 3.0 Competency**

DECK OFFICERS	Master	Chief Mate	Second Mate	Third Mate
Nationality	Indonesia	THAI	THAI	-
STCW Certificate Current (Yes/No)	Yes	Yes	Yes	-
Years with company	13	6	6	-
Years in rank	11	10	6	-
Years on this type of vessel	7	10	5	-
DP Vessels (if applicable): Full DPO Certification (Yes/No)	No	No	No	-
Anchor Handling Vessels ONLY: Min Experience as Master	No			
Anchor Handling Vessels ONLY: Years Experience as Chief Mate		Nil		
ENGINEERING OFFICERS	Chief Engineer	First Engineer	Second Engineer	Third Engineer
Nationality	Thai	-	Thai	Thai
STCW Certificate Current (Yes/No)	Yes	-	Yes	Yes
Years with company	10	-	10	8
Years in rank	1	-	9	7
Years on this type of vessel	2	-	6	1
Years on DP Vessels (if applicable)	NA	-	Nil	Nil
Anchor Handling Vessels ONLY: Years Experience as Chief Engineer	5			
Anchor Handling Vessels ONLY: Years Experience as Engineer		-		

**S1.7 DP System Verification**

Comments:

Vessel was not fitted with DP system.

**Chevron Upstream and Gas (CUG) Global Upstream Marine Standard §11.1**

11.2 All DP (dynamically positioned) vessels or units in scope of this Standard shall comply with the current version MTS (Marine Technology Society) DP Operations Guidance (2010) and Appendices which shall be the Chevron Upstream and Gas (U&G) Global DP operating requirements.

Marine Inspector shall undertake a review of the DP System & operation using an SBU DP Verification process (Standard MTS 2010):  
Is there an Electronic Technician or Engineer on board with approved training on the DP system? If answer NO, issue HARD STOP and contact SBU Marine Expert (SCM)

Are DP footprints regularly recorded and compared against previous footprints and the DP Capability Plots?

Are project related factors such as pipelay loads considered?

Does the vessel/unit use the IMCA Incident reporting system?

Have all personnel involved in DP operations read and understood the FME(C)A?

FMEA details and last revision should be noted. Is FMEA < 5 years old?

Check most recent Annual trials details

Is ASOG or WSOG (MODU) limit setting agreement in place for current or intended operations? If answer NO, issue HARD STOP and contact SBU Marine Expert (SCM)

Check operations manuals, maintenance and guidance materials using MTS 2010 template.

**S1.8 Vessel Access / Work Practices & personnel transfer**

Comments:





1. All walkways were clear of obstructions and tripping hazards.
2. During boarding the vessel, the gangway angle of inclination was less than 30 degrees from the horizontal.
3. Both side embarkation ladder for the life raft noted in satisfactory condition.
4. Work vests were provided at both ends of gangway.
5. Personnel boarding platform temporarily installed at both side stern corner and secured with nuts and bolts.
6. Ship-specific plans and procedures for the recovery of persons from the water was available on board. (Not approved by Class)

For personnel Transfer, does the vessel have a safe loading/landing zone clearly marked?

The angles of inclination of a gangway or accommodation ladder shall be kept within the limits for which it is designed, is the angle of inclination less than 30 degrees from the horizontal?

When the inboard end of the gangway rests on or is flush with the top of the bulwark, is a bulwark ladder provided? (Gangway shall not rest on ship rails unless it has been reinforced for that purpose)?

Is the gangway adequately secured on board the vessel?

Is a life ring with a self activating light and buoyant safety line attached and available adjacent to the gangway location?

Are both ends of the gangway suitably lighted to reduce falling and tripping hazards?

Are PFDs used when using gangways?

Walkways clear? Proper lighting? Walkways clear of tripping hazards. Appropriate trash cans? Designated smoking areas? Electronic communications devices in use intrinsically safe? Control of entry/exit on the work site?

### S1.9 Cargo Handling / Crane Operations / Electrical / Tools / life saving appliances

Comments:

1. Webbing sling used for securing cargo.
2. Guards in place for energized moving parts.
3. Emergency drills schedule was posted and carried out, record of drills was kept in file.
4. Cargo Securing Manual was found on board. (Approve by class)
5. The correct tools are used on board appropriate for the job being carried out.
6. Protection guards are in place for moving parts on machinery, and tools (eg. Grinders)
7. There were 6 x 440 V reefer sockets available on board.
8. Scrambling nets on both sides were in satisfactory condition and length enough to waterline.

Does the vessel utilize ratchet type chain binders for securing of cargo (this is the type allowed)?

Does vessel have boomer / stored energy type chain binders (this type of chain is not allowed for cargo securing)?

Has a JSA been completed and are the use of taglines included?

Are tag lines of ¼" natural fibre material and 15 to 20 feet in length?

Is cargo loaded with adequate access lanes for crew members to pass?

Does the vessel have all slings stored on racks when not in use?

Do cranes and other lifting equipment on board the vessel have current certification?

Is movement warning devices installed for cranes?

Launching and Recovery system (LARS) where applicable - Davit, tackles, winches and wires – is this equipment being properly surveyed and inspected and included in the vessels survey system?

Is load limit visibly identifiable on the crane?

Crane Log books available and current?

Are power tools grounded or double insulated?

Are appropriate tools used for each job?

Guards in place for energized moving parts?

Vessel complies with lifesaving appliance Standards.

Do on board policies and procedures state clearly that "Personnel shall not be placed in lifeboats, rescue boats or liferafts during a drill while these are being raised or lowered.

**Minimum 6 X 440V Reefer Sockets on deck for reefer containers (AHTS and PSVs)**

Are survival craft / FRC and/or boats tested and drills held in accordance with ISM Manual, SOLAS, LSA Code and all applicable flag and port state regulations?

Does evidence exist that survival craft and other FRCs or support boats aboard are operated in accordance with manufacturers manuals including the evidence of safety alerts and manufacturers updates

Check validity and accuracy of the training manuals in use on the vessel/unit

Check maintenance records of all support boats or lifeboats including wire falls, release mechanisms. Examine last test and test frequency

### S1.10 Special Focus Areas- Towing and Anchor Handling Operations

Comments:





Vessel was not fitted with Anchor handling equipment.

Bollard Pull Certificate within 5 years

Stern Bollard Pull Certificate (Bow Towing for Terminal Support Vessels)

Main tow wire less than 1 year service life at start of contract (Terminal Support vessels will require bow tow wire renewed every year)

Main tow wire in compliance to IMO Guidance for safe Ocean Towing MSC 884 with respect to length and Maximum Breaking Load

Annual re-termination and destruct test of tow wire

Main Tow wire end for ended every 2 years

Tow wire Maintenance Logs

Tow wire log records as per MSC 884

Condition and age of spare tow wire

Tow Operations Manual to contain reference to wire handling

No towing from hook (if fitted)

No use of polypropylene ropes for towing allowed

Condition and operation of remote securing devices

Conduct brake slip test for towing and work winches.

- Ensure the Dog is disengaged
- Place winch in the lowest gear
- Set brake to full
- Power winch to full

Test Emergency Release for Tow and AH drums

Sufficient manning such as additional Master or additional deck crew for 24 hours AH operations



**S2.1 OBSERVATIONS (INCLUDING NOTES OF ANY HARD STOPS and any SWA ISSUED)**

OBSERVATION CONSEQ No.	DETAILS	CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE
	<b>SUPO preliminary defect &amp; observation check list</b>	
S 1.1	Fuel hose was supplied in Sept 2021. Last annual hose test was conducted on 22 May 22.	Information
S 1.1	Fuel transfer flow meter last calibrated on 03 May 2021.	Information
S 1.1	TODO tank unit and TODO hose unit with certificate were available on board.	Information
S 1.1	Breakaway coupling was available on board. Last hydro test of MBC was conducted on 22 May 2022.	Information
S 1.1	Last fuel oil hose test together with TODO hose unit were conducted in May 2022.	Information
S 1.5	Stern mooring platform was in good condition.	Information
S 1.5	Snap back zones were clearly marked on deck	Information
	<b>Inspection Focus Area</b>	
	<b>1. Supply Operation</b>	
1	Cargo Securing manual was approved by BV Class.	Information
2	Tugger winch wires with Type-C end termination fitting were newly supply in August 2017.	Information
3	Cargo securing gear register sighted and up to date.	Information
4	Certificate of Fitness or Document of Compliance for the carriage of dangerous Goods available on board. (Issued on 13 December 2018)	Information
		Information
	<b>2. Documentation</b>	
5	MLC Certificate available on board.	Information
6	IEEC Certificate is available on board.	Information
7	Plans and Procedures for Recovery of Persons as per requirements of MSC.1/Circ.1447 were available on board.	Information
8	Garbage Record book available on board and updated.	Information
9	Bridging document between UWO and Chevron - available on board.	Information
	<b>3. Crane and Lifting Equipment</b>	



OBSERVATION CONSEQ No.	DETAILS	CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE
10	3T SWL deck care was carried out last annual inspection and load test - 01 Nov 2021.	Information
11	Last annual inspection of rescue boat Davit - 01 Nov 2021	Information
	<b>4. Personnel Transfer Operations</b>	
12	For personnel transfer, safe loading/landing zone were clearly marked on the deck.	Information
13	There was no personnel basket provided on board, use personnel baskets from rig/platform.	Information
14	Used of T-card system for monitoring personal movement.	Information
15	Man overboard alarm was fitted on board.	Information
	<b>5. Hose Management</b>	
16	Bunker hose is TODO type connection and provided with breakaway coupling.	Information
17	8 pcs of flotation collars were provided for bunker and freshwater hoses.	Information
18	Real time fuel monitoring system were installed on 7 April 2018. Calibration certificate - 13 May 2020	Information
	<b>6. Stern Mooring to Platforms</b>	
19	Panama fairlead were in satisfactory condition	Information
20	JSA for stern mooring to the platform are in place with specific limitation of wind/sea state.	Information
21	Mooring ropes use for stern mooring were in satisfactory condition.	Information
	<b>7. Accommodation</b>	
22	Noise level measurement were carried out on 10 Feb 2022.	Information
23	CCTV was installed in accommodation area.	Information
24	Smoking Room was located on deck.	Information
	<b>8. Power Management Systems and Testing of Black Out Recovery Procedure</b>	
25	Documented Black Out Recovery Procedures was available on board. - Start up and auto synchronization posted in C/R - Start up procedure for Em'Cy Gen posted in Em'Cy Gen room - List of critical equipment powered by Em'Cy Gen posted in C/R - Generator Power configuration drawing posted in C/R	Information
26	Last Black out and Recovery Drill was conducted on 31 July 2022.	Information



OBSERVATION CONSEQ No.	DETAILS	CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE
	<b>9. Project Inspection Items</b>	
27	Project plan was available on board.	Information
28	Project kick off meeting will plan to conduct prior vessel depart for offshore.	Information
	<b>Other</b>	
29	There were no smoke hoods available in the passenger cabin ( EEBD were fitted on board )	Information
30	Last Gyro compass annual service - 01 April 2022	Information
31	Survey equipment installation is in progress	Information

CONCLUDING STATEMENT	
<p>MSRE RATING</p> <p>The Marine Inspector shall make an overall assessment of the vessel and choose a rating based upon his overall impression of the contractor's safety management systems, procedures and practices witnessed.</p> <p>Inspector shall (type either A, B, C or D in the right-hand box) using the following scale as guidance: -</p> <p>D= Less than 70%    C= 70-79%    B= 80-89%    A= 90% or above</p>	<b>B+</b>



Chevron Upstream (CU)  
Upstream Marine Standard  
OVID Supplement R14

SUPO

Inspector Name	Chatchai Arunrat
Department / Inspecting Company	LOC

Chevron Upstream & Gas is fully committed to Operational Excellence in maritime safety, reliability and efficiency (MSRE) and the global Upstream Marine Standard. Please use the contact details above at any time for guidance or advice relating to maritime safety, operational standards or compliance issues. Chevron Upstream & Gas (CUG) fully support use of **OVID** the Offshore Vessel Inspection Database (OCIMF) and encourage Operators use of **OVMSA**, Offshore Vessel Management and Self Assessment (OCIMF).

[One Upstream Marine Standard](#) | [One risk management process](#) | [Zero incidents](#)

## APPENDIX 1- CHESM/MSW FIELD VERIFICATION

### CHESM/MSW Field Verification

Instructions: All information in sections A, B and C must be completed. Information in section B related to subcontractors should be obtained from the work crew if possible. If info is unavailable, leave blank. In section C, only items applicable to the work being performed must be completed. For example, if you are observing a confined space entry job, you will complete items Confined Space Entry, IHE and Portable Gas Detection at a minimum.

### General Information

#### A. Person Conducting Verification

Name: Chatchai Arunrat

CAI:

Functional Group (circle): Maintenance

#### B. Verification Information

Engagement Location: Thailand

Date of Engagement: 14/09/2022

Specific Location: Songkhla

Time of Day (Day/Night): Day

Workforce Type (circle): Mixed Crew



Chevron Upstream (CU)  
Upstream Marine Standard  
OVID Supplement R14

SUPO

Company Name: Uniwise Offshore		
Is the Work Crew a subcontractor of a primary contractor (circle): Yes		
If yes, name of primary company:		
Check all specialized activity that was being conducted during the verification:		
<input type="checkbox"/> Confined Space	<input type="checkbox"/> Hot Work	<input type="checkbox"/>
<input type="checkbox"/> Diving	<input type="checkbox"/> IHE	<input type="checkbox"/> Work at Height
<input type="checkbox"/> Electrical	<input type="checkbox"/> Lifting and Rigging	<input type="checkbox"/> Other: _____
<input type="checkbox"/>	<input type="checkbox"/> Portable Gas Detection	

Verification Questions

C. Behavior - Check 'Yes' or 'No' for each item listed. If 'No' document reason.

<p><b>Job Safety Analysis (JSA):</b> <i>The task scope was discussed and documented in the following detail:</i></p> <p>1. All steps associated with the work task were identified and documented.</p> <p><i>Hazards &amp; Mitigations were identified, discussed and documented in the following detail:</i></p> <p>2. Hazards associated with each task step were documented.</p> <p>3. Each mitigation was assigned a responsible person.</p> <p>4. Hazards &amp; mitigations were identified based on consequence potential (i.e., with the potential to cause serious injury or fatality death) were documented.</p> <p>5. Hazards &amp; mitigations identified were appropriate for the work task.</p> <p><i>Mitigations were completed and documented in the following detail:</i></p> <p>6. Each mitigation was verified and individually documented on the JSA prior to starting work.</p> <p><i>Stop work authority:</i></p> <p>7. Stop work situations were discussed and documented on the JSA. SWA policy was communicated to work crew.</p> <p><i>Human Performance</i></p> <p>8. Worker has the training / knowledge to conduct work</p> <p>9. Actions to take if conditions change or unplanned events occur (e.g. stop and seek assistance)</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Comments: JSA were available on board for review. All the working crew discussed and signed the JSA prior commence the work.</p> <p>If condition is change. Stop work and re conduct another JSA prior resume the work.</p>
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<p><b>Short Service Employee Management:</b></p> <p>1. Did work crew contain SSEs? (<i>If 'no', skip questions 2-7</i>).</p> <p>2. Was a SSE Risk Reduction Plan in place? (<i>If 'yes', skip questions 3-7</i>).</p> <p>3. SSEs were visibly identifiable.</p> <p>4A. Was crew size less than 5 workers? (<i>If 'no', skip question 4B</i>).</p> <p>4B. Crew does not contain more than 1 SSE.</p> <p>5A. Was crew size in excess of 5 workers? (<i>If 'no', skip question 5B</i>).</p> <p>5B. Crew does not contain more than 20% SSEs.</p> <p>6. SSEs were assigned mentors.</p> <p>7. Mentors were on site.</p>	<p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Comments:</p>
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<p><b>Emergency Management:</b> <i>Work crews were:</i></p> <p>1. Knowledgeable about facility alarms and muster points.</p> <p>2. Able to explain emergency evacuation procedures.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Comments:</p>
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<b>Permit to Work:</b> <i>Work was permitted in accordance with Chevron permitting requirements:</i> 1. Permits were issued by Authorized Permit Issuer. 2. The task scope was defined on the work permit (and on any specialty permits/certificates). 3. The work conditions under which the permit is <i>valid</i> were discussed and understood by the work crew. 4. A crew member was designated responsibility to monitor and verify work is performed safely and is consistent with the permit conditions.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Comments: PTW system is set up and implemented on board. PTW register is available on board for review.
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<b>D. Supplemental Items – Complete ONLY items applicable to the work being performed during verification.</b>		
<b>Confined Space Work:</b> <i>Confined space work was conducted in accordance with Chevron requirements:</i> 1. Entry to the confined space was controlled at all times by an entry attendant and entry logs were maintained. 2. Initial gas testing was conducted & documented in accordance with the special permit/certificate conditions. 3. Gas monitoring was conducted & documented in accordance with the special permit/certificate conditions. 4. All permits were documented and kept onsite with the work package. 5A. Did the confined space contain special hazardous characteristics? ( <i>If 'no', skip questions 5B &amp; 5C.</i> ) 5B. Rescue teams and equipment were readily available. 5C. Rescue plans were documented and communicated to the work crew.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments: No work had been carried out during the time of inspection.





D. Supplemental Items – Complete ONLY items applicable to the work being performed during verification.

<p><b>Commercial Diving Work:</b> <i>Commercial diving work was conducted in accordance with Chevron requirements:</i></p> <ol style="list-style-type: none"> <li>1. A dedicated dive supervisor, working diver, stand-by diver, tender for the working diver and tender for the stand-by diver were onsite at a minimum.</li> <li>2. All diving equipment was inspected prior to use; inspections were documented.</li> <li>3. Rescue plans were developed, documented and communicated to the work crew.</li> <li>4. Conditions under which the dive must be terminated were documented and discussed with the work crew.</li> <li>5. The diving was conducted in accordance with the special permit/certificate conditions.</li> <li>6. All permits were documented and kept onsite with the work package.</li> </ol>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Comments:</p>
<p><b>Electrical Work:</b> <i>Electrical work was conducted in accordance with Chevron requirements:</i></p> <ol style="list-style-type: none"> <li>1. Electrical systems, power lines, equipment and parts were placed in an electrically safe work condition prior to starting work (e.g. de-energized, isolated, etc.)</li> <li>2. Access to the electrical work area was restricted and safe work zones were visibly identifiable.</li> <li>3. Grounding and bonding was in place to prevent static accumulation and discharge during transfer activity.</li> <li>4. Electrical work was conducted in accordance with all permitted conditions.</li> <li>5. All permits and hazard analyses (e.g. shock &amp; arc flash, JSA, etc.) were documented and kept onsite with the work package.</li> <li>6A. Was electrical work conducted inside the limited approach boundary? <i>(If 'no', skip questions 6B &amp; 6C.)</i></li> <li>6B. Only qualified electrical personnel worked inside the limited approach boundary.</li> <li>6C. A qualified electrical stand-by person was onsite.</li> <li>7A. Was electrical work conducted on or around overhead power lines? <i>(If 'no', skip question 7B.)</i></li> <li>7B. Equipment (including mobile equipment) maintained minimum clearance distances from overhead power lines.</li> </ol>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Comments:</p>



D. Supplemental Items – Complete ONLY items applicable to the work being performed during verification.

<b>Hot Work</b> <i>Hot work was conducted in accordance with Chevron requirements:</i> <ol style="list-style-type: none"> <li>Hot work was conducted in accordance with the special permit/certificate conditions (if not conducted in a designated safe hot work area).</li> <li>Initial gas testing was conducted &amp; documented in accordance with the special permit/certificate conditions.</li> <li>Gas monitoring was conducted &amp; documented in accordance with the special permit/certificate conditions.</li> <li>A dedicated fire watch was onsite to monitor work conditions.</li> <li>Access to the hot work area was controlled and visible barriers/warning displays were erected.</li> <li>Dedicated fire-fighting equipment (e.g. fire extinguishers, hoses, etc.) was onsite and available for immediate response.</li> <li>All permits were documented and kept onsite with the work package.</li> </ol>	<input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments:
<b>Isolation of Hazardous Energy:</b> <i>Potentially hazardous energy (including electrical, mechanical, hydraulic, pneumatic, kinetic, thermal, chemical, etc.) was isolated in accordance with Chevron requirements:</i> <ol style="list-style-type: none"> <li>Locks and tags used for isolations indicated the identity of the individual who applied the device.</li> <li>Lockout devices were used to place equipment in a safe working condition or off position.</li> <li>Isolations were visibly verified and isolation points were documented in an isolation log, checklist or special permit/certificate prior to starting work.</li> <li>Isolations were communicated to the work crew and all other impacted work crews.</li> <li>All permits were documented and kept onsite with the work package.</li> </ol>	<input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments:
<b>Lifting and Rigging:</b> <i>Lifting and rigging work was performed in accordance with Chevron requirements:</i> <ol style="list-style-type: none"> <li>Non-certified fabricated or modified lifting and rigging equipment was not used.</li> <li>Lifting and rigging equipment was inspected prior to use; inspections were documented.</li> <li>Pick up and lay down zones were established and visible and free of obstructions, debris and personnel.</li> <li>Lifting and rigging work was conducted by qualified/certified operators, riggers and signalmen.</li> <li>5A. Was the lift a critical and/or non-routine lift (including complicated, complex, heavy, blind and personnel lifts)? <i>(If 'no' skip question 5B.)</i></li> <li>5B. A lift plan was documented and kept onsite with the work package.</li> <li>6A. Was the lift being conducted around/near overhead power lines? <i>(If 'no', skip question 6B.)</i></li> <li>6B. Lifting and rigging equipment maintained minimum clearance distances from overhead power lines.</li> </ol>	<input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No  <input type="checkbox"/> Yes <input type="checkbox"/> No	Comments:

D. Supplemental Items – Complete ONLY items applicable to the work being performed during verification.

<b>Portable Gas Detection:</b>		Comments:
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<p><i>Gas detection was conducted in accordance with Chevron requirements:</i></p> <ol style="list-style-type: none"><li>1. Gas testing was conducted; results were documented and within acceptable limits prior to starting work activity.</li><li>2. Portable gas detection equipment was functional/bump tested prior to use (daily).</li><li>3. Gas testing was performed by a qualified gas tester.</li></ol>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	
<p><b>Work at Heights:</b> <i>Work at height was conducted in accordance with Chevron requirements:</i></p> <ol style="list-style-type: none"><li>1. Crew members working at height wore fall prevention gear.</li><li>2. Rescue teams and equipment were readily available to respond to work at height emergencies.</li><li>3. Rescue plans for work at height were documented and communicated to the work crew.</li><li>4. A safety standby was onsite while work was performed at height to monitor work conditions and notify rescue personnel in the event of a fall.</li><li>5. All permits were documented and kept onsite with the work package.</li><li>6A. Did the work at height involve the erecting, modifying and/or dismantling of scaffolding? (<i>If 'no', skip question 6B.</i>)</li><li>6B. Scaffolding was inspected prior to use; inspections were documented.</li><li>7A. Did the work at height take place around/near overhead power lines? (<i>If 'no', skip question 7B.</i>)</li><li>7B. Equipment (e.g. scaffolds, MEWPS, etc.) maintained minimum clearance distances from overhead power lines.</li></ol>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Comments:</p>

Was feedback provided to the work team during the close-out of this engagement? ☒ Yes ☐ No

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One Upstream Marine Standard | One risk management process | Zero incidents



# Chevron Marine Standard Non-Tankers OVID Supplement R15

**SUPO**

SUPO INSPECTION DATE		15 Nov 2022		OVID DETAILS	
VESSEL NAME		Uniexpress 23		LAST OVIQ INSPECTION DATE	
INSPECTORS NAME		Chatchai Arunrat		LAST OVIQ PORT OF INSPECTION	
MASTERS NAME		Capt. Dusit Wisitphaiboon		LAST OVIQ INSPECTION COMMISSIONING COMPANY	
PORT OF INSPECTION		Sattahip Port		DATE OF OVPQ LAST UPDATED	
<b>Risk Management</b> <b>Processes or tasks undertaken</b> <i>Inspector to tick any applicable activity undertaken during inspection visit</i>		Annual OVIQ Supplement Promote / conduct BBS training or observation Safety Equipment Condition Observations OE & tenets of operation or Stop Work Authority Toolbox talks or pre-Ops or regular Safety Meeting Follow Up / Confirm Close Out of CARs / OVIS Work scope of vessel Table 5 Chevron Marine Standard Non-Tankers ( eg DP,Towing, Supply, IMR, Diving etc)		x Pre-Mobilization OVIQ Supplement Random Fuel Check JSA and / or PTW II&R Investigation Masters Briefing or Crew training Overall, Vessel Random inspection Management engagement visit x	
<b>Vessel Particulars (complete all sections for all scope vessels)</b>					
Maximum transit speed		25.0 kts		Fuel consumption. @ Maximum Transit speed (m <sup>3</sup> /24 hrs)	
Economical transit speed		16.0 kts		Fuel consumption. @ Econ Transit speed (m <sup>3</sup> /24 hrs)	
Fuel consumption @ DP operations moderate met conditions (m <sup>3</sup> /24 hrs)		12.09 m3		Fuel consumption. @ Port stand-by (m <sup>3</sup> /24 hrs) Port standby	
Certified Bollard Pull (if applicable)		NA		Date & place of last dry dock	
				23-03-2021- Unithai shipyard - Songkhla port	
<b>Anchor Handling (AHTS) Vessels ONLY</b>					
Sharks jaws or Karm forks fitted Yes/No?		N/A		Note: Pelican hooks NOT permitted under any circumstances No towing hooks and soft line towing permitted	
Length of tow wire: (m)		N/A		Tow wire acceptable condition? Check PMS of Towline, Towing log and time in use.	
Length of spare tow wire: (m)		N/A		Spare tow wire acceptable condition and terminated?	
Length of work wire: (m)		N/A		Work wire acceptable condition? Check PMS of Work wire and time in use . Certification in order?	
Tow pin SWL: (MT)		N/A		Stern roller SWL and condition	
Karm Forks in good order?		N/A		Sharks jaws in good order?	
Winches MUST be fitted with Tension meters Confirm (Y/N)		N/A		All wires fitted with Gold nose socket - Confirm (Y/N)	
<b>Standards</b> Corporate Marine Safety, Reliability & Efficiency (MSRE) Standards Applicable. 2022 Chevron Marine Standard Non-Tankers MSRE Standardized OE Process Ref 1.4.4, 1.4.5 CMSOPM Rev 5 - Competency Management Table 1 Marine Vessel Inspections Periodically issued Corporate MSRE Marine Notices for Chevron Marine Standard Non-tankers execution & management policies					
<b>Application</b>					



# Chevron Marine Standard Non-Tankers OVID Supplement R15

# SUPO

This Supplement shall be completed by a CVX inspector a Supplement to the standard OVID Annual Inspection for in-scope vessels & units. All applicable vessels/units are required to hold a valid Annual OVIQ & SUPO. This checklist provides assurance against specific Marine requirements contained within the Chevron Marine Standard Non-Tankers. This checklist includes the latest developments in standards.

**Inspection Note:** Inspectors must complete Pages 1 and 2 initially. If any Negative findings in TABLES1 OR 2 (Hard Stops) are observed, vessel is not permitted to Operate. Inspectors should contact the TBU MSRE Process Authority in any instances of Hard Stops.

**SUPO TABLE 1 Hard-Stop Marine requirements** (Section to be completed for All Vessels of any size)

ITEM	YES	NO
Certificate of Registry or Certificate of Survey	Y	
Safe Manning Certificate or Certificate Annual Survey	Y	
Certificate of Class	Y	
OVID. All Vessels working to <u>offshore locations</u> (>1NM from shore) shall be required to hold a valid Annual OVIQ inspection lodged in the OVID system	Y	
SMS - All Vessels working to <u>offshore locations</u> (>1NM from shore) shall be required to hold a functionally appropriate SMS. The Safety management system shall be equivalent in scope to ISM Code (International Management Code for the Safe Operation of Ships and for Pollution Prevention) and suitable for size of vessel.	Y	
Crew Certificates (may be included in Survey Certificate)	Y	
SRC Safety Radio Certificate (for vessels >300 GT only)	Y	
Approved plans - GA. Must reflect current fit/design of vessel	Y	
Approved plans - LSA-FFA Plan. Must reflect current fit/design of vessel	Y	
Inspector to verify Master holds current Chevron Marine Standard Non- Tankers and ALL in-force Marine Notices on bridge (Applicable to vessels already on-hire or have been on-hire. NOT Hard stop for vessels new to Chevron)	Y	

**SUPO TABLE 2 CUG Hard-Stop Marine requirements** (In addition to TABLE 1, TABLE 2 to be completed for ALL Vessels >500 GT)

ITEM	YES	NO
SMS (Safety Management Certificate)	Y	
DOC (Document of Compliance)	Y	
Load Line Certificate	Y	
SCC Safety Construction Certificate (for vessels >500 GT only)	Y	
SEC Safety Equipment Certificate	Y	
SRC Safety Radio Certificate	Y	
IOPP Cert	Y	
IAPP Cert (vessels >400 GT)	Y	
ISPS Cert		N/A
Safe Manning Certificate	Y	
Port health certificate	Y	
First Aid / Medicine Chest certification and validity	Y	
Is there a qualified medic on board and do they have sufficient equipment and facilities for the intended POB		N/A
Approved tank calibration tables and approved stability information booklet (must be Class/Flag approved)	Y	
Vessel holds checks of all navigational equipment and holds a critical equipment inventory list	Y	
Fire extinguishers and fixed firefighting systems certificates	Y	
EPIRB Cert or in date stamp on unit	Y	
SART Cert or in date stamp on unit	Y	
Life Rafts Servicing Certificates	Y	
FRC Certification, maintenance, training and launching and recovery arrangements	Y	N/A
Marine crew STCW Certificates (all vessels) & all DP operational personnel certification (DP vessels)	Y	
Instruction Manuals and evidence of procedures of all key equipment	Y	
Functional PMS Planned Maintenance System in operation & verified including engine room PMS records	Y	
Valid Insurance Cover Certificates P&I and H&M & Employers Liability Insurance Cover	Y	
Physical Check of close-out items from all previous inspections (OVIQ and/or SUPO / RDM inspections)	Y	
Is the vessel >20 years of age (hull age, <u>not</u> rebuilt year/age)? If YES, does it comply with requirements of Chevron Marine Standard Non-Tankers Section 2.5: Older Vessel assurance		N/A
Special Purpose Ship Certification (SPS) for Offshore Support Vessels carrying Special Purpose Crew e.g. DSVs, Offshore Construction Vessels. If no SPS, then Dispensation Notification issued by Flag state		N/A
International Energy Efficiency Certificate (IEEC) and Shipboard Energy Efficiency Management Plan (SEEMP) (for vessels>400GRT)		N/A
Drills for Enclosed Space Entry as per new SOLAS requirements-(Drills-minimum once every 2 months)-IMO A (1051/27)		No
Plans and procedures for the recovery of persons from the water as per requirements of MSC.1/Circ.1447	Y	
Wreck Removal Liability Insurance Certificate (WRC).		N/A
Maritime Labour Certificate (MLC 2006) and Document of Maritime Labour Compliance		N/A
Written Black-Out Procedure- Start-up Instructions of Critical Equipment following power black-out	Y	
No Conditions of Class in Class Survey Status Report		No

**SUPO TABLE1 & TABLE2 Application Note:** The above requirements must be checked at the beginning of any marine inspection. Inspectors shall use the Section applicable for the size of vessel being inspected ONLY. Any failure (NO) in the above shall mean halt of operations/rejection and/or SWA.



# Chevron Marine Standard Non-Tankers OVID Supplement R15

**SUPO**

No vessel shall be acceptable where basic trading, flag or port state safety certification is deficient. All items shall be confirmed YES, prior to ANY Operations.

## S1.1 Transfer of Fuel Oil and Hazardous Liquids / Waste Management Plan

Comments:

1. MSDS Datasheet for last bunker fuel supply as per SOLAS Annex VI was available on board.
2. All wastes properly segregated and disposed.
3. SBU Marine Notices relating to hose transfer operation was available on board the vessel.
4. Diesel hoses were available on board.
5. Bunker manifold ( TODO ) type was available on board.
6. Fuel flow meter for fuel transfer and real time flow meter were installed on board.
7. MBC manufacture certificate was available on board.

Does the vessel have quick dry disconnect fittings (i.e., TODO fittings) for use in hazardous liquid transfers? If not, what types of fittings are used?

Appropriate fittings are used for hazardous liquid transfers over water?

Inspector to ask for MSDS Datasheet for last bunker fuel supply as per SOLAS Annex VI

Are there adequate labelling systems for all the chemicals used on board?

Are all hoses fitted with sufficient floatation collars as per CMSOPM Rev.5 section 22.5.6 Hose Sizes and Flotation ?

Ensure all bulk hoses are supplied and make use of self-sealing couplings for pollutants

Ensure that all hoses have breakaway (weak link) couplings for pollutants and use them when the unmoored vessel is engaged in bulk liquid transfer to or from an installation. An example of an acceptable system is G-OMO Bulk Hose Best Practice Guidelines which along with other reference material is available through the MSRE Process Authority.

Are any Corporate or TBU Marine Notices relating to hose transfer operations held aboard the vessel bridge? Inspector to positively verify

Are all wastes properly segregated and disposed?

Fuel flow meters for supply/transfer and engine consumption fitted and calibrated every 2.5 years

## S1.2 Safety Management / Personal Protective Equipment

Comments:

1. Stop work had been implemented on board.
2. BBS system in operation and being used by all personnel on board.
3. Rotating machineries in engine room were fitted with adequate guards.
4. All crew have received Chevron Safety Orientation.
5. Proper & adequate Personal Protective Equipment provided for all crew members.

Have all crew received a TBU specific Chevron Safety Orientation, OE and SWA familiarization?

Are Behaviour Based Safety observations recorded and feedback provided? Note on board BBS system in use

Is the Behaviour Based Safety process actively led by Supervisors?

Is there evidence of knowledge of Stop Work Authority on board? Ensure awareness of the ethos.

When was the last date Stop Work Authority used and re-enforced by Supervisors?

Is all rotating machinery as installed fitted with adequate guards?

Are Start Work Checks or equivalent checks being conducted on board?

Are proper & adequate Personal Protective Equipment provided for all crew members & few reserves for replacement & visitors?

## S1.3 Hazard Identification / Standards of management & Culture

Comments:

1. Bridging document was available on board. However, document was not signed by update Chevron Logistic Manager)
2. JSA's completed prior to work.
3. Permits to Work completed when required.
4. PTW includes SWA statement.
5. The accident/incident investigation (II&R) OE Process was understood by Master and crew.
6. Log out/Tag out procedure was implemented on board.





# Chevron Marine Standard Non-Tankers OVID Supplement R15

**SUPO**

Is the Master holding a work or chart specific bridging document which clearly explains which operating Standards are in place and effectively clarifies marine interface and Standards between all stakeholders (TBU, Operator and subcontractor(s)) with personnel active aboard the vessel?

JSA is completed before start of any work?

Did the whole crew participate in filling out the JSA and sign off?

New JSA filled out when a change occurred (weather, people, work tasks)?

Task steps written out (not pre-filled in) to perform the job? Include site specific considerations? Procedure use?

Hazards identified and addressed & evidence all POB observed following the written steps or procedures?

Are all crew and subcontractors aboard aware of the "Stop Work Authority" principles?

Has the last 12 months accident incident statistics, particularly root cause analysis available to Inspector and reviewed? Note: The OVID should give a clear indication of the adequacy of the systems and implementation on board.

Is the accident/incident investigation (II&R and MSRE) OE Processes understood by Master and all crew.

Are the procedures for isolations followed?

## S1.4 Safety management & crew involvement

Comments:

1. Safety induction had been conducted on board for all personnel.
2. Chief Officer elected as Safety Officer.
3. Vessel Crew Marine, Passengers. Shore side Contractors and Visitors receive Safety Induction /Familiarisation Briefing.
4. The Emergency Response Plan relates to the risks relevant to the vessel's operations.
5. SBU Marine notice & CMSOPM documents were available on board.
6. Updated field chart, anchor pattern, navigation hazards were available on board.

Are regular Safety Committee Meetings held and do the crew participate in them? Verify minutes and actions of last meeting.

Does the vessel have a copy of the current Chevron Marine Standard Non-Tankers and any in-force Corporate or TBU Marine Notices aboard?

Is there a Safety Induction System in place?

Does the Emergency Response Plan relate to the risks relevant to the vessel's operations?

Are Start Work checks as per CMSOPM rev 5 -Safety Culture section 11.0 in Place?

Is the OCIMF document "Deck Cargo Management Onboard Offshore Vessels and a MOPD "as per CMSOPM rev 5 -Safety Culture section 12.0 Safe Deck Operations in Place?

## S1.5 Mooring system design review & Safety re-enforcement

Comments:

1. Hazardous zones and trip areas clearly marked.
2. Intrinsically safe VHF's were provided for each mooring station.
3. Bollards indicate SWL marked.
4. Snap Back was marked on deck

Marine Inspector shall undertake a review of the mooring arrangements & procedures in place in each vessel:

Vessel specific procedures shall be in place to address all towing contingencies and should include such items as; equipment available, towage arrangements, stowage positions, connection arrangements, securing points and training of personnel in particular with regard to line throwing appliances and instructions to those receiving.

Check Tow log, PMS and wire Management process on vessel and identify any gaps? (e.g. Wire age, last end to end, wire replacement schedule)

Are Chevron TBU Marine Notices relating to offshore Mooring located on board and contents known to crew?

Check maintenance of equipment. Condition of mooring ropes, stoppers, greasing of deck machinery & fairleads.

Ensure effective supervision is provided during mooring, particularly for inexperienced seamen.

Ensure comprehensive JSAs are implemented prior to any mooring activity. Ensure Stop Work Authority is reinforced

Are hazardous zones, trip hazards clearly marked? Check and ensure snapback zones are clearly marked in YELLOW.

Check effective means of communication with bridge

Assess design of capstans or windlasses for potential weakness e.g. slips, trip hazards, hand injuries, bights, line of fire. Suggest alternatives where applicable.

## S1.6 Competency Management (Qualification of Officers) Requirements in CMSOPM rev.5 Section Marine Personnel Table 1-3

DECK OFFICERS	Master	Chief Mate	Second Mate	Sr.DPO
Nationality	Thai	Thai	Thai	
STCW Certificate Current (Yes/No)	Yes	Yes	Yes	





# Chevron Marine Standard Non-Tankers OVID Supplement R15

# SUPO

Years with company	12	9	5	
Years in rank	7	5	7	
Years on this type of vessel	7	5	2	
DP Vessels (if applicable): Full DPO Certification (Yes/No)	N/A	N/A	N/A	
<b>Anchor Handling</b> Vessels ONLY: Min Experience as Master	N/A	N/A	N/A	
<b>Anchor Handling</b> Vessels ONLY: Year's Experience as Chief Mate	N/A	N/A	N/A	
ENGINEERING OFFICERS	Chief Engineer	ETO	Second Engineer	Third Engineer
Nationality	Thai		Thai	
STCW Certificate Current (Yes/No)	Yes		Yes	
Years with company	10		12	
Years in rank	5		10	
Years on this type of vessel	10		10	
Years on DP Vessels (if applicable)	N/A		N/A	
<b>Anchor Handling</b> Vessels ONLY: Years' Experience as Chief Engineer	N/A		N/A	
<b>Anchor Handling</b> Vessels ONLY: Years' Experience as Engineer	N/A		N/A	

## S1.7 DP System Verification

Comments:

DP system was not fitted on board.

### Current Chevron Marine Standard Non-Tankers - Section 2.4

All DP vessels or MOUs shall comply with the current version of Marine Technology Society (MTS) DP Operations Guidance and Appendices, including associated references. The MTS DP Operations Guidance and Appendices is written as "guidance", but for the purposes of this Standard the contents shall be interpreted as requirements.

Marine Inspector shall undertake a review of the DP System & operation using an TBU DP Verification process (Current MTS Standard):

Is there an Electronic Technician or Engineer on board with approved training on the DP system? If answer NO, issue HARD STOP and contact TBU MSRE Marine Authority.

Are DP footprints regularly recorded and compared against previous footprints and the DP Capability Plots?

Are project related factors such as pipelay loads considered?

Does the vessel/unit use the IMCA Incident reporting system?

Have all personnel involved in DP operations read and understood the FME(C)A?

FMEA details and last revision should be noted. Is FMEA < 5 years old?

Check most recent Annual trials details

Check the version of the DP software in use and if system is not supported by the Manufacturer what is the mitigation on board?

Is ASOG or WSOG (MODU) limit setting agreement in place for current or intended operations? If answer NO, issue HARD STOP and contact TBU MSRE Process Authority

Check operations manuals, maintenance and guidance materials using Current MTS Standard template.

If an eDPAP is applicable as per the current Chevron Marine Standard Non-Tankers, verify the date it was implemented

## S1.8 Vessel Access / Work Practices & personnel transfer

Comments:

1. Personnel transfer area was marked on deck.
2. PFD were used and available on deck.
3. Intrinsically safe portable radios were provided on board.

For personnel Transfer, does the vessel have a safe loading/landing zone clearly marked?

The angles of inclination of a gangway or accommodation ladder shall be kept within the limits for which it is designed, is the angle of inclination less than 30 degrees from the horizontal?



When the inboard end of the gangway rests on or is flush with the top of the bulwark, is a bulwark ladder provided? (Gangway shall not rest on ship rails unless it has been reinforced for that purpose)?  
Is the gangway adequately secured on board the vessel?  
Is a life ring with a self-activating light and buoyant safety line attached and available adjacent to the gangway location?  
Are both ends of the gangway suitably lighted to reduce falling and tripping hazards?  
Are PFDs used when using gangways?  
Walkways clear? Proper lighting? Walkways clear of tripping hazards? Appropriate trash cans? Designated smoking areas? Electronic communications devices in use intrinsically safe? Control of entry/exit on the work site?  
If the vessel has a Helideck has it been approved for use by the TBU Aviation team and Regional Aviation Expert.

**S1.9 Cargo Handling / Crane Operations / Electrical / Tools / lifesaving appliances**

Comments:

1. Guards in place for energized moving parts.
2. Emergency drills schedule was posted and carried out, record of drills was kept in file.
3. Cargo Securing Manual was found on board. (Approve by Class)
4. The correct tools are used on board appropriate for the job being carried out.
5. Protection guards are in place for moving parts on machinery, and tools (e.g. Grinders).
6. There were 10 x 440 V reefer sockets were fitted on board.

Does the vessel utilize ratchet type chain binders for securing of cargo (this is the type allowed)?  
Does vessel have boomer / stored energy type chain binders (this type of chain is not allowed for cargo securing)?  
Has a JSA been completed and are the use of taglines included?  
Are tag lines of 1/4" natural fibre material and 15 to 20 feet in length?  
Is cargo loaded with adequate access lanes for crew members to pass?  
Does the vessel have all slings stored on racks when not in use?  
Do cranes and other lifting equipment on board the vessel have current certification? Note the last load test of the cranes.  
Are seals on Knuckle Boom cranes free of any oil leakage on Luffing and Main boom rams?  
Is movement warning devices installed for cranes?  
Launching and Recovery system (LARS) where applicable - Davit, tackles, winches and wires - is this equipment being properly surveyed and inspected and included in the vessels survey system?  
Is load limit visibly identifiable on the crane?  
Crane Log books available and current?  
Are power tools grounded or double insulated?  
Are appropriate tools used for each job?  
Guards in place for energized moving parts?  
Vessel complies with lifesaving appliance Standards?  
Do on board policies and procedures state clearly that "Personnel shall not be placed in lifeboats, rescue boats or liferafts during a drill while these are being raised or lowered."  
Minimum 6 X 440V Reefer Sockets on deck for reefer containers (AHTS and PSVs)  
Are survival craft / FRC and/or boats tested and drills held in accordance with ISM Manual, SOLAS, LSA Code and all applicable flag and port state regulations?  
Does evidence exist that survival craft and other FRCs or support boats aboard are operated in accordance with manufacturers manuals including the evidence of safety alerts and manufacturers updates  
Check validity and accuracy of the training manuals in use on the vessel/unit  
Check maintenance records of all support boats or lifeboats including wire falls, release mechanisms. Examine last test and test frequency.

**S1.10 Special Focus Areas- Towing and Anchor Handling Operations**

Comments:

NA - vessel was not fitted with anchor handling equipment

Bollard Pull Certificate within 5 years  
Stern Bollard Pull Certificate (Bow Towing for Terminal Support Vessels)  
Main tow wire less than 1 year service life at start of contract (Terminal Support vessels will require bow tow wire renewed every year)  
Main tow wire in compliance to IMO Guidelines for Safe Ocean Towing MSC 884 with respect to length and Maximum Breaking Load  
Annual re-termination and destruct test of tow wire  
Main Tow wire end for ended every 2 years  
Tow wire Maintenance Logs and Wire Management plan (e.g. Wire age, last end to end, wire replacement schedule)  
Tow wire log records as per MSC 884  
Condition and age of spare tow wire  
Tow Operations Manual to contain reference to wire handling  
No towing from hook (if fitted)  
No use of polypropylene ropes for towing allowed  
Condition and operation of remote securing devices



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# SUPO

Conduct brake slip test for towing and work winches;

- Ensure the Dog is disengaged
- Place winch in the lowest gear
- Set brake to full
- Power winch to full

Test Emergency Release for Tow and AH drums

Sufficient manning such as additional Master or additional deck crew for 24 hours AH operations

## S2.1 OBSERVATIONS (INCLUDING NOTES OF ANY HARD STOPS and any SWA ISSUED)

OBSERVATION CONSEQ No.	DETAILS	CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE
	SUPO preliminary defect & Observation check list	
S1.1	TODO tank unit and TODO hose unit certificate were available on board.	Information
S 1.1	Last fuel oil hoses test together with TODO hose unit and breakaway couplings (2 Inch hose) were conducted on 02 Mar 2022.	Information
S 1.5	Scrambling nets were found in good condition and long enough to reach water level.	Information
S 1.5	Bridging document was available on board. - Signed by Chevron. However, Bridging document was not update with update Chevron Logistic Manager	Information
S 1.5	Real time flow meter was last calibrated on 11 Oct 2021.	Information
S 1.5	Snap back zones were clearly marked on deck.	Information



	Inspection focus area	
	<b>1. Crew Boat Operations</b>	
1	Class Annual survey was last conducted on 13/06/2022	Information
2	Company approved SMS available on board. SMC Certificate - valid till 23 Sept 2024 by DNV GL	Information
3	Personnel boarding arrangements on the stern of the vessel were found to be in order.	Information
4	Cargo Securing Manual was approved by flag.	Information
	<b>2. Lifting Equipment</b>	
5	Webbing sling certificates were available on board.	Information
6	Lifting certificates and Register for loose lifting equipment, chain block inspection valid within one year. (Last supplied - 16 Aug 2022)	Information
7	Vessel pre Lifting check list was implemented on board.	Information
	<b>3. Hose Management and Fuel Monitoring</b>	
8	Bunker hoses and bunker connections were found in order. Last test was conducted on 02 March 2022.	Information
9	8 sets of floatation collars were provided on board.	Information
10	MBC was fitted on the hose string. Certificate was available on board. Last hydro test was conducted in March 2022 ( Complied with MSN 013 )- original bolts and nuts.	Information
	<b>4. Power Management Systems and Engines</b>	
<b>OBSERVATION CONSEQ No.</b>	<b>DETAILS</b>	<b>CLOSEOUT REMARKS /ACTION FOLLOW-UP DUE DATE</b>
11	Black Out Recovery Procedures was available on board.	Information
12	A/E P running hours - 21144 hrs ; A/E S running hours - 19926 hrs.	Information
13	M/E P running hour 9674 hrs. M/E C running hours - 5369 hrs. M/E S - running hours - 6566 hrs.	Information
	<b>5. Navigational Equipment and Practices</b>	
14	Confirmed that ARPA was installed and functioning.	Information
15	Gyro Compass was fitted on board. Last annual service - 10 Oct 2022.	Information
16	Record passage planning available onboard and fix positions on charts. ( 13/11/2022- From Benchamas field to Sattahip port )	Information
17	Echo Sounder was in satisfactory working condition.	Information
	<b>6. Personnel Transfer Operations</b>	
18	Vessel specific JSAs were in place for personnel transfer operations.	Information
19	Personnel boarding arrangements on the stern of the vessel were found to be in order.	Information
20	Scrambling nets were provided and long enough to reach water.	Information
21	Searchlights/floodlights on Fwd & Stern deck were in good condition.	Information
	<b>7. Sewage Treatment and Oily Waste Disposal</b>	



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# SUPO

22	Sewage Treatment Plant was tested and found in good working condition.	Information
23	Approved OWS installed on board.	Information
24	15 PPM audible alarm was tested and found in order. Certificate date on 05 Feb 2018.	Information
25	Overboard valve was locked and sealed	Information
	<b>Other</b>	
26	There were four crew on board had trained for HAZMAT Training Course.	Information
27	Maintenance certificate of Kobelt control system by third parties was conducted on 8 Nov 2018.	Information
28	Last confined space drill was conducted on 05 Sept 2022	Observation

CONCLUDING STATEMENT		
<p>MSRE RATING</p> <p>The Marine Inspector shall make an overall assessment of the vessel and choose a rating based upon his overall impression of the contractor's safety management systems, procedures and practices witnessed.</p> <p>Inspector shall (type either A, B, C or D in the right-hand box) using the following scale as guidance: -</p> <p>D= Less than 70%    C= 70-79%    B= 80-89%    A= 90% or above</p>		<p>MSRE RATING GIVEN</p> <p><b>B+</b></p>
Inspector Name	Chatchai Arunrat	
Department / Inspecting Company	LOC Laemchabang	



## Chevron Marine Standard Non-Tankers OVID Supplement R15

**SUPO**

Chevron Upstream & Gas is fully committed to Operational Excellence in maritime safety, reliability and efficiency (MSRE) and the global Upstream Marine Standard. Please use the contact details above at any time for guidance or advice relating to maritime safety, operational standards or compliance issues. Chevron Upstream & Gas (CUG) fully support use of OVID the Offshore Vessel Inspection Database (OCIMF) and encourage Operators use of OVMSA, Offshore Vessel Management and Self Assessment (OCIMF).

One Upstream Marine Standard | One risk management process | Zero incidents

ภาคผนวก 28

รายงานการตรวจสอบสภาพท่อภายนอก (*Pipeline/Riser Inspection*)





Revision	Date	Reason for Issue/Change	CMOR #	Enter by
1	23-Mar-17	To initial jobcard of inspection program to JDE	NA	Napaporn C.
2	07-Sep-15	Update Template Inspection Jobcard	0707/17	Patiparn K.

FIELD: Berchamas.WORK ORDER: 1179393PLATFORM: LAMBTAG/CIRCUIT NO: 10-LAPLB-R

REPRESENTATIVE OF: \_\_\_\_\_

EQUIPMENT TYPE: ( ) PVI ( ) PPI ( ) FHC ( ☒ ) RCI ( ) BCI ( ) OTHERSINSPECTION TYPE: ( ☒ ) ONSTREAM ( ) FULL**JOB CARD NUMBER:****5Y RCI RISER ONSTREAM INSPECTION - PM****OPT. SEQUENCE: 10****5Y RCI RISER ONSTREAM INSPECTION PM - GOTAI****WORK CENTER:****GOTAI****CREW SIZE DURATION EST.MAN-HRS****RESOURCE DESCRIPTIONS**

3 4 12

ASSET INTEGRITY TEAM

**MFGR, INDUSTRY REFERENCES AND ENGINEERING RECOMMENDATION:**

- API-570
- API-RP-574
- ASME B31.4 / ASME B31.8

**JOB INSTRUCTIONS****ASSET INTEGRITY TASKS:****COMPLETED  
(YES) (NO)****1) PRE-REQUISITE TASKS:**

1.1 OBTAIN WORK PERMIT, REVIEW HA/JSA AND CARRY OUT TOOLBOX MEETING.

( ☒ ) ( ) REMARKS \_\_\_\_\_

1.2 COORDINATE WITH PRODUCTION TO PERFORM RISER CLOSE-UP INSPECTION.

( ☒ ) ( ) REMARKS \_\_\_\_\_**2) RISER CLOSE-UP INSPECTION:**

2.1 PERFORM VISUAL INSPECTION FOR EXTERNAL AND INTERNAL OF RISER.

( ☒ ) ( ) REMARKS \_\_\_\_\_

2.2 DETERMINE THICKNESS, ACTUAL CORROSION RATE, REMAINING LIFE AND NEXT INSPECTION DUE DATE.

( ☒ ) ( ) REMARKS \_\_\_\_\_**3) FINAL CHECK:**

3.1 SIGN OFF WORK PERMIT AND CLOSE ITPM WORK ORDER.

( ☒ ) ( ) REMARKS \_\_\_\_\_**CHECKLIST****ASSET INTEGRITY TASKS:****REQUIRED COMPLETED  
(YES) (NO)****1) VISUAL:**

1.1 OVERALL INTEGRITY.

( ☒ ) ( ) REMARKS \_\_\_\_\_

1.2 PAINT PROTECTION

( ☒ ) ( ) REMARKS \_\_\_\_\_**2) INSULATION CURRENT STATUS:**

2.1 INSULATION REMOVAL

( ) Fully ( ) Partial ( ☒ ) No insulation

2.2 INSPECTION THROUGH WINDOW

( ) ( ) REMARKS \_\_\_\_\_

2.3 JACKET VISUAL INSPECTION (INSULATION NOT REMOVED)

( ) 100% ( ) Partial

( ) ( ) REMARKS \_\_\_\_\_

( ) ( ) REMARKS \_\_\_\_\_

### 3) CORROSION UNDER SUPPORT (CUS)

3.1 CUS INSPECTION

( ☒ ) REMARKS \_\_\_\_\_

( ☒ ) 100% ( ) Partial

( ) ( ) REMARKS \_\_\_\_\_

Date Required \_\_\_\_\_

3.2 ADDITIONAL REQUIREMENT

### 4) NDE

4.1 UT/UTM

( ☒ ) REMARKS \_\_\_\_\_

4.2 PT

( ) ( ) REMARKS \_\_\_\_\_

4.3 MT

( ) ( ) REMARKS \_\_\_\_\_

4.4 RT

( ☒ ) REMARKS \_\_\_\_\_

4.5 OTHER NDEs

( ☒ ) REMARKS visual

4.6 ADDITIONAL REQUIREMENT

( ) ( ) REMARKS \_\_\_\_\_

Date Required \_\_\_\_\_

### 5) ANOMALY IDENTIFICATION

( ) ( ☒ ) REMARKS \_\_\_\_\_

### 6) PHOTOGRAPHS

( ☒ ) ( ) REMARKS \_\_\_\_\_

### 7) ADDITIONAL REQUIREMENTS

7.1 SCAFFOLDING

( ) ( ) REMARKS \_\_\_\_\_

7.2 BLASTING

( ) ( ) REMARKS \_\_\_\_\_

7.3 SHUTDOWN

( ) ( ) REMARKS \_\_\_\_\_

7.4 ROPE ACCESS

( ☒ ) ( ) REMARKS \_\_\_\_\_

7.5 OTHER REQUIREMENT

( ) ( ) REMARKS \_\_\_\_\_

Date Required \_\_\_\_\_

=====

COMMENT: Visual - Still in normal condition.

UTM. - Still in normal condition

INTEGRITY REPORT (IR): 130611

EXAMINER: Tangphan P. / Amkha S. DATE: 15 Mar'22

SUPERVISOR : Chatcharvan R. DATE : 15 Mar'22.



Beacon Offshore Ltd.

QHSE (IMS) Management System  
Beacon Offshore Ltd.  
Thailand

# Chevron Thailand Exploration and Production 2021 Pipeline External Inspection

## 10in LAGLE Pipeline Survey

21006\_CTEP\_BOL\_RPT\_001

### Acceptance Signatures

Beacon Offshore Limited

Mr Gary Choo

Inspection Controller 3.4U

Beacon Offshore Limited

Mr Craig Lane

OCM



Chevron Exploration and Production

Mr Paul Hulatt

Company Site Representative

### DOCUMENT REVISION HISTORY

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Rev	Date	Description	Prepared by	Checked by	Approved by	Approved Client

 	2021 Pipeline External Inspection <b>10in LAGLE Pipeline Survey</b>	Doc no.:	21006CTEPBOLRPT001
		Rev.:	A
		Date:	09/12/2021
		Page:	2 of 23

### DISTRIBUTION LIST



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## APPENDICES

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- APPENDIX 04. ALL EVENT LISTINGS
- APPENDIX 05. WYE EVENT LISTING
- APPENDIX 06. CATHODIC PROTECTION REPORT
- APPENDIX 07. PIPELINE CHARTS



## ABBREVIATIONS

Term	Meaning
ABD	As-built difference, discrepancy
ABR	Abrasion
ADM	Anode Damage
ADP	Anode Depletion
BOL	Beacon Offshore Limited
BUR	Burial
C – O	Calculated minus observed
CAL	Calibrations
CD	Chart Datum
CG	Centre of Gravity
COD	Coating damage
COR	Corrosion
CP	Cathodic Potential
CPR	Low CP reading
CRP	Common Reference Point
CSR	Client Site Representative
CTD	Conductivity-Temperature-Depth
CTDS	Conductivity, Temp, Density and Salinity
CVI	Close Visual Inspection
DBM	Metallic Debris
DBN	Non-Metallic Debris
DCC	Distance Cross Course
DGNSS	Differential Global Navigation Satellite System
DGPS	Differential Global Positioning System
DHSS	Dual Head Scanning Sonar
DP2	Dynamic Positioning system 2
DPR	Daily Progress Report
EFG	Electric Field Gradient
EL	Elevation
FG	Fishing Gear
FJ	Field Joint
FS	Freespan
G	Grid (Heading)
GVI	General Visual Inspection
HDOP	Horizontal Dilution of Precision
HiPAP	High Precision Acoustic Positioning
HLM	Highland Maritime Co., Ltd.
HPR	Hydro-acoustic Position Reference
HSE	Health, Safety and Environment
IAW	In Accordance With
IDC	Internal Documents Control
iNav	iSURVEY rig master navigation suite including the hardware installation
JDA	Joint Development Area
Km	Kilometre

Term	Meaning
KP	Kilometre Post
LAC	Lack of Access for Inspection
LAT	Lowest Astronomical Tide
LEK	Leak
LI	Lack of Integrity
MDGPS	Multi-Differential Global Positioning System
MGR	Marine Growth
MIS	Missing parts
mm	Millimetres
MOV	Relative Movement or vibration
MRU	Motion Reference Unit
MSL	Mean Sea Level
MSV	Multi-Support Vessel
mV	Millivolt
OTH	Other Anomaly
PDOP	Position Dilution of Precision
PLEM	Pipeline End Manifold
PPP	Precise Point Positioning
PPS	Pulse Per Second
CHEVRO NEP	CHEVRON Exploration & Production
QA	Quality Assurance
QC	Quality Control
REM	Repair/ Remedial
RFS	Riser freespan
RMS	Root Mean Square
RO	Reference Object
ROV	Remotely Operated Vehicle
RTK	Real-time Kinematics
SBES	Single Beam Echo Sounder
SD	Standard Deviation
SOW	Scope of Work
SSIV	Sub Sea Isolation Valve
T	True (Heading)
USBL	Ultra-Short Baseline
UTC	Universal Time Co-ordinated
UTM	Universal Transverse Mercator
WDF	Weld defects
WGS	World Geodetic System
WGS84	World Geodetic System 1984
WI	Work Instruction
WOC	Waiting on Tide/Current
WOW	Standby on Weather
WP	Waypoints
WROV	Work Class Remotely Operated Vehicle



## 1 EXECUTIVE SUMMARY

This final report details the 10in LAGLE pipeline survey which was carried out in ascending kp (direction of flow) from LAWE to LAWA between 3 December 2021 and 5 December 2021 .

The survey commenced at the LAWE riser tie-in flange to 10in LAGLE pipeline and ended at the LAWA riser tie-in flange.

*Table 1 - 10in LAGLE pipeline survey details*

Start Date	End Date	Length
3 Dec 2021	5 Dec 2021	8.090 km

Diameter	From:	LAWE Riser Flange		To:	LAWA Riser Flange	
	Easting	Northing	KP	Easting	Northing	KP
10"	739282.64 m	1158391.61 m	0	742740.06 m	1165619.58 m	8.090

Coordinate system: Indians 1975

### 1.1 GENERAL CONDITION

The pipeline survey of the 10in LAGLE from LAWA to LAWE confirmed the as-laid route with no significant deviation observed. The as-found pipeline was deemed to be in good condition with no significant damage observed along the length of the pipe.

### 1.2 FREESPAN STATUS

A total of one hundred sixty (160) freespans were recorded along the length of the pipeline, none of which exceeded the operational free span criteria.

### 1.3 PIPELINE FEATURES

A total of twenty-nine (29) pipeline features were recorded along the pipeline, all of which were deemed to be in good condition. Three (3) field joints were reported with loose wrapping, however no bare metal was exposed.

The two (2) WYE structures, (LAPLE-Y1 and LAPLE-Y2) were deemed to be in good condition, with no visible damage observed.

### 1.4 ANODE CONDITION

One hundred twenty-two (122) anodes were visible along the pipeline.

- One hundred nineteen anodes (119) were assessed with less than 25% of depletion
- Three (3) anodes were in full burial

Eight (8) bar anodes were evented during the discrete inspection on the LAPLE-Y1 and LAPLE-Y2 WYE assemblies.

- LAPLE-Y1: Four (4) bar anodes were assessed with less than 25% of depletion
- LAPLE-Y2: Four (4) bar anodes were assessed with less than 25% of depletion

## 2 INTRODUCTION

This section summarises the project location, work scope and technical details of the 10in LAGLE pipeline.

### 2.1 PROJECT OVERVIEW

Chevron Thailand Exploration and Production (CTEP) contracted Beacon Offshore Ltd. to perform the 2021 subsea external pipeline survey in Gulf of Thailand.

Beacon Offshore supplied

- ROV and inspection personnel
- ROV equipment and Digital video recording and venting hardware and software

Beacon Offshore subcontracted

- iSurvey Pte. Ltd. supplying project survey equipment and personnel.
- ISES Technical Services Pte. Ltd. supplying cathodic potential equipment and personnel.

The OSV Crest Hydra was chartered to conduct the operations using the Seaeye Leopard 1702 work class ROV

Inspection tasks were performed as per the requirements outlined within the document: **2021 Pipeline External Inspection – Work Package for 2021 Campaign** as issued by CTEP. All seabed and pipeline data and video were collected and processed using EIVA and VisualSoft software suites.

The routine inspection videos (media accompanying this report) were recorded in Windows Media Audio/Video file format (.asf) and supplied on external hard disk storage devices which are accessible via the supplied Visual Review software.

This final report details the results of the 10in LAGLE pipeline survey conducted between 3 December 2021 and 5 December 2021

### 2.2 SCOPE OF WORK AND WORK COMPLETED

A general visual survey was required to determine the external condition of the pipelines as per workscope document **2021 Pipeline External Inspection – Work Package for 2021 Campaign**.

The purpose of this pipeline survey is to detect obvious damage or defects which are visible without prior cleaning, such as:

- Damaged, dented, buckled or bent pipeline sections/ valves / appurtenances
- Evidence of movement of pipelines from their original locations
- Pipeline leakage
- Corrosion of exposed metal areas
- Damaged anodes
- Damaged field joint fills
- Unsupported lengths of pipe
- Significant debris and damage or abrasion caused debris
- Lack of adequate cathodic protection

Summary of the basic work scope and completions are tabulated in Table 2 - Work scope and completion summary.

*Table 2 - Work scope and completion summary*

Component	Task Details	Completion
10in LAGLE	Whole Pipeline - ROV/CP survey	100 %

## 2.3 FIELD LOCATION

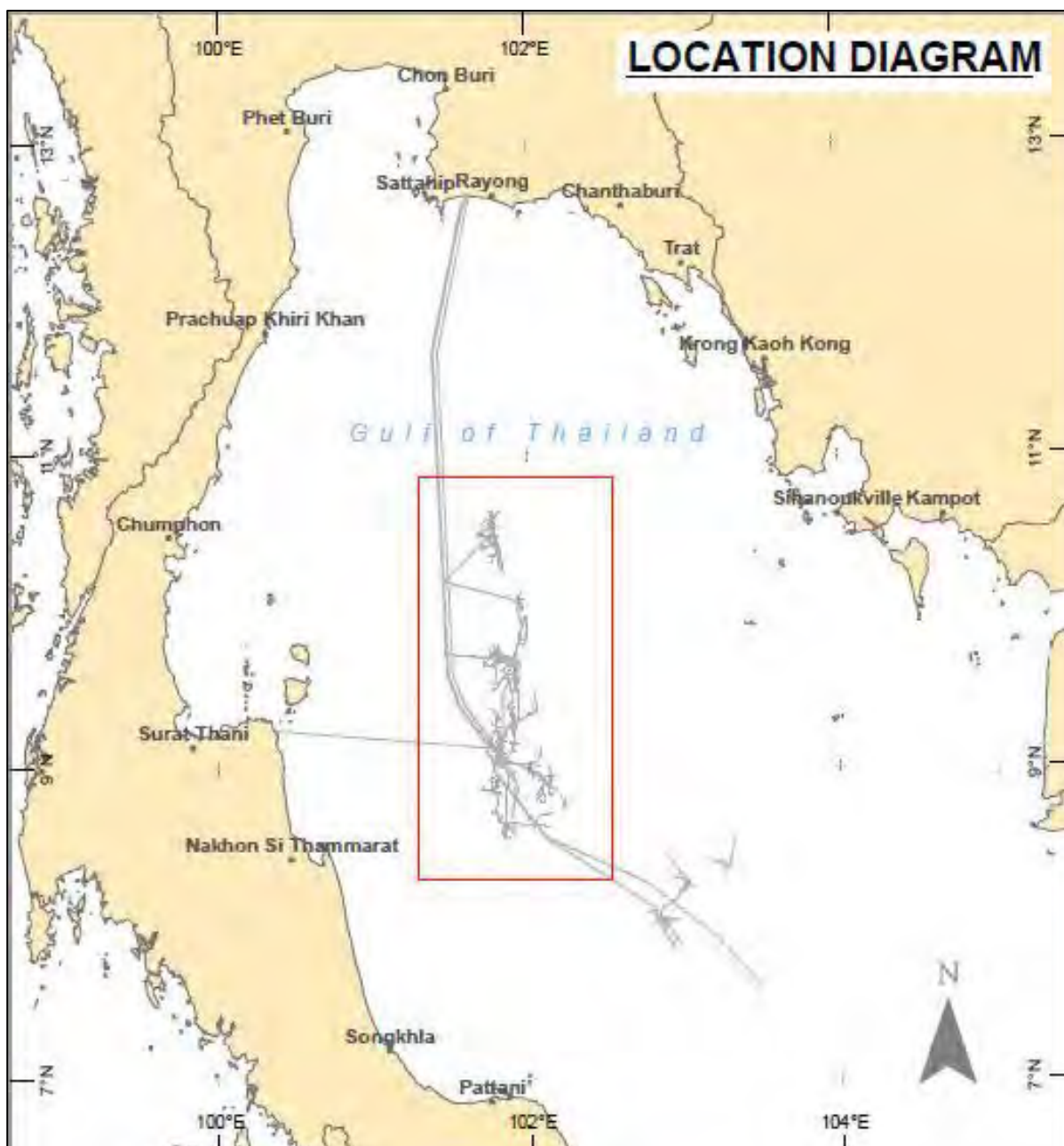


Figure 1 - Chevron Field Location

## 2.4 PIPELINE TECHNICAL DETAILS

The 10in LAGLE pipeline is an infield gas pipeline from LAWE to LAWA.

*Table 3 – 10in LAGLE Pipeline Parameters*

General Data			
Owner	Chevron Thailand Exploration and Production		
Name	10in LAGLE		
Originate From	LAWE		
Terminate At	LAWA		
Pipeline Outside Diameter (in)	10.75		
Pipeline Wall Thickness (in)	0.438		
Pipe Grade	API 5L X52		
Service	3-Phase Non-Sour		
Anti-Corrosion Coating			
Material	FBE		
Thickness (mm)	0.36		
Concrete Coating			
Thickness (mm)	None		
Route Length (Approximately) km	8.086		
Allowable Free Span	Pipe Diameter (in)	Allowable Freespan	
		Oil/ Gas/ Cond Line (m)	WI Line (m)
	6	70	25
	8	80	35
	10	90	40
	12	80	50
	16	70	60
	18	80	70
	20	80	80
	24	90	90

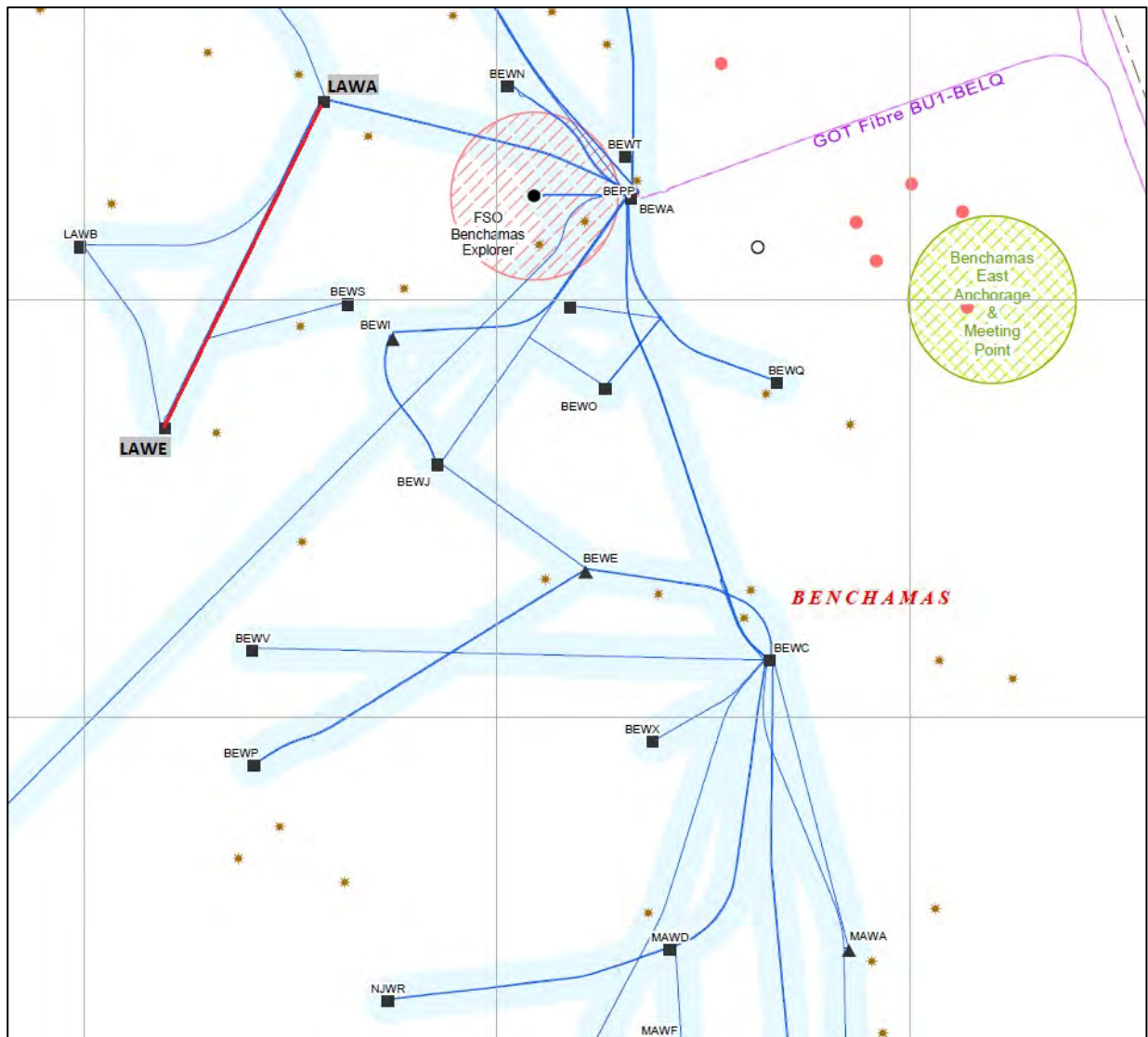


Figure 2- Location of 10in LAGLE pipeline

### 3 ANOMALIES

This section summarises the anomaly criteria and anomalies recorded during the pipeline survey of the 10in LAGLE pipeline.

#### 3.1 ANOMALY CRITERIA

Anomalies are classified based on Chevron's criteria as detailed in Section 6: Anomaly Criteria in 2021 Underwater Platform Inspection Work Package.

*Table 4 – Anomaly Weighting (Criticality)*

<b>4</b>	<b>Immediate</b> Remedy of remove as soon as possible.
<b>3</b>	<b>Significant</b> Monitor, remedy or remove as soon as possible.
<b>2</b>	<b>Insignificant</b> Monitor, remedy or remove as convenient.
<b>1</b>	<b>Good Condition</b> For information only or to update as-built data, records or drawings.

#### 3.2 ANOMALY COUNT

Forty-one (41) anomalies were recorded during the pipeline survey of the 10in LAGLE pipeline as summarized in Table 5 – Anomaly Count below.

Twenty-nine (29) events of high CP contact readings were recorded throughout the survey which are outside the range of -850 mV to -1050 mV.

1. Eighteen (18) readings were recorded on the pipeline.
2. Eleven (11) readings were recorded at LAPLE-Y1 WYE assembly Eleven (11) items of metallic and non-metallic debris were deemed hazardous to ROV/driver operations.
3. One (1) ineffective pipeline support was reported with clear gap separation to the pipeline.

Refer to Appendix 01 – Anomaly Reports for full details.

*Table 5 – Anomaly Count*

Anomaly Class	Anodes	CP	Crossing	Damage	Debris	Freespan	Supports	Other	Sub Total
1. Good condition					1				1
2. Insignificant		29			10		1		40
3. Significant									0
4. Immediate									0
<b>Total</b>	<b>0</b>	<b>29</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>41</b>

**ภาคผนวก 29**

***Briding Document (Chevron and Shelf Drilling)***



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## 1.0 Introduction

### 1.1 Purpose

The purpose of the HES Bridging Document is to document agreements and clarify expectations between Chevron and Shelf Drilling regarding the primacy and implementation of the Chevron Operational Excellence Management System (OEMS) requirements with Shelf Drilling's Safety Management System (SMS) for the contracted scope of work (Table 1).

The HES Bridging Document is also used to demonstrate that interfaces between Chevron's OEMS and Shelf Drilling's SMS have been evaluated and reviewed by all affected parties. It is not intended to replace the HES related Attachment in the contract; rather, it is designed to supplement it.

The implementation of agreements determined within this document allows the management of workforce safety and health, process safety, reliability, and integrity, environmental efficiencies, security and stakeholder needs to ultimately deliver OE performance.

In the event of a conflict between the processes and procedures of Chevron and Shelf Drilling, the default position shall be that procedures which are more stringent take precedence.

These expectations are met by;

- Conducting a gap assessment between applicable Chevron's OEMS requirements and Shelf Drilling's SMS.
- Developing a mitigation plan to address identified gaps.
- Ensuring roles, responsibilities and competencies of key personnel are clearly defined and communicated.
- Defining assurance, verification and validation (V&V) activities to assure safeguards are in place and functioning.
- Ensuring local legislative and industry requirements are met or exceeded.

### 1.2 Scope

The scope of this document covers the contracted services between Chevron and Shelf Drilling as identified in Table 1.

**Table 1: Contracted Services**

Contracted Service Scope	Contract Number
Drilling Unit, Ancillary Equipment and Personnel	Rig "Chao Phraya" – 1235832 Rig "Krathong" – 1235834
Rig Rental Service Supporting Asset Retirement Activities	Rig "Scepter" - 1735026 Rig "Enterprise" – 1779186