



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด  
S.P.S. CONSULTING SERVICE CO., LTD.  
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900  
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900  
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25  $\pm$  3  $^{\circ}$ C  
Pressure : 1010  $\pm$  15 mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R <sup>2</sup>
R01	SKC	224-PCXR4	602467	06/10/2022	1,000	1,500	2,000	993	1,508	2,004	1.020x - 38.145	0.999
R02	SKC	224-PCXR4	626450	06/10/2022	1,000	2,000	3,000	998	1,499	1,990	0.989x + 12.189	1.000
R03	SKC	224-PCXR4	691592	03/10/2022	1,000	1,500	2,000	1,004	1,500	2,004	1.011x - 21.482	0.999
R04	SKC	224-PCXR4	691672	03/10/2022	1,000	1,500	2,000	996	1,493	1,994	0.997x - 0.766	1.000
R05	SKC	224-PCXR4	798470	06/10/2022	1,000	1,500	2,000	994	1,505	1,999	1.014x - 30.635	0.999
R06	SKC	224-PCXR4	798456	06/10/2022	1,000	1,500	2,000	994	1,498	1,994	1.002x - 7.000	1.000
R07	SKC	224-PCXR4	798480	06/10/2022	1,000	1,500	2,000	994	1,490	1,999	1.008x - 16.751	1.000
R08	SKC	224-PCXR4	883215	06/10/2022	1,000	1,500	2,000	1,001	1,501	2,005	1.014x - 26.148	0.999
R09	SKC	224-PCXR4	034650	06/10/2022	1,000	1,500	2,000	991	1,504	2,002	1.018x - 36.179	0.999
R10	SKC	224-PCXR4	091765	06/10/2022	1,000	1,500	2,000	996	1,512	1,994	1.000x + 0.140	1.000
R11	SKC	224-PCXR4	091763	06/10/2022	1,000	1,500	2,000	1,000	1,499	2,002	1.013x - 25.678	0.999
R12	SKC	224-PCXR4	091568	06/10/2022	1,000	1,500	2,000	997	1,501	1,999	1.001x - 5.065	1.000
R13	SKC	224-PCXR4	091638	06/10/2022	1,000	1,500	2,000	1,002	1,499	1,994	0.992x + 9.636	1.000
R14	SKC	224-PCXR4	091764	06/10/2022	1,000	1,500	2,000	994	1,502	1,999	1.014x - 30.053	0.999
R15	SKC	224-PCXR8	529457	06/10/2022	1,000	1,500	2,000	1,001	1,500	2,004	1.013x - 25.023	0.999
R16	SKC	224-PCXR8	529643	06/10/2022	1,000	1,500	2,000	998	1,497	1,994	0.998x - 1.017	1.000
R17	SKC	224-PCXR8	529645	06/10/2022	1,000	1,500	2,000	994	1,509	2,000	1.015x - 30.372	0.999
R18	SKC	224-PCXR8	566756	06/10/2022	1,000	1,500	2,000	991	1,498	1,998	1.001x - 6.880	1.000
R19	SKC	224-PCXR8	566802	06/10/2022	1,000	1,500	2,000	1,003	1,499	2,000	1.009x - 19.751	0.999
R20	SKC	224-PCXR8	529089	06/10/2022	1,000	1,500	2,000	990	1,501	2,003	1.020x - 40.195	0.999
R21	SKC	224-PCXR8	665728	06/10/2022	1,000	1,500	2,000	998	1,493	1,999	1.001x - 6.003	1.000
R22	SKC	224-PCXR8	707444	06/10/2022	1,000	1,500	2,000	1,002	1,500	2,002	1.011x - 21.733	0.999
R23	SKC	224-PCXR8	761067	06/10/2022	1,000	1,500	2,000	998	1,494	1,991	0.993x + 36.535	1.000
R24	SKC	224-PCXR8	707893	06/10/2022	1,000	1,500	2,000	996	1,505	2,000	1.013x - 27.803	0.999
R25	SKC	224-PCXR8	761052	05/10/2022	1,000	1,500	2,000	998	1,499	1,993	0.993x + 6.713	1.000
R26	SKC	224-PCXR8	707956	05/10/2022	1,000	1,500	2,000	1,002	1,500	2,004	1.013x - 24.058	0.999
R27	SKC	224-PCXR8	707398	05/10/2022	1,000	1,500	2,000	996	1,503	2,001	1.006x - 15.683	1.000
R28	SKC	224-PCXR8	707481	05/10/2022	1,000	1,500	2,000	1,004	1,500	2,003	1.010x - 19.687	0.999
R29	SKC	224-PCXR8	707402	05/10/2022	1,000	1,500	2,000	1,005	1,493	1,991	0.988x + 14.366	1.000
R30	SKC	224-PCXR8	093811	05/10/2022	1,000	1,500	2,000	999	1,495	1,994	0.997x - 0.8069	1.000
R31	SKC	224-PCXR8	093183	06/10/2022	1,000	1,500	2,000	1,001	1,501	2,001	1.012x - 22.523	0.999
R32	SKC	224-PCXR8	671950	06/10/2022	1,000	1,500	2,000	1,000	1,498	1,994	0.994x + 8.041	1.000
R33	SKC	224-PCXR4	626254	06/10/2022	1,000	1,500	2,000	993	1,502	1,999	1.016x - 33.303	0.999
R34	SKC	224-PCXR4	626131	06/10/2022	1,000	1,500	2,000	1,002	1,498	2,004	1.013x - 24.453	0.999
R35	SKC	224-PCXR8	707460	06/10/2022	1,000	1,500	2,000	999	1,498	1,995	0.994x + 6.709	1.000
R36	SKC	224-PCXR8	707446	06/10/2022	1,000	1,500	2,000	1,003	1,499	2,001	1.009x - 19.432	0.999
R37	SKC	224-PCXR8	707432	06/10/2022	1,000	1,500	2,000	997	1,499	1,998	0.998x + 0.116	1.000
R38	SKC	224-PCXR8	707349	05/10/2022	1,000	1,500	2,000	996	1,500	2,002	1.015x - 31.540	0.999
R39	SKC	224-PCXR8	761095	05/10/2022	1,000	1,500	2,000	1,001	1,496	1,994	0.997x + 2.094	1.000

Calibrated by :

Adul Dangklom  
(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



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Rotameter Calibration Report (For Personal Pump Low Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

Rotameter Data			Calibration Data								
No.	Brand	Model	Date	Flow Rate (ml/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)				
				1	2	3	1	2	3	y	R²
L-R01	Dwyer	VFA-21	04/10/2022	50	100	200	50.2	101.0	203.9	0.987x + 2.546	1.000
L-R02	Dwyer	VFA-21	05/10/2022	50	100	200	50.1	101.3	200.5	1.007x - 0.870	0.999
L-R03	Dwyer	VFA-21	06/10/2022	50	100	200	50.1	99.8	202.3	1.017x - 1.042	1.000
L-R04	Dwyer	VFA-21	06/10/2022	50	100	200	50.2	100.9	201.0	1.008x - 1.004	0.999
L-R05	Dwyer	VFA-21	05/10/2022	50	100	200	50.2	100.8	203.0	0.990x + 1.973	1.000
L-R06	Dwyer	VFA-21	04/10/2022	50	100	200	50.2	99.1	201.5	1.004x - 0.364	1.000

Calibrated by :

Adul Dangklom  
(Mr. Adul Dangklom)

Approved by :

Mr. Peera Detudom  
(Mr. Peera Detudom)



รายงานฉบับที่ 3 : รายงานผลการดูแล ตรวจสอบ บำรุงรักษาและปรับแต่งเครื่องมือและอุปกรณ์ในสถานี  
ตรวจวัดคุณภาพอากาศ และหน่วยตรวจวัดคุณภาพอากาศแบบเคลื่อนที่ทั้ง 9 หน่วย  
ครั้งที่ 2 : ตั้งแต่วันที่ 1 กรกฎาคม 2565 ถึงวันที่ 31 ตุลาคม 2565

## สถานีตรวจวัดฯ บริเวณ วัดปลวกเกตุ

ใบสั่งซื้อ/ส่งจ้างเลขที่ 3100170564 Job No : JID2200310	 บริษัท เพทโร-อินสตรูเมนต์ จำกัด
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### PETRO-INSTRUMENTS CORP.,LTD.

#### General Checking

Equipment :	AQMs Pluak Kate	Model :	-
Serial Number :	Pluak Kate Station	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	On Mobile			
1	Air conditioner operation	OK	OK	
2	Mobile temperature	25-27 °C	26°C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	-	1850/40 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1800/36 psi	

Note :

### PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	KhunWirasakKhumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Pluak Kate Station	E-mail address/Fax. :	wirasak.k@irpc.co.th
Working Date :	03 July 2022	Working Hour :	4 Hours

#### Service Report

##### Working Scope:

Service Station

##### Physical Checking:

- ตรวจเช็ค Data logger พบว่าทำงานได้ปกติ
- ตรวจเช็ค Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจเช็ค ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจเช็ค เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ
- ตรวจเช็ค เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจเช็ค การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

##### Correction working:

Calibrate single-point of all analyzers.	Calibrate mass flow for Dilutor.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

##### Part Replacements:

- Sample Filter 47 mm. 6 ea. (Part support by IRPC)

##### Addition Recommended:

- ตรวจเช็คถังดับเพลิงในสถานีพบว่า หมดยอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Serviced by :	ชินโรส มุขโรจน์	Serviced Date	03 July 2022
Approved by:		Approved Date :	03 July 2022

7/409 SoVibhavadi-Rangsit 36, Vibhavadi-Rangsit Rd., Chatuchak, Chatuchak, Bangkok 10900, Thailand  
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### PETRO-INSTRUMENTS CORP.,LTD.

#### NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	1170530044	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	0.5	0.4	ppb	
NO <sub>2</sub> reading	1.8	2.0	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	8.5	8.5	ppb	0 to 60
NO <sub>x</sub> BKG. ppb	8.6	8.7	ppb	0 to 60
NO COEF.	1.079	1.084	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	45	45	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
PMT Supply	-855.8	-855.8	Vdc	-400 to -1200 Vdc
5 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
-15 Supply	-14.8	-14.8	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	37.3	36.0	°C	15 °C to 45 °C
Chamber	46.9	46.8	°C	45 °C ± 2 °C
Cooler	-2.8	-3.0	°C	(-3) °C ± 2 °C
Converter	323.9	326.3	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	274.5	275.1	mmHg	250 ± 100 mmHg
Flow	0.684	0.686	L/min	0.5 to 1.00 L/min

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i-BZSAB
Serial Number :	CM06280010	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	3.4	3.8	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	13.6	13.7	ppb	0 to 60
SO <sub>2</sub> COEF	0.978	0.984	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-573.1	-573.1		
Flash Supply	831	832		
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	36.8	36.4	°C	15°C to 45°C
Chamber	44.9	44.9	°C	45°C ± 2°C
Pressure	724.6	725.2	mmHg	750 ± 100 mmHg
Flow	0.544	0.543	L/min	0.5 to 1.00 L/min
Lamp intensity	91	92	%	40 – 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351403	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.593	0.309	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	-0.049	0.060	ppm	0 to 60
CO COEF	0.966	0.971	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.8	14.8	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	24.0	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	21.1	18.3	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.2	-106.2	Vdc	-100 to -110 Vdc
Temperatures				
Internal	38.4	38.3	°C	
Bench	48.2	48.0	°C	
Pressure	747.9	748.5	mmHg	760 ± 100 mmHg
Flow	0.725	0.727	L/min	1 ± 0.3 L/min
S/R Ratio	1.1421800	1.1429700	-	1.140 – 1.180
AGC Intensity	199389	199324	Hz	200,000 ±50,000 Hz
Motor speed	100.03	100.03	%	100 ± 5%

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**O<sub>3</sub> Analyzer**

Equipment :	OzoneAnalyzer.	Model :	49i-B2NCC
Serial Number :	CM09040067	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	NominalRange
	Before	After		
Sample reading	15.5	15.2	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	0.5	0.5	ppb	0 to 60
O <sub>3</sub> COEF	0.937	0.937	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	35	35	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-14.9	-14.9	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.0	9.0	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	37.8	37.6	°C	5 - 50 °C
Bench Lamp Temp	54.0	54.0	°C	50 - 60 °C
Pressure	746.4	746.7	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.607	0.601	L/min	0.6 ± 0.2 L/min
Cell-B	0.641	0.633	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	14.7	10.6	ppb	Record only
Cell-B	17.3	20.9	ppb	Record only
O <sub>3</sub>	15.6	15.7	ppb	Record only
Lamp Intensity				
Cell A	89816	89786	Hz	45,000 – 150,000 HZ
Cell B	90902	90872	Hz	45,000 - 150,000 HZ

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	200800005504	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH <sub>4</sub> reading	1.253	1.370	ppm	0-25 ppm
NMHC reading	0.521	1.143	ppm	0-25 ppm
THC reading	1.774	2.513	ppm	0-25 ppm
Analyzer reading				
CH <sub>4</sub> reading	1.253	1.370	ppm	0-25 ppm
NMHC reading	0.521	1.143	ppm	0-25 ppm
THC reading	1.774	2.513	ppm	0-25 ppm
Calibration Factors				
CH <sub>4</sub>				
Zero calibration coefficient	-50	-50	-	-3500 to 3500
Span calibration coefficient	0.6000	0.6000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	0	0	-	-3500 to 3500
Span calibration coefficient	1.1000	1.1000	-	0.50000 to 2.00000
Analog Input				
Detector temp	39.4	39.3	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	76.3	76.4	kPa	80 kPa± 4 kPa
Ambient	100.6	100.6	kPa	Current Atmospheric pressure
Purifier temp	419.0	424.9	°C	390-430 °C
Purifier pressure	7.3	7.1	kPa	8 kPa -25 kPa
NMC cutter temp	230.1	230.0	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5V
DC 5V	4.9	4.9	V.	5V ± 0.5V

**Note :**

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PETRO-INSTRUMENTS CORP.,LTD.

Continuous Ambient Particulate Monitor (PM10)

Equipment :	PM10 (C14 Beta)	Model :	FH 62-C14Series
Manufacturer :	Thermo Scientific	Serial number :	E-1182

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	12	5	ug/m <sup>3</sup>	0 to 1000 ug/m <sup>3</sup>
b. Mass	104	131	ug/m <sup>3</sup>	0 – 5,000 ug/m <sup>3</sup>
2) Operating Data				
a. Ambient conditions				
• Ambient Temperature :	31	32	°C	20 °C...+50 °C
• Ambient Air Pressure :	1002	1002	kPa	750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	Ug	
b. Air flow rate	<950	<950	L/Hr.	
c. Cycle	600	600	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	34	34	°C	
b. Air flow rate	1046	1046	L/Hr.	1000 L/Hr.
5) Maintenance				
a. High Voltage	1388	1388	V	
b. Ref. threshold	165	165	mV	

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION

All analyzer.

Equipment :	All analyzer.	Model :	42C, 43i , 48i, 49i
Serial Number :	0504710413,CM06280010, 1201351403,CM09040067	Manufacturer :	Thermo Electron

Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.73 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84 ppm	Model :	146C
Methane (CH <sub>4</sub> )	497.9 ppm	Serial number :	0504710414
Carbon oxide (CO)	4524 ppm		
Cylinder NO. :	CC112336		
Expiration Date :	21 Aug 2023		

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.50	0.50	400	397.0	-0.75	Valid
NO <sub>x</sub> (ppb)	0.00	1.40	1.40	400	401.0	0.25	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	397.0	-0.75	Valid
CO (ppm)	0.00	0.34	0.34	40.0	40.3	0.75	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	396.0	-1.00	Valid
CH <sub>4</sub> (ppm)	0.00			4.00			
THC (ppm)	0.00			4.00			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.60	0.60	400	399.0	-0.25	Valid
NO <sub>x</sub> (ppb)	0.00	1.50	1.50	400	403.0	0.75	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	402.0	0.50	Valid
CO (ppm)	0.00	0.03	0.03	40.0	40.0	0.00	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	400.0	0.00	Valid
CH <sub>4</sub> (ppm)	0.00	0.01	0.01	5.00	4.99	-0.20	Valid
THC (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid

Remark :

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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Pluakgate IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas H2



Gas STD



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PETRO-INSTRUMENTS CORP.,LTD.

อุปกรณ์ทำความสะอาด



Log Sheet



ถังดับเพลิง



EXP >XX-XX-XXXX

Replace Silica gel

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PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	KhunWirasakKhumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Pluak Kate Station	E-mail address/Fax. :	wirasak.k@irpc.co.th
Working Date :	19 July 2022	Working Hour :	4 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

Correction working:

Calibrate single-point of all analyzers.	Calibrate mass flow for Dilutor.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacements:

- Sample Filter 47 mm. 6 ea. (Part support by IRPC)

Addition Recommended:

- ตรวจสอบเครื่องวัดมลพิษในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Served by :	ชินโรส มุขโรจน์	Served Date	19 July 2022
Approved by:		Approved Date :	19 July 2022

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PETRO-INSTRUMENTS CORP.,LTD.

NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	1170530044	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	7.3	0.4	ppb	
NO <sub>2</sub> reading	11.5	4.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	8.4	8.5	ppb	0 to 60
NO <sub>2</sub> BKG. ppb	8.8	8.6	ppb	0 to 60
NO COEF.	1.075	1.079	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	45	45	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
PMT Supply	-855.8	-855.8	Vdc	-400 to -1200 Vdc
5 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
-15 Supply	-14.8	-14.8	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	35.9	36.7	°C	15 °C to 45 °C
Chamber	46.8	46.7	°C	45 °C ± 2 °C
Cooler	-2.8	-3.0	°C	(-3) °C ± 2 °C
Converter	324.5	325.0	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	272.4	272.5	mmHg	250 ± 100 mmHg
Flow	0.688	0.688	L/min	0.5 to 1.00 L/min

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

General Checking

Equipment :	AQMs Pluak Kate	Model :	-
Serial Number :	Pluak Kate Station	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	On Mobile			
1	Air conditioner operation	OK	OK	
2	Mobile temperature	25-27 °C	26 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	-	1650/40 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1800/36 psi	

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

SO<sub>2</sub> Analyzer

Equipment :	Sulfur Dioxide analyzer.	Model :	43i-BZSAB
Serial Number :	CM06280010	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	3.3	2.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	13.7	13.7	ppb	0 to 60
SO <sub>2</sub> COEF	0.979	0.978	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-573.1	-573.1		
Flash Supply	832	831		
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	35.2	36.1	°C	15 °C to 45 °C
Chamber	45.3	45.2	°C	45 °C ± 2 °C
Pressure	723.7	723.4	mmHg	750 ± 100 mmHg
Flow	0.541	0.539	L/min	0.5 to 1.00 L/min
Lamp intensity	92	92	%	40 - 100 %

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

O <sub>3</sub> Analyzer			
Equipment :	OzoneAnalyzer.	Model :	49I-B2NCC
Serial Number :	CM09040067	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	NominalRange
	Before	After		
Sample reading	27.2	20.5	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.5	-0.5	ppb	0 to 60
O <sub>3</sub> COEF	0.921	0.937	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	35	35	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-14.9	-14.9	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.0	9.0	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	36.2	36.1	°C	5 - 50 °C
Bench Lamp Temp	54.0	54.0	°C	50 - 60 °C
Pressure	745.8	745.5	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.584	0.601	L/min	0.6 ± 0.2 L/min
Cell-B	0.620	0.632	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	12.1	22.5	ppb	Record only
Cell-B	19.8	18.7	ppb	Record only
O <sub>3</sub>	16.1	20.6	ppb	Record only
Lamp Intensity				
Cell A	89857	89846	Hz	45,000 – 150,000 HZ
Cell B	91211	91191	Hz	45,000 – 150,000 HZ

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**PETRO-INSTRUMENTS CORP.,LTD.**

CO Analyzer			
Equipment :	CO analyzer.	Model :	48I
Serial Number :	1201351403	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.511	0.626	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	-0.050	-0.049	ppm	0 to 60
CO COEF	0.978	0.966	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.8	14.8	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	24.0	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	17.6	17.9	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.2	-106.2	Vdc	-100 to -110 Vdc
Temperatures				
Internal	37.5	37.9	°C	
Bench	47.9	48.6	°C	
Pressure	746.7	747.3	mmHg	760 ± 100 mmHg
Flow	0.629	0.672	L/min	1 ± 0.3 L/min
S/R Ratio	1.1421100	1.1423300	-	1.140 – 1.180
AGC Intensity	199629	199642	Hz	200,000 ±50,000 Hz
Motor speed	100.04	100.03	%	100 ± 5%

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer			
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	200800005504	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.577	1.637	ppm	0-25 ppm
NMHC reading	0.271	0.101	ppm	0-25 ppm
THC reading	1.848	1.738	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.577	1.637	ppm	0-25 ppm
NMHC reading	0.271	0.101	ppm	0-25 ppm
THC reading	1.848	1.738	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	130	130	-	-3500 to 3500
Span calibration coefficient	1.2000	1.2000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	140	140	-	-3500 to 3500
Span calibration coefficient	1.3000	1.3000	-	0.50000 to 2.00000
Analog Input				
Detector temp	41.1	41.6	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	81.1	81.1	kPa	80 kPa± 4 kPa
Ambient	100.4	100.4	kPa	Current Atmospheric pressure
Purifier temp	420.5	417.7	°C	390-430 °C
Purifier pressure	11.7	11.8	kPa	8 kPa -25 kPa
NMC cutter temp	230.0	230.1	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5V
DC 5V	4.9	4.9	V.	5V ± 0.5V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

Continuous Ambient Particulate Monitor (PM10)			
Equipment :	PM10 (C14 Beta)	Model :	FH 62-C14Series
Manufacturer :	Thermo Scientific	Serial number :	E-1182

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	23	5	ug/m <sup>3</sup>	0 to 1000 ug/m <sup>3</sup>
b. Mass	17	33	ug/m <sup>3</sup>	0 – 5,000 ug/m <sup>3</sup>
2) Operating Data				
a. Ambient conditions				
● Ambient Temperature :	32	32	°C	20 °C...+50 °C
● Ambient Air Pressure :	1001	1001	kPa	750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	Ug	
b. Air flow rate	<950	<950	L/hr.	
c. Cycle	600	600	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	34	34	°C	
b. Air flow rate	1046	1046	L/hr.	1000 L/hr.
5) Maintenance				
a. High Voltage	1388	1388	V	
b. Ref. threshold	165	165	mV	

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION			
All analyzer.			
Equipment :	All analyzer.	Model :	42C, 43I, 48I, 49I
Serial Number :	0504710413,CM06280010, 1201351403,CM09040067	Manufacturer :	Thermo Electron

Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.73 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84 ppm	Model :	146C
Methane (CH <sub>4</sub> )	497.9 ppm	Serial number :	0504710414
Carbon oxide (CO)	4524 ppm		
Cylinder NO. :	CC112336		
Expiration Date :	21 Aug 2023		

BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.70	0.70	400	396.0	-1.00	Valid
NO <sub>x</sub> (ppb)	0.00	1.20	1.20	400	400.0	0.00	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	400.0	0.00	Valid
CO (ppm)	0.00	0.15	0.15	40.0	40.8	2.00	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	391.0	-2.25	Valid
CH <sub>4</sub> (ppm)	0.00			4.00			
THC (ppm)	0.00			4.00			

AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.70	0.70	400	399.0	-0.25	Valid
NO <sub>x</sub> (ppb)	0.00	1.20	1.20	400	402.0	0.50	Valid
SO <sub>2</sub> (ppb)	0.00	2.00	2.00	400	399.0	-0.25	Valid
CO (ppm)	0.00	0.06	0.06	40.0	39.9	-0.25	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	399.0	-0.25	Valid
CH <sub>4</sub> (ppm)	0.00	0.01	0.01	5.00	4.99	-0.20	Valid
THC (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid

Remark :

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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Pluakgate IRPC	Inside Station
Lamp Sampling Box	Replace Filter
Gas H2	Gas STD



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PETRO-INSTRUMENTS CORP.,LTD.

อุปกรณ์ทำความสะอาด	Log Sheet
ถังดับเพลิง	Replace Silica gel



EXP ๖๐๔-๐๐๐๐

PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	KhunWirasakKhumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Pluak Kate Station	E-mail address/Fax :	<a href="mailto:wirasak.k@irpc.co.th">wirasak.k@irpc.co.th</a>
Working Date :	03 August 2022	Working Hour :	4 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

Correction working:

Calibrate single-point of all analyzers.	Calibrate mass flow for Dilutor.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacements:

- Sample Filter 47 mm. 6 ea. (Part support by IRPC)

Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่าหมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Serviced by :	จิโนต มุขโรจน์	Serviced Date	03 August 2022
Approved by :		Approved Date :	03 August 2022

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**PETRO-INSTRUMENTS CORP.,LTD.**
**General Checking**

Equipment :	AQMs Pluak Kate	Model :	-
Serial Number :	Pluak Kate Station	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Mobile temperature	25-27 °C	26°C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	-	1400/40 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1800/36 psi	

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i-BZSAB
Serial Number :	CM06280010	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	1.5	1.4	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	13.7	13.7	ppb	0 to 60
SO <sub>2</sub> COEF.	0.984	0.984	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-573.5	-573.5		
Flash Supply	824	825		
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	37.1	37.7	°C	15°C to 45°C
Chamber	45.3	45.2	°C	45°C ± 2°C
Pressure	726.4	725.8	mmHg	750 ± 100 mmHg
Flow	0.545	0.544	L/min	0.5 to 1.00 L/min
Lamp intensity	91	92	%	40 ~ 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	1170530044	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	0.5	0.5	ppb	
NO <sub>2</sub> reading	0.9	1.8	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	8.5	8.6	ppb	0 to 60
NO <sub>2</sub> BKG. ppb	8.7	8.7	ppb	0 to 60
NO COEF.	1.084	1.088	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	45	45	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
PMT Supply	-855.8	-855.8	Vdc	-400 to -1200 Vdc
5 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
-15 Supply	-14.8	-14.8	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	37.3	37.4	°C	15 °C to 45 °C
Chamber	46.9	46.9	°C	45°C ± 2 °C
Cooler	-2.9	-2.7	°C	(-13 °C ± 2 °C
Converter	325.3	323.9	°C	325°C ± 5 °C
Converter Set	325.0	325.0	°C	325°C
Pressure	278.4	277.8	mmHg	250 ± 100 mmHg
Flow	0.682	0.679	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**O<sub>3</sub> Analyzer**

Equipment :	OzoneAnalyzer.	Model :	49i-B2NCC
Serial Number :	CM09040067	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	NominalRange
	Before	After		
Sample reading	18.0	18.7	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.5	-0.5	ppb	0 to 60
O <sub>3</sub> COEF.	0.937	0.941	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	35	35	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-14.9	-14.9	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.0	9.0	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	37.8	37.7	°C	5 - 50 °C
Bench Lamp Temp	54.0	54.0	°C	50 - 60 °C
Pressure	748.2	747.6	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.586	0.604	L/min	0.6 ± 0.2 L/min
Cell-B	0.614	0.628	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	24.9	24.3	ppb	Record only
Cell-B	11.6	13.1	ppb	Record only
O <sub>3</sub>	18.3	18.7	ppb	Record only
Lamp Intensity				
Cell A	89823	89558	Hz	45,000 - 150,000 HZ
Cell B	90674	90695	Hz	45,000 - 150,000 HZ

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351403	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.484	0.402	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	0.060	0.062	ppm	0 to 60
CO COEF	0.971	0.965	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.8	14.8	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	24.0	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	20.6	18.5	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.2	-106.2	Vdc	-100 to -110 Vdc
Temperatures				
Internal	39.1	39.1	°C	
Bench	47.9	48.3	°C	
Pressure	750.6	749.1	mmHg	760 ± 100 mmHg
Flow	0.617	0.683	L/min	1 ± 0.3 L/min
S/R Ratio	1.1429600	1.1428400	-	1.140 – 1.180
AGC Intensity	199362	199478	Hz	200,000 ±50,000 Hz
Motor speed	100.01	100.03	%	100 ± 5%

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	20080005504	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.748	1.783	ppm	0-25 ppm
NMHC reading	0.248	0.283	ppm	0-25 ppm
THC reading	1.996	2.066	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.748	1.783	ppm	0-25 ppm
NMHC reading	0.248	0.283	ppm	0-25 ppm
THC reading	1.996	2.066	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-450	-450	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-20	-20	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
Analog Input				
Detector temp	37.6	37.4	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	64.7	68.4	kPa	80 kPa± 4 kPa
Ambient	101.3	101.2	kPa	Current Atmospheric pressure
Purifier temp	420.1	417.9	°C	390-430 °C
Purifier pressure	8.1	8.5	kPa	8 kPa -25 kPa
NMC cutter temp	227.4	225.6	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5V
DC 5V	4.9	4.9	V.	5V ± 0.5V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**Continuous Ambient Particulate Monitor (PM10)**

Equipment :	PM10 (C14 Beta)	Model :	FH 62-C14Series
Manufacturer :	Thermo Scientific	Serial number :	E-1182

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	8	11	ug/m <sup>3</sup>	0 to 1000 ug/m <sup>3</sup>
b. Mass	16	3	ug/m <sup>3</sup>	0 – 5,000 ug/m <sup>3</sup>
2) Operating Data				
a. Ambient conditions				
● Ambient Temperature :	29	29	°C	20 °C...+50 °C
● Ambient Air Pressure :	1004	1004	kPa	750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	Ug	
b. Air flow rate	<950	<950	L/Hr.	
c. Cycle	600	600	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	34	34	°C	
b. Air flow rate	1046	1046	L/Hr.	1000 L/Hr.
5) Maintenance				
a. High Voltage	1388	1388	V	
b. Ref. threshold	165	165	mV	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SINGLE-POINT GAS CALIBRATION**
**All analyzer.**

Equipment :	All analyzer.	Model :	42C, 43i , 48i, 49i
Serial Number :	0504710413,CM06280010, 1201351403,CM09040067	Manufacturer :	Thermo Electron

Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.73 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84 ppm	Model :	146C
Methane (CH <sub>4</sub> )	497.9 ppm	Serial number :	0504710414
Carbon oxide (CO)	4524 ppm		
Cylinder NO. :	CC112336		
Expiration Date :	21 Aug 2023		

**BEFORE CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.70	0.70	400	397.0	-0.75	Valid
NO <sub>x</sub> (ppb)	0.00	1.70	1.70	400	401.0	0.25	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	401.0	0.25	Valid
CO (ppm)	0.00	0.15	0.15	40.0	39.6	-1.00	Valid
O <sub>3</sub> (ppb)	0.00	0.00	0.00	400	394.0	-1.50	Valid
CH <sub>4</sub> (ppm)	0.00			4.00			
THC (ppm)	0.00			4.00			





**AFTER CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.60	0.60	400	400.0	0.00	Valid
NO <sub>x</sub> (ppb)	0.00	1.50	1.50	400	404.0	1.00	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	400.0	0.00	Valid
CO (ppm)	0.00	0.06	0.06	40.0	40.2	0.50	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	399.0	-0.25	Valid
CH <sub>4</sub> (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid
THC (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid

Remark :

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Pluakgate IRPC 	Inside Station 
Lamp Sampling Box 	Replace Filter 
Gas H2 	Gas STD 

อุปกรณ์ทำความสะอาด 	Log Sheet 
ถังดับเพลิง 	Replace Silica gel 
EXP 200-100-10000	

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	KhunWirasakKhumasuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Pluak Kate Station	E-mail address/Fax :	<a href="mailto:wirajak.k@irpc.co.th">wirajak.k@irpc.co.th</a>
Working Date :	19 August 2022	Working Hour :	4 Hours

### Service Report

#### Working Scope:

Service Station

#### Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

#### Correction working:

Calibrate single-point of all analyzers.	Calibrate mass flow for Dilutor.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

#### Part Replacements:

- Sample Filter 47 mm. 6 ea. (Part support by IRPC)

#### Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Serviced by :	ชินโรส มุขโรจน์	Serviced Date	19 August 2022
Approved by :		Approved Date :	19 August 2022

General Checking				
Equipment :	AQMs Pluak Kate	Model :	-	
Serial Number :	Pluak Kate Station	Manufacturer :	-	

Item	Description	Set-Point Value	Status & Value	Remark
	On Mobile			
1	Air conditioner operation	OK	OK	
2	Mobile temperature	25-27 °C	26°C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	-	1200/40 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1800/36 psi	

Note :

**PETRO-INSTRUMENTS CORP.,LTD.**

NO-NO <sub>2</sub> -NO <sub>x</sub> Analyzer				
Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.		Model :	42i
Serial Number :	1170530044		Manufacturer :	Thermo Electron
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	27.4	2.0	ppb	
NO <sub>2</sub> reading	33.0	5.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	8.6	8.6	ppb	0 to 60
NO <sub>2</sub> BKG. ppb	8.7	8.7	ppb	0 to 60
NO COEF.	1.088	1.088	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	45	45	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
PMT Supply	-855.8	-855.8	Vdc	-400 to -1200 Vdc
5 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
-15 Supply	-14.8	-14.8	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	38.0	38.1	°C	15 °C to 45 °C
Chamber	46.8	47.0	°C	45°C ± 2 °C
Cooler	-2.7	-2.8	°C	(-13 °C ± 2 °C
Converter	323.9	324.7	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	279.0	278.8	mmHg	250 ± 100 mmHg
Flow	0.678	0.679	L/min	0.5 to 1.00 L/min
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

SO <sub>2</sub> Analyzer				
Equipment :	Sulfur Dioxide analyzer.	Model :	43i-BZSAB	
Serial Number :	CM06280010	Manufacturer :	Thermo Electron	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	4.3	3.7	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	13.7	13.9	ppb	0 to 60
SO <sub>2</sub> COEF	0.984	0.984	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-573.5	-573.5		
Flash Supply	831	830		
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	38.4	38.4	°C	15°C to 45°C
Chamber	45.3	45.1	°C	45°C ± 2°C
Pressure	725.8	725.2	mmHg	750 ± 100 mmHg
Flow	0.545	0.544	L/min	0.5 to 1.00 L/min
Lamp Intensity	92	92	%	40 – 100 %
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

O <sub>3</sub> Analyzer				
Equipment :	OzoneAnalyzer.	Model :	49I-B2NCC	
Serial Number :	CM09040067	Manufacturer :	Thermo Electron	
Diagnostic Test Value				
Parameter	Observed Value		Unit	NominalRange
	Before	After		
Sample reading	1.8	10.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.5	-0.5	ppb	0 to 60
O <sub>3</sub> COEF	0.941	0.946	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	35	35	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-14.9	-14.9	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.0	9.0	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	38.8	38.9	°C	5 - 50 °C
Bench Lamp Temp	54.1	54.2	°C	50 - 60 °C
Pressure	747.9	747.7	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.601	0.603	L/min	0.6 ± 0.2 L/min
Cell-B	0.635	0.638	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	0.8	24.3	ppb	Record only
Cell-B	2.0	13.1	ppb	Record only
O <sub>3</sub>	1.4	18.7	ppb	Record only
Lamp Intensity				
Cell A	89451	89464	Hz	45,000 – 150,000 HZ
Cell B	90570	90583	Hz	45,000 - 150,000 HZ
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

CO Analyzer				
Equipment :	CO analyzer.	Model :	48i	
Serial Number :	1201351403	Manufacturer :	Thermo Electron	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.540	0.457	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	0.062	0.102	ppm	0 to 60
CO COEF	0.965	0.958	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.8	14.8	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	24.0	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	19.3	17.8	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.2	-106.2	Vdc	-100 to -110 Vdc
Temperatures				
Internal	39.6	39.9	°C	
Bench	48.5	48.2	°C	
Pressure	749.4	749.3	mmHg	760 ± 100 mmHg.
Flow	0.727	0.735	L/min	1 ± 0.3 L/min
S/R Ratio	1.1421200	1.1425700	-	1.140 – 1.180
AGC Intensity	199461	199483	Hz	200,000 ±50,000 Hz
Motor speed	100.02	100.01	%	100 ± 5%
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer			
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	200800005504	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	2.027	1.989	ppm	0-25 ppm
NMHC reading	0.430	0.397	ppm	0-25 ppm
THC reading	2.457	2.386	ppm	0-25 ppm
Analyzer reading				
CH4 reading	2.027	1.989	ppm	0-25 ppm
NMHC reading	0.430	0.397	ppm	0-25 ppm
THC reading	2.457	2.386	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-450	-450	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-20	-20	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
Analog Input				
Detector temp	38.0	38.1	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	75.7	76.0	kPa	80 kPa± 4 kPa
Ambient	101.3	101.3	kPa	Current Atmospheric pressure
Purifier temp	416.1	416.3	°C	390-430 °C
Purifier pressure	7.4	7.4	kPa	8 kPa -25 kPa
NMC cutter temp	230.2	229.9	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5V
DC 5V	4.9	4.9	V.	5V ± 0.5V

Note :

**PETRO-INSTRUMENTS CORP.,LTD.**

Continuous Ambient Particulate Monitor (PM10)			
Equipment :	PM10 (C14 Beta)	Model :	FH 62-C14Series
Manufacturer :	Thermo Scientific	Serial number :	E-1182

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	2.6	11	ug/m <sup>3</sup>	0 to 1000 ug/m <sup>3</sup>
b. Mass	91	93	ug/m <sup>3</sup>	0 – 5,000 ug/m <sup>3</sup>
2) Operating Data				
a. Ambient conditions				
• Ambient Temperature :	29	30	°C	20 °C...+50 °C
• Ambient Air Pressure :	1003	1004	kPa	750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	Ug	
b. Air flow rate	<950	<950	L/Hr.	
c. Cycle	600	600	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	34	34	°C	
b. Air flow rate	1046	1046	L/Hr.	1000 L/Hr.
5) Maintenance				
a. High Voltage	1388	1388	V	
b. Ref. threshold	165	165	mV	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

SINGLE-POINT GAS CALIBRATION			
All analyzer.			
Equipment :	All analyzer.	Model :	42C, 43i, 48i, 49i
Serial Number :	0504710413,CM06280010, 1201351403,CM09040067	Manufacturer :	Thermo Electron
Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.73 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84 ppm	Model :	146C
Methane (CH <sub>4</sub> )	497.9 ppm	Serial number :	0504710414
Carbon oxide (CO)	4524 ppm		
Cylinder NO. :	CC112336		
Expiration Date :	21 Aug 2023		

**BEFORE CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.80	0.80	400	393.0	-1.75	Valid
NO <sub>x</sub> (ppb)	0.00	1.90	1.90	400	398.0	-0.50	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	404.0	1.00	Valid
CO (ppm)	0.00	0.30	0.30	40.0	39.3	-1.75	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	391.0	-2.25	Valid
CH <sub>4</sub> (ppm)	0.00			4.00			
THC (ppm)	0.00			4.00			

**AFTER CALIBRATION RESULT**
**PETRO-INSTRUMENTS CORP.,LTD.**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.60	0.60	400	399.0	-0.25	Valid
NO <sub>x</sub> (ppb)	0.00	1.60	1.60	400	403.0	0.75	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	402.0	0.50	Valid
CO (ppm)	0.00	0.10	0.10	40.0	40.0	0.00	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	398.0	-0.50	Valid
CH <sub>4</sub> (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid
THC (ppm)	0.00	0.01	0.01	5.00	5.01	0.20	Valid

Remark :

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Puakgate JRPC	Inside Station
	
Lamp Sampling Box	Replace Filter
	

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PETRO-INSTRUMENTS CORP.,LTD.

Gas H2	Gas STD
	
อุปกรณ์ทำความสะอาด	Log Sheet
	
ถังดับเพลิง	Replace Silica gel
	
EXP :xx-xx-xxxx	

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PETRO-INSTRUMENTS CORP.,LTD.

General Checking

Equipment :	AQMs Pluak Kate	Model :	-
Serial Number :	Pluak Kate Station	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	On Mobile			
1	Air conditioner operation	OK	OK	
2	Mobile temperature	25-27 °C	26°C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	-	850/40 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1800/36 psi	

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	KhunWirasakKhumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Pluak Kate Station	E-mail address/Fax. :	<a href="mailto:wirajak.k@irpc.co.th">wirajak.k@irpc.co.th</a>
Working Date :	06 September 2022	Working Hour :	4 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

Correction working:

Calibrate single-point of all analyzers.	Calibrate mass flow for Dilutor.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.
Replace fan of O3.	

Part Replacements:

- Sample Filter 47 mm. 6 ea. (Part support by IRPC)
- Fan of O3. 1 ea. (Part support by IRPC)

Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Serviced by :	ชินวรส มุขโรจน์	Serviced Date	06 September 2022
Approved by :		Approved Date :	06 September 2022

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PETRO-INSTRUMENTS CORP.,LTD.

NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	1170530044	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	0.7	22.0	ppb	
NO <sub>2</sub> reading	2.1	31.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	8.6	8.6	ppb	0 to 60
NO <sub>x</sub> BKG. ppb	8.8	8.8	ppb	0 to 60
NO COEF.	1.088	1.092	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	45	45	"	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
PMT Supply	-855.8	-855.8	Vdc	-400 to -1200 Vdc
5 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
-15 Supply	-14.8	-14.8	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	36.2	36.6	°C	15 °C to 45 °C
Chamber	49.9	50.0	°C	45 °C ± 2 °C
Cooler	-2.7	-2.8	°C	(-3 °C ± 2 °C
Converter	325.5	324.5	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	281.4	280.2	mmHg	250 ± 100 mmHg
Flow	0.675	0.676	L/min	0.5 to 1.00 L/min

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i-BZSAB
Serial Number :	CM06280010	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	1.2	1.6	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	13.9	13.9	ppb	0 to 60
SO <sub>2</sub> COEF	0.984	0.981	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-573.5	-573.5		
Flash Supply	824	825		
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	36.3	37.1	°C	15°C to 45°C
Chamber	45.1	45.3	°C	45°C ± 2°C
Pressure	726.7	725.2	mmHg	750 ± 100 mmHg
Flow	0.546	0.545	L/min	0.5 to 1.00 L/min
Lamp intensity	92	91	%	40 – 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351403	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.325	0.155	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	0.115	0.123	ppm	0 to 60
CO COEF	0.958	0.992	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.8	14.8	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	24.0	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	17.6	19.2	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.1	-106.1	Vdc	-100 to -110 Vdc
Temperatures				
Internal	38.5	38.4	°C	
Bench	48.0	48.6	°C	
Pressure	749.7	749.1	mmHg	760 ± 100 mmHg
Flow	0.644	0.663	L/min	1 ± 0.3 L/min
S/R Ratio	1.1423400	1.1426700	-	1.140 – 1.180
AGC Intensity	199624	199925	Hz	200,000 ±50,000 Hz
Motor speed	100.03	100.02	%	100 ± 5%

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**O<sub>3</sub> Analyzer**

Equipment :	OzoneAnalyzer.	Model :	49i-B2NCC
Serial Number :	CM09040067	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	NominalRange
	Before	After		
Sample reading	12.5	1.6	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.5	-0.5	ppb	0 to 60
O <sub>3</sub> COEF	0.946	0.932	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	35	35	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-14.9	-14.9	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.0	9.0	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	48.2	33.7	°C	5 - 50 °C
Bench Lamp Temp	54.2	53.9	°C	50 - 60 °C
Pressure	744.6	748.2	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.597	0.614	L/min	0.6 ± 0.2 L/min
Cell-B	0.629	0.639	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	16.4	10.2	ppb	Record only
Cell-B	9.4	-2.6	ppb	Record only
O <sub>3</sub>	13.6	1.6	ppb	Record only
Lamp intensity				
Cell A	84824	84242	Hz	45,000 – 150,000 HZ
Cell B	89796	89132	Hz	45,000 - 150,000 HZ

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	200800005504	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH <sub>4</sub> reading	2.053	1.666	ppm	0-25 ppm
NMHC reading	0.521	0.158	ppm	0-25 ppm
THC reading	2.574	1.824	ppm	0-25 ppm
Analyzer reading				
CH <sub>4</sub> reading	2.053	1.666	ppm	0-25 ppm
NMHC reading	0.521	0.158	ppm	0-25 ppm
THC reading	2.574	1.824	ppm	0-25 ppm
Calibration Factors				
CH <sub>4</sub>				
Zero calibration coefficient	-450	-450	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-20	-20	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
Analog Input				
Detector temp	37.4	37.0	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	64.8	64.6	kPa	80 kPa± 4 kPa
Ambient	101.3	101.1	kPa	Current Atmospheric pressure
Purifier temp	425.9	420.3	°C	390-430 °C
Purifier pressure	7.1	7.4	kPa	8 kPa -25 kPa
NMC cutter temp	215.6	218.0	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5V
DC 5V	4.9	4.9	V.	5V ± 0.5V

**Note :**

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PETRO-INSTRUMENTS CORP.,LTD.

Continuous Ambient Particulate Monitor (PM10)

Equipment :	PM10 (C14 Beta)	Model :	FH 62-C14Series
Manufacturer :	Thermo Scientific	Serial number :	E-1182

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	11	10	ug/m <sup>3</sup>	0 to 1000 ug/m <sup>3</sup>
b. Mass	4	22	ug/m <sup>3</sup>	0 – 5,000 ug/m <sup>3</sup>
2) Operating Data				
a. Ambient conditions				
• Ambient Temperature :	29	29	°C	20 °C...+50 °C
• Ambient Air Pressure :	1004	1004	kPa	750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	Ug	
b. Air flow rate	<950	<950	L/Hr.	
c. Cycle	600	600	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	34	34	°C	
b. Air flow rate	1046	1046	L/Hr.	1000 L/Hr.
5) Maintenance				
a. High Voltage	1388	1388	V	
b. Ref. threshold	165	165	mV	

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION

All analyzer.

Equipment :	All analyzer.	Model :	42C, 43I, 48I, 49I
Serial Number :	0504710413,CM06280010, 1201351403,CM09040067	Manufacturer :	Thermo Electron

Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.73 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84 ppm	Model :	146C
Methane (CH <sub>4</sub> )	497.9 ppm	Serial number :	0504710414
Carbon oxide (CO)	4524 ppm		
Cylinder NO. :	CC112336		
Expiration Date :	21 Aug 2023		

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.80	0.80	400	398.0	-0.50	Valid
NO <sub>x</sub> (ppb)	0.00	1.60	1.60	400	402.0	0.50	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	405.0	1.25	Valid
CO (ppm)	0.00	0.31	0.31	40.0	40.0	0.00	Valid
O <sub>3</sub> (ppb)	0.00	0.00	0.00	400	390.0	-2.50	Valid
CH <sub>4</sub> (ppm)	0.00			4.00			
THC (ppm)	0.00			4.00			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.80	0.80	400	400.0	0.00	Valid
NO <sub>x</sub> (ppb)	0.00	1.60	1.60	400	403.0	0.75	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	398.0	-0.50	Valid
CO (ppm)	0.00	0.08	0.08	40.0	40.2	0.50	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	400.0	0.00	Valid
CH <sub>4</sub> (ppm)	0.00	0.01	0.01	5.00	4.99	-0.20	Valid
THC (ppm)	0.00	0.01	0.01	5.00	5.01	0.20	Valid

Remark :

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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Pluakgate IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas H2



Gas STD



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อุปกรณ์ทำความสะอาด



Log Sheet



ถังดับเพลิง



EXP ๒๐๒๓-๒๐๒๔

Replace Silica gel

Replace fan of Q3



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PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	KhunWirasakKhumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Pluak Kate Station	E-mail address/Fax. :	<a href="mailto:wirajak.k@irpc.co.th">wirajak.k@irpc.co.th</a>
Working Date :	19 September 2022	Working Hour :	4 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

Correction working:

Calibrate single-point of all analyzers.	Calibrate mass flow for Dilutor.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacements:

- Sample Filter 47 mm. 6 ea. (Part support by IRPC)
- Fan of O3. 1 ea. (Part support by IRPC)

Addition Recommended:

- ตรวจสอบเครื่องวัดฝุ่นในสถานีพบว่า หมดยอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Serviced by :	ชินวรส มุขโรจน์	Serviced Date	19 September 2022
Approved by:		Approved Date :	19 September 2022

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PETRO-INSTRUMENTS CORP.,LTD.

General Checking

Equipment :	AQMs Pluak Kate	Model :	-
Serial Number :	Pluak Kate Station	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	On Mobile			
1	Air conditioner operation	OK	OK	
2	Mobile temperature	25-27 °C	26 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	-	650/40 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1800/36 psi	

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	1170530044	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	2.4	6.3	ppb	
NO <sub>2</sub> reading	7.3	13.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	8.6	8.6	ppb	0 to 60
NO <sub>2</sub> BKG. ppb	8.8	8.8	ppb	0 to 60
NO COEF.	1.092	1.092	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	45	45	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
PMT Supply	-855.8	-855.8	Vdc	-400 to -1200 Vdc
5 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
-15 Supply	-14.8	-14.8	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	36.1	36.6	°C	15 °C to 45 °C
Chamber	49.8	49.9	°C	45 °C ± 2 °C
Cooler	-2.8	-3.0	°C	(-3) °C ± 2 °C
Converter	325.5	322.9	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	280.5	280.2	mmHg	250 ± 100 mmHg
Flow	0.675	0.675	L/min	0.5 to 1.00 L/min

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

SO<sub>2</sub> Analyzer

Equipment :	Sulfur Dioxide analyzer.	Model :	43i-BZSAB
Serial Number :	CM06280010	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	5.3	4.4	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	13.9	14.1	ppb	0 to 60
SO <sub>2</sub> COEF	0.981	0.981	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-573.5	-573.5		
Flash Supply	828	827		
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	36.4	36.9	°C	15 °C to 45 °C
Chamber	45.1	45.0	°C	45 °C ± 2 °C
Pressure	725.8	725.5	mmHg	750 ± 100 mmHg
Flow	0.544	0.544	L/min	0.5 to 1.00 L/min
Lamp Intensity	92	92	%	40 – 100 %

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

O <sub>3</sub> Analyzer			
Equipment :	OzoneAnalyzer.	Model :	49I-B2NCC
Serial Number :	CM09040067	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	NominalRange
	Before	After		
Sample reading	15.4	10.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.5	-0.5	ppb	0 to 60
O <sub>3</sub> COEF	0.932	0.929	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	35	35	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-14.9	-14.9	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.0	9.0	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	33.2	33.4	°C	5 - 50 °C
Bench Lamp Temp	53.9	53.9	°C	50 - 60 °C
Pressure	749.7	749.3	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.624	0.614	L/min	0.6 ± 0.2 L/min
Cell-B	0.649	0.637	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	20.4	6.3	ppb	Record only
Cell-B	8.2	8.7	ppb	Record only
O <sub>3</sub>	14.3	7.5	ppb	Record only
Lamp Intensity				
Cell A	87992	87988	Hz	45,000 – 150,000 HZ
Cell B	88139	88132	Hz	45,000 – 150,000 HZ

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**PETRO-INSTRUMENTS CORP.,LTD.**

CO Analyzer			
Equipment :	CO analyzer.	Model :	48I
Serial Number :	1201351403	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.314	0.657	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	0.123	0.081	ppm	0 to 60
CO COEF	0.992	0.988	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.8	14.8	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	24.0	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	19.5	19.7	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.1	-106.1	Vdc	-100 to -110 Vdc
Temperatures				
Internal	38.2	38.5	°C	
Bench	48.0	48.4	°C	
Pressure	749.1	749.4	mmHg	760 ± 100 mmHg
Flow	0.671	0.629	L/min	1 ± 0.3 L/min
S/R Ratio	1.1426400	1.1420700	-	1.140 – 1.180
AGC Intensity	199560	199982	Hz	200,000 ±50,000 Hz
Motor speed	100.02	100.01	%	100 ± 5%

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer			
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	200800005504	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.910	1.837	ppm	0-25 ppm
NMHC reading	0.142	0.337	ppm	0-25 ppm
THC reading	2.052	2.174	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.910	1.837	ppm	0-25 ppm
NMHC reading	0.142	0.337	ppm	0-25 ppm
THC reading	2.052	2.174	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-450	-450	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-20	-20	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
Analog Input				
Detector temp	37.2	37.5	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	64.7	64.7	kPa	80 kPa± 4 kPa
Ambient	101.2	101.2	kPa	Current Atmospheric pressure
Purifier temp	414.3	417.5	°C	390-430 °C
Purifier pressure	7.5	7.4	kPa	8 kPa -25 kPa
NMC cutter temp	230.0	229.9	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5V
DC 5V	4.9	4.9	V.	5V ± 0.5V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

Continuous Ambient Particulate Monitor (PM10)			
Equipment :	PM10 (C14 Beta)	Model :	FH 62-C14Series
Manufacturer :	Thermo Scientific	Serial number :	E-1182

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	10	27	ug/m <sup>3</sup>	0 to 1000 ug/m <sup>3</sup>
b. Mass	35	47	ug/m <sup>3</sup>	0 – 5,000 ug/m <sup>3</sup>
2) Operating Data				
a. Ambient conditions				
● Ambient Temperature :	31	31	°C	20 °C...+50 °C
● Ambient Air Pressure :	1003	1003	kPa	750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	Ug	
b. Air flow rate	<950	<950	L/hr.	
c. Cycle	600	600	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	34	34	°C	
b. Air flow rate	1046	1046	L/hr.	1000 L/hr.
5) Maintenance				
a. High Voltage	1388	1388	V	
b. Ref. threshold	165	165	mV	

Note :

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SINGLE-POINT GAS CALIBRATION			
All analyzer.			
Equipment :	All analyzer.	Model :	42C, 43I, 48I, 49I
Serial Number :	0504710413,CM06280010, 1201351403,CM09040067	Manufacturer :	Thermo Electron

Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.73 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84 ppm	Model :	146C
Methane (CH <sub>4</sub> )	497.9 ppm	Serial number :	0504710414
Carbon oxide (CO)	4524 ppm		
Cylinder NO. :	CC112336		
Expiration Date :	21 Aug 2023		

BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.70	0.70	400	398.0	-0.50	Valid
NO <sub>x</sub> (ppb)	0.00	1.60	1.60	400	401.0	0.25	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	400.0	0.00	Valid
CO (ppm)	0.00	-0.05	-0.05	40.0	41.0	2.50	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	399.0	-0.25	Valid
CH <sub>4</sub> (ppm)	0.00			4.00			
THC (ppm)	0.00			4.00			

AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.70	0.70	400	400.0	0.00	Valid
NO <sub>x</sub> (ppb)	0.00	1.50	1.50	400	404.0	1.00	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	401.0	0.25	Valid
CO (ppm)	0.00	0.18	0.18	40.0	40.0	0.00	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	401.0	0.25	Valid
CH <sub>4</sub> (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid
THC (ppm)	0.00	0.01	0.01	5.00	5.01	0.20	Valid

Remark :

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Pluakgate IRPC	Inside Station
Lamp Sampling Box	Replace Filter
Gas H2	Gas STD



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อุปกรณ์ทำความสะอาด	Log Sheet
ถังดับเพลิง	Replace Silica gel
Replace fan of O3	



EXP ๖๐๕-๖๐๕



Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	KhunWirasakKhumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Pluak Kate Station	E-mail address/Fax :	<a href="mailto:wirarak.k@irpc.co.th">wirarak.k@irpc.co.th</a>
Working Date :	05 October 2022	Working Hour :	4 Hours

### Service Report

#### Working Scope:

Service Station

#### Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

#### Correction working:

Calibrate single-point of all analyzers.	Calibrate mass flow for Dilutor.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

#### Part Replacements:

- Sample Filter 47 mm. 6 ea. (Part support by IRPC)
- Fan of O<sub>3</sub>. 1 ea. (Part support by IRPC)

#### Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดยอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Serviced by :	จิโนต มุขโรจน์	Serviced Date	05 October 2022
Approved by :		Approved Date :	05 October 2022

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**PETRO-INSTRUMENTS CORP.,LTD.**

**General Checking**

Equipment :	AQMs Pluak Kate	Model :	-
Serial Number :	Pluak Kate Station	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Mobile temperature	25-27 °C	26°C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	-	450/40 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1800/36 psi	

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i-BZSAB
Serial Number :	CM06280010	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	1.8	1.4	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	14.0	13.0	ppb	0 to 60
SO <sub>2</sub> COEF.	0.981	0.989	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-573.5	-573.5		
Flash Supply	829	828		
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	37.8	37.9	°C	15°C to 45°C
Chamber	45.3	45.2	°C	45°C ± 2°C
Pressure	729.2	728.5	mmHg	750 ± 100 mmHg
Flow	0.499	0.501	L/min	0.5 to 1.00 L/min
Lamp intensity	91	92	%	40 – 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	1170530044	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	4.7	1.6	ppb	
NO <sub>2</sub> reading	9.0	5.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	8.6	8.6	ppb	0 to 60
NO <sub>2</sub> BKG. ppb	8.8	8.9	ppb	0 to 60
NO COEF.	1.092	1.096	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	45	45	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
PMT Supply	-855.8	-855.8	Vdc	-400 to -1200 Vdc
5 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
-15 Supply	-14.8	-14.8	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	37.2	37.4	°C	15 °C to 45 °C
Chamber	50.0	49.8	°C	45°C ± 2 °C
Cooler	-2.9	-2.9	°C	(-13 °C ± 2 °C
Converter	325.3	324.5	°C	325°C ± 5 °C
Converter Set	325.0	325.0	°C	325°C
Pressure	282.6	282.6	mmHg	250 ± 100 mmHg
Flow	0.676	0.675	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

**O<sub>3</sub> Analyzer**

Equipment :	OzoneAnalyzer.	Model :	49i-B2NCC
Serial Number :	CM09040067	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	NominalRange
	Before	After		
Sample reading	6.4	17.0	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.5	-0.5	ppb	0 to 60
O <sub>3</sub> COEF.	0.929	0.929	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	35	35	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-14.9	-14.9	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.0	9.0	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	34.5	33.9	°C	5 - 50 °C
Bench Lamp Temp	54.0	53.9	°C	50 - 60 °C
Pressure	753.1	751.8	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.611	0.612	L/min	0.6 ± 0.2 L/min
Cell-B	0.636	0.638	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	-2.9	23.3	ppb	Record only
Cell-B	17.9	10.6	ppb	Record only
O <sub>3</sub>	7.5	17.2	ppb	Record only
Lamp Intensity				
Cell A	88597	88640	Hz	45,000 – 150,000 HZ
Cell B	88111	88135	Hz	45,000 - 150,000 HZ

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351403	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.465	0.305	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	0.081	0.043	ppm	0 to 60
CO COEF	0.988	0.971	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.8	14.8	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	24.0	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	18.4	20.1	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.1	-106.1	Vdc	-100 to -110 Vdc
Temperatures				
Internal	39.3	38.6	°C	
Bench	48.0	47.9	°C	
Pressure	752.1	751.8	mmHg	760 ± 100 mmHg
Flow	0.683	0.688	L/min	1 ± 0.3 L/min
S/R Ratio	1.1421600	1.1422700	-	1.140 – 1.180
AGC Intensity	199412	199413	Hz	200,000 ±50,000 Hz
Motor speed	100.03	100.02	%	100 ± 5%

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	20080005504	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.577	1.789	ppm	0-25 ppm
NMHC reading	0.091	0.289	ppm	0-25 ppm
THC reading	1.668	2.078	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.577	1.789	ppm	0-25 ppm
NMHC reading	0.091	0.289	ppm	0-25 ppm
THC reading	1.668	2.078	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-450	-450	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-20	-20	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
Analog Input				
Detector temp	37.9	37.7	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	65.1	65.1	kPa	80 kPa± 4 kPa
Ambient	101.7	101.6	kPa	Current Atmospheric pressure
Purifier temp	415.5	424.8	°C	390-430 °C
Purifier pressure	7.4	7.2	kPa	8 kPa -25 kPa
NMC cutter temp	230.0	229.8	°C	230-260 °C
DC 24V	23.9	23.9	V.	24V ± 0.5V
DC 5V	4.9	4.9	V.	5V ± 0.5V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**Continuous Ambient Particulate Monitor (PM10)**

Equipment :	PM10 (C14 Beta)	Model :	FH 62-C14Series
Manufacturer :	Thermo Scientific	Serial number :	E-1182

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	32	28	ug/m <sup>3</sup>	0 to 1000 ug/m <sup>3</sup>
b. Mass	227	91	ug/m <sup>3</sup>	0 – 5,000 ug/m <sup>3</sup>
2) Operating Data				
a. Ambient conditions				
● Ambient Temperature :	30	31	°C	20 °C...+50 °C
● Ambient Air Pressure :	1008	1007	kPa	750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	Ug	
b. Air flow rate	<950	<950	L/Hr.	
c. Cycle	600	600	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	34	34	°C	
b. Air flow rate	1046	1046	L/Hr.	1000 L/Hr.
5) Maintenance				
a. High Voltage	1388	1388	V	
b. Ref. threshold	165	165	mV	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SINGLE-POINT GAS CALIBRATION**
**All analyzer.**

Equipment :	All analyzer.	Model :	42C, 43i , 48i, 49i
Serial Number :	0504710413,CM06280010, 1201351403,CM09040067	Manufacturer :	Thermo Electron

Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.73 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84 ppm	Model :	146C
Methane (CH <sub>4</sub> )	497.9 ppm	Serial number :	0504710414
Carbon oxide (CO)	4524 ppm		
Cylinder NO. :	CC112336		
Expiration Date :	21 Aug 2023		

**BEFORE CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.80	0.80	400	397.0	-0.75	Valid
NO <sub>x</sub> (ppb)	0.00	1.50	1.50	400	401.0	0.25	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	398.0	-0.50	Valid
CO (ppm)	0.00	-0.17	-0.17	40.0	40.2	0.50	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	397.0	-0.75	Valid
CH <sub>4</sub> (ppm)	0.00			4.00			
THC (ppm)	0.00			4.00			

**AFTER CALIBRATION RESULT**





PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.70	0.70	400	399.0	-0.25	Valid
NO <sub>x</sub> (ppb)	0.00	1.60	1.60	400	402.0	0.50	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	401.0	0.25	Valid
CO (ppm)	0.00	0.18	0.18	40.0	40.1	0.25	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	401.0	0.25	Valid
CH <sub>4</sub> (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid
THC (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid

Remark :

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Pluakgate IRPC 	Inside Station 
Lamp Sampling Box 	Replace Filter 
Gas H2 	Gas STD 

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อุปกรณ์ทำความสะอาด 	Log Sheet 
ถังดับเพลิง 	Replace Silica gel 
EXP 200-100-10000	

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Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	KhunWirasakKhumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Pluak Kate Station	E-mail address/Fax :	<a href="mailto:wirajak.k@irpc.co.th">wirajak.k@irpc.co.th</a>
Working Date :	20 October 2022	Working Hour :	4 Hours

### Service Report

#### Working Scope:

Service Station

#### Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

#### Correction working:

Calibrate single-point of all analyzers.	Calibrate mass flow for Dilutor.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

#### Part Replacements:

- Sample Filter 47 mm. 6 ea. (Part support by IRPC)
- Fan of O3. 1 ea. (Part support by IRPC)

#### Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Serviced by :	จิโนต มุขโรจน์	Serviced Date	20 October 2022
Approved by :		Approved Date :	20 October 2022

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### General Checking

Equipment :	AQMs Pluak Kate	Model :	-
Serial Number :	Pluak Kate Station	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	On Mobile			
1	Air conditioner operation	OK	OK	
2	Mobile temperature	25-27 °C	26°C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	-	200/40 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1750/36 psi	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	1170530044	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	5.5	11.0	ppb	
NO <sub>2</sub> reading	21.5	35.2	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	8.6	8.9	ppb	0 to 60
NO <sub>2</sub> BKG. ppb	8.9	9.4	ppb	0 to 60
NO COEF.	1.096	1.096	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	45	45	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
PMT Supply	-856.2	-856.2	Vdc	-400 to -1200 Vdc
5 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
-15 Supply	-14.8	-14.8	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	38.2	37.5	°C	15 °C to 45 °C
Chamber	50.0	49.7	°C	45°C ± 2 °C
Cooler	-2.8	-2.9	°C	(-13 °C ± 2 °C
Converter	324.7	326.0	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	283.2	284.4	mmHg	250 ± 100 mmHg
Flow	0.674	0.675	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**O<sub>3</sub> Analyzer**

Equipment :	OzoneAnalyzer.	Model :	49I-B2NCC
Serial Number :	CM09040067	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	NominalRange
	Before	After		
Sample reading	20.1	36.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.5	-0.5	ppb	0 to 60
O <sub>3</sub> COEF	0.929	0.929	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	35	35	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-14.9	-14.9	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.3	9.3	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	35.0	34.2	°C	5 - 50 °C
Bench Lamp Temp	53.9	53.9	°C	50 - 60 °C
Pressure	751.5	752.8	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.615	0.607	L/min	0.6 ± 0.2 L/min
Cell-B	0.639	0.633	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	10.7	5.9	ppb	Record only
Cell-B	21.6	23.4	ppb	Record only
O <sub>3</sub>	16.1	11.9	ppb	Record only
Lamp Intensity				
Cell A	88858	88861	Hz	45,000 - 150,000 HZ
Cell B	88155	88176	Hz	45,000 - 150,000 HZ

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43I-BZSAB
Serial Number :	CM06280010	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	1.4	1.2	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	13.9	14.2	ppb	0 to 60
SO <sub>2</sub> COEF	0.989	0.989	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-573.1	-573.1		
Flash Supply	826	825		
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	38.4	38.0	°C	15°C to 45°C
Chamber	45.1	45.4	°C	45°C ± 2°C
Pressure	728.2	728.9	mmHg	750 ± 100 mmHg
Flow	0.547	0.547	L/min	0.5 to 1.00 L/min
Lamp Intensity	92	90	%	40 - 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351403	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.585	0.544	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	0.043	0.037	ppm	0 to 60
CO COEF	0.971	0.971	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.8	14.8	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	24.0	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	21.7	18.4	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.2	-106.2	Vdc	-100 to -110 Vdc
Temperatures				
Internal	39.5	38.7	°C	
Bench	48.1	48.5	°C	
Pressure	751.8	752.4	mmHg	760 ± 100 mmHg.
Flow	0.628	0.634	L/min	1 ± 0.3 L/min
S/R Ratio	1.1427900	1.1421200	-	1.140 - 1.180
AGC Intensity	199386	199995	Hz	200,000 ±50,000 Hz
Motor speed	100.02	100.01	%	100 ± 5%

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer			
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	20080005504	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.835	1.768	ppm	0-25 ppm
NMHC reading	0.335	0.268	ppm	0-25 ppm
THC reading	2.170	2.036	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.835	1.768	ppm	0-25 ppm
NMHC reading	0.335	0.268	ppm	0-25 ppm
THC reading	2.170	2.036	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-450	-450	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-20	-20	-	-3500 to 3500
Span calibration coefficient	0.5000	0.5000	-	0.50000 to 2.00000
Analog input				
Detector temp	38.4	38.2	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	65.0	65.2	kPa	80 kPa± 4 kPa
Ambient	101.6	101.7	kPa	Current Atmospheric pressure
Purifier temp	424.7	416.7	°C	390-430 °C
Purifier pressure	7.4	7.5	kPa	8 kPa -25 kPa
NMC cutter temp	230.1	229.9	°C	230-260 °C
DC 24V	23.9	23.9	V.	24V ± 0.5V
DC 5V	4.9	4.9	V.	5V ± 0.5V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**Continuous Ambient Particulate Monitor (PM10)**

Equipment :	PM10 (C14 Beta)	Model :	FH 62-C14Series
Manufacturer :	Thermo Scientific	Serial number :	E-1182

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	42	79	ug/m <sup>3</sup>	0 to 1000 ug/m <sup>3</sup>
b. Mass	332	489	ug/m <sup>3</sup>	0 ~ 5,000 ug/m <sup>3</sup>
2) Operating Data				
a. Ambient conditions				
● Ambient Temperature :	28	28	°C	20 °C...+50 °C
● Ambient Air Pressure :	1007	1007	kPa	750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	Ug	
b. Air flow rate	<950	<950	L/Hr.	
c. Cycle	600	600	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	34	34	°C	
b. Air flow rate	1046	1046	L/Hr.	1000 L/Hr.
5) Maintenance				
a. High Voltage	1388	1388	V	
b. Ref. threshold	165	165	mV	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

SINGLE-POINT GAS CALIBRATION			
All analyzer.			
Equipment :	All analyzer.	Model :	42C, 43i , 48i, 49i
Serial Number :	0504710413,CM06280010, 1201351403,CM09040067	Manufacturer :	Thermo Electron
Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.73 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84 ppm	Model :	146C
Methane (CH <sub>4</sub> )	497.9 ppm	Serial number :	0504710414
Carbon oxide (CO)	4524 ppm		
Cylinder NO. :	CC112336		
Expiration Date :	21 Aug 2023		

BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.90	0.90	400	398.0	-0.50	Valid
NO <sub>x</sub> (ppb)	0.00	1.80	1.80	400	403.0	0.75	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	401.0	0.25	Valid
CO (ppm)	0.00	-0.06	-0.06	40.0	39.2	-2.00	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	398.0	-0.50	Valid
CH <sub>4</sub> (ppm)	0.00			4.00			
THC (ppm)	0.00			4.00			

AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.00	0.50	0.50	400	398.0	-0.50	Valid
NO <sub>x</sub> (ppb)	0.00	1.20	1.20	400	401.0	0.25	Valid
SO <sub>2</sub> (ppb)	0.00	1.00	1.00	400	401.0	0.25	Valid
CO (ppm)	0.00	0.04	0.04	40.0	40.2	0.50	Valid
O <sub>3</sub> (ppb)	0.00	1.00	1.00	400	400.0	0.00	Valid
CH <sub>4</sub> (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid
THC (ppm)	0.00	0.01	0.01	5.00	5.00	0.00	Valid

Remark :




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**PETRO-INSTRUMENTS CORP.,LTD.**

ภาพถ่ายการปฏิบัติงานตามแผนการบำรุงรักษา	
<b>Stations Pluakgate IRPC</b> 	<b>Inside Station</b> 
<b>Lamp Sampling Box</b> 	<b>Replace Filter</b> 
<b>Gas H2</b> 	<b>Gas STD</b> 

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PETRO-INSTRUMENTS CORP.,LTD.

อุปกรณ์ทำความสะอาด	Log Sheet
	
ถังดับเพลิง	Replace Silica gel
	
EXP 200-100-10000	

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รายงานฉบับที่ 3 : รายงานผลการดูแล ตรวจสอบ บำรุงรักษาและปรับแต่งเครื่องมือและอุปกรณ์ในสถานี  
ตรวจวัดคุณภาพอากาศ และหน่วยตรวจวัดคุณภาพอากาศแบบเคลื่อนที่ทั้ง 9 หน่วย  
ครั้งที่ 2 : ตั้งแต่วันที่ 1 กรกฎาคม 2565 ถึงวันที่ 31 ตุลาคม 2565

## สถานีตรวจวัดฯบริเวณโรงเรียน เทคโนโลยี ไออาร์พีซี

ใบสั่งซื้อ/ส่งจ้างเลขที่ 3100170564  
Job No : JID2200310



บริษัท เพทโร-อินสตรูเมนต์ จำกัด

PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Technology Station	E-mail address/Fax :	<a href="mailto:wirasak.k@irpc.co.th">wirasak.k@irpc.co.th</a>
Working Date :	02 July 2022	Working Hour :	6 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacement:

- Sample filter 47 mm. 7 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

Addition Recommended:

- ตรวจสอบระดับถังเก็บน้ำในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- TEOM ยกเครื่องกลับไปยังกรณีที่ บริษัท PICO

-- End --

Serviced by :	ชินธร มุขโรจน์	Serviced Date :	02 July 2022
Approved by :		Approved Date :	02 July 2022

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PETRO-INSTRUMENTS CORP.,LTD.

General Checking

Equipment :	AQMs Technology	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box.	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1850/32 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1900/32 psi	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0620617608	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	5.5	2.1	ppb	
NO <sub>2</sub> reading	5.9	2.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. Ppb	50.3	53.3	ppb	0 to 60
NO <sub>2</sub> BKG. Ppb	49.8	52.7	ppb	0 to 60
NO COEF.	1.070	1.095	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On	On/Off	On
PMT Supply	On	On	On/Off	On
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-925.7	-925.7	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.8	14.8	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	40.6	40.7	°C	15 °C to 45 °C
Chamber	47.0	47.0	°C	45 °C ± 2 °C
Cooler	-2.5	-2.5	°C	(-13 °C ± 2 °C
Converter	322.9	323.9	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	255.1	255.1	mmHg	250 ± 100 mmHg
Flow	0.688	0.686	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO<sub>2</sub> Analyzer**

Equipment :	Carbon Dioxide analyzer.	Model :	410i
Serial Number :	0908235308	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading			ppm	
Range			ppm	0 to 100 ppm
Averaging Time			Sec	10 to 300 Sec
Calibration Factors				
CO <sub>2</sub> BKG. ppm			ppm	0 to 60
CO <sub>2</sub> COEF	-	-	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	-	-	On/Off	On/Off
Pressure Correction	-	-	On/Off	On/Off
Baud Rate			bps	9600 to 115000 bps
Instrument ID	-	-		0 to 99
Screen Brightness			%	0 to 100 %
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-3.3 Supply			Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-15.0 Supply			Vdc	-15.0 ± 2 Vdc
-18.0 IR Supply			Vdc	18.0 ± 2 Vdc
18 MOT Supply			Vdc	24.0 ± 2 Vdc
Temperatures				
Internal			°C	15 °C to 45 °C
Chamber			°C	50 °C ± 2 °C
Pressure			mmHg	760 ± 100 mmHg
Flow			L/min	1.00 ± 0.3 L/min
S/R Ratio			-	0.8 - 1.12 @ Zero
AGC Intensity			Hz	150,000 - 300,000 Hz
Motor speed			%	80 - 100 %

**Note :** บิดเครื่องให้อยู่ในระหว่างนำ part มาเปลี่ยน

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0620617611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	6.8	5.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	57.2	56.0	ppb	0 to 60
SO <sub>2</sub> COEF	0.855	0.837	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	70	70	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-593.5	-593.5		
Flash Supply	877	878		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.6	23.6	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	34.1	34.3	°C	15 °C to 45 °C
Chamber	45.1	45.2	°C	45 °C ± 2 °C
Pressure	735.5	735.8	mmHg	750 ± 100 mmHg
Flow	0.585	0.585	L/min	0.5 to 1.00 L/min
Lamp intensity	89	88	%	40 - 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**O<sub>3</sub> Analyzer**

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09040068	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	19.8	18.7	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	1.0	0.5	ppb	0 to 60
O <sub>3</sub> COEF	1.191	1.191	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.2	9.2	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	32.9	33.1	°C	5 - 50 °C
Bench Lamp Temp	53.4	53.5	°C	50 - 60 °C
Pressure	743.6	744.2	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.734	0.724	L/min	0.6 ± 0.2 L/min
Cell-B	0.653	0.638	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	184.3	940.0	ppb	Record only
Cell-B	-146.9	-916.0	ppb	Record only
O <sub>3</sub>	18.7	21.5	ppb	Record only
Lamp Intensity				
Cell A	53960	53787	Hz	45,000 - 150,000 HZ
Cell B	103202	102701	Hz	45,000 - 150,000 HZ

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351402	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.321	0.298	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	1.973	1.961	ppm	0 to 60
CO COEF	1.008	1.001	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.1	24.1	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	18.1	18.3	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.8	-106.8	Vdc	-100 to -110 Vdc
Temperatures				
Internal	31.9	33.7	°C	
Bench	47.9	48.2	°C	
Pressure	740.5	742.3	mmHg	760 ± 100 mmHg
Flow	0.765	0.802	L/min	1 ± 0.3 L/min
S/R Ratio	1.1401000	1.1401300	-	1.140 – 1.180
AGC intensity	201048	200780	Hz	200,000 ±50,000 Hz
Motor speed	100.03	100.02	%	100 ± 5%

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**TEOM 1405**

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)						
Total mass (µg)						
Filter Loading (0-100%)						
Frequency(150-400Hz)						
Noise (µg)						
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)						
Ambient pressure (ATM)						
Ambient dew point (°C)						
Ambient relative humidity (%)						
Cap temperature(°C)						
Case temperature(°C)						
PM2.5 air tube temp. (°C)						
PM Coarse tube temp. (°C)						
PM2.5 path flow rate(L/m)						
PM coarse path flow rate(L/m)						
By pass flow rate(L/m)						
Total flow(L/m)						
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

Note :

เครื่อง ยกขึ้นไปซ่อมที่ บริษัท pico

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**PETRO-INSTRUMENTS CORP.,LTD.**
**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	NM7K7YND	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.802	1.796	ppm	0-25 ppm
NMHC reading	0.185	0.202	ppm	0-25 ppm
THC reading	1.987	1.998	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.802	1.796	ppm	0-25 ppm
NMHC reading	0.185	0.202	ppm	0-25 ppm
THC reading	1.987	1.998	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-40	-40	-	-3500 to 3500
Span calibration coefficient	0.574	0.574	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	70	70	-	-3500 to 3500
Span calibration coefficient	0.560	0.560	-	0.50000 to 2.00000
Analog Input				
Detector temp	42.1	42.6	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	78.9	78.9	kPa	80 kPa ± 4 kPa
Ambient	100.8	100.8	kPa	Current Atmospheric pressure
Purifier temp	413.4	413.2	°C	390-430 °C
Purifier pressure	9.8	9.9	kPa	8 kPa -25 kPa
NMC cutter temp	235.5	235.8	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**VOC Analyzer**

Equipment :	VOCs analyzer.	Model :	GC866
Serial Number :	#21541009	Manufacturer :	CHOMATOTECH

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Reading				
1-3 BUTADIENE	15.167	4.610	ug/m3	0-320 ug/m3
BENZENE	81.254	14.779	ug/m3	0-320 ug/m3
CYCLOHEXANE	0.000	0.000	ug/m3	0-320 ug/m3
TOLUENE	29.360	30.740	ug/m3	0-320 ug/m3
ETHYLBENZENE	22.129	22.589	ug/m3	0-320 ug/m3
M&P XYLENES	17.86	7.040	ug/m3	0-320 ug/m3
STYRENE	0.704	0.000	ug/m3	0-320 ug/m3
O-XYLENE	15.906	10.009	ug/m3	0-320 ug/m3
Diagnostics				
Carrier pressure	611	610	hPa	500 Between 700
Ambiance pressure Non sampling step	1011	1011	hPa	>1000 hPa
Critical pressure Non sampling step	1011	1011	hPa	> 1000 hPa
Ambiance pressure sampling step	1006	1006	hPa	> 1000 hPa
Critical pressure sampling step	1011	1011	hPa	> 950 hPa
Flow rate	25	25	ml/min	> 30 ml/min
RT Time				
1-3 BUTADIENE	8-40	8-40	sec	
BENZENE	435-465	435-465	sec	
CYCLOHEXANE	564-594	564-594	sec	
TOLUENE	695-779	695-779	sec	
ETHYLBENZENE	940-955	940-955	sec	
M&P XYLENES	956-989	956-989	sec	
STYRENE	980-996	980-996	sec	
O-XYLENE	995-1023	995-1023	sec	
Base Sensitivity	95	95	-	
Molar Volume Used	-	-	dm3	
Sample Volume	324.5	324.5	ml	

Note :

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All analyzer.							
Equipment :	All analyzer.	Model :	42i, 43i , 48i , 49i , 410i, APHA-370				
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba				

Standard gas concentration			Dilutor detail		
Sulfur Dioxide (SO <sub>2</sub> )	45.03	ppm	Manufacturer :	Thermo	
Nitric Oxide (NO)	44.74	ppm	Model :	146i	
Methane (CH <sub>4</sub> )	499.1	ppm	Serial number :	0630318396	
Carbon Monoxide (CO)	4521	ppm			
Cylinder NO. :	CC6535				
Expiration Date :	13 Aug 2023				

BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	3.10	3.10	400.0	391.0	-2.25	Valid
NO <sub>x</sub> (ppb)	0.0	3.50	3.50	400.0	392.0	-2.00	Valid
SO <sub>2</sub> (ppb)	0.0	0.70	0.70	400.0	406.0	1.50	Valid
CO(ppm)	0.0	0.10	0.10	40.1	40.0	-0.25	Valid
O3(ppb)	0.0	1.70	1.70	400.0	394.0	-1.50	Valid
CH4(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
THC(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid

AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	1.30	1.30	400.0	395.0	-1.25	Valid
NO <sub>x</sub> (ppb)	0.0	1.60	1.60	400.0	396.0	-1.00	Valid
SO <sub>2</sub> (ppb)	0.0	1.90	1.90	400.0	403.0	0.75	Valid
CO(ppm)	0.0	0.10	0.10	40.1	40.2	0.25	Valid
O3(ppb)	0.0	1.50	1.50	400.0	401.0	0.25	Valid
CH4(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
THC(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid

Remark :

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
<b>Stations Techno IRPC</b> 	<b>Inside Station</b> 
<b>Lamp Sampling Box</b> 	<b>Replace Filter</b> 
<b>Gas STD</b> 	<b>Gas H2</b> 

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<b>AQMs Log Sheet</b> 	<b>Replace Silica gel</b> 
<b>ถังดับเพลิง</b>  <p>EXP xxx-xxx-xxxx</p>	<b>อุปกรณ์ทำความสะอาด</b> 
<b>Clean sampling set</b> 	

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Technology Station	E-mail address/Fax :	<a href="mailto:wirasak.k@irpc.co.th">wirasak.k@irpc.co.th</a>
Working Date :	18 July 2022	Working Hour :	6 Hours

Service Report	
<b>Working Scope:</b>	
Service Station	
<b>Physical Checking:</b>	
<ul style="list-style-type: none"> <li>- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ</li> <li>- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ</li> <li>- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ</li> <li>- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ เครื่องวัดฝุ่น PM-10 &amp; PM-2.5 พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ</li> <li>- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี</li> </ul>	
<b>Correction working:</b>	
Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.
<b>Part Replacement:</b>	
<ul style="list-style-type: none"> <li>- Sample filter 47 mm. 7 ea. (Part Support by IRPC)</li> <li>- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)</li> </ul>	
<b>Addition Recommended:</b>	
<ul style="list-style-type: none"> <li>- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่</li> <li>- TEOM ยกเครื่องยกไปซ่อมที่ บริษัท PICO</li> </ul>	
-- End --	

Serviced by :	ชินรสุ มุขโรจน์	Serviced Date :	18 July 2022
Approved by :		Approved Date :	18 July 2022

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**PETRO-INSTRUMENTS CORP.,LTD.**
**General Checking**

Equipment :	AQMs Technology	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1650/34 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1900/30 psi	

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0620617611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	4.3	4.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	56.1	56.9	ppb	0 to 60
SO <sub>2</sub> COEF.	0.837	0.848	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	70	70	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-593.5	-593.5		
Flash Supply	878	878		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.6	23.6	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	33.9	33.6	°C	15°C to 45°C
Chamber	45.1	44.9	°C	45°C ± 2°C
Pressure	736.4	735.8	mmHg	750 ± 100 mmHg
Flow	0.584	0.584	L/min	0.5 to 1.00 L/min
Lamp intensity	90	89	%	40 – 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0620617608	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	1.9	1.6	ppb	
NO <sub>x</sub> reading	2.7	2.5	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. Ppb	53.3	48.8	ppb	0 to 60
NO <sub>x</sub> BKG. Ppb	52.7	47.6	ppb	0 to 60
NO COEF.	1.095	1.150	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-925.7	-925.7	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.8	14.8	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	39.8	38.9	°C	15 °C to 45 °C
Chamber	47.1	47.0	°C	45°C ± 2 °C
Cooler	99.9	-0.4	°C	(-13) °C ± 2 °C
Converter	326.6	325.8	°C	325°C ± 5 °C
Converter Set	325.0	325.0	°C	325°C
Pressure	259.0	258.1	mmHg	250 ± 100 mmHg
Flow	0.682	0.681	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO<sub>2</sub> Analyzer**

Equipment :	Carbon Dioxide analyzer.	Model :	410i
Serial Number :	0908235308	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading			ppm	
Range			ppm	0 to 100 ppm
Averaging Time			Sec	10 to 300 Sec
Calibration Factors				
CO <sub>2</sub> BKG. ppm			ppm	0 to 60
CO <sub>2</sub> COEF	-	-	-	1.0 ± 0.3
Instrument Controls				
Temp Correction			-	On/Off
Pressure Correction			-	On/Off
Baud Rate			bps	9600 to 115000 bps
Instrument ID			-	0 to 99
Screen Brightness			%	0 to 100 %
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-3.3 Supply			Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-15.0 Supply			Vdc	-15.0 ± 2 Vdc
-18.0 IR Supply			Vdc	18.0 ± 2 Vdc
18 MOT Supply			Vdc	24.0 ± 2 Vdc
Temperatures				
Internal			°C	15°C to 45°C
Chamber			°C	50°C ± 2°C
Pressure			mmHg	760 ± 100 mmHg
Flow			L/min	1.00 ± 0.3 L/min
S/R Ratio			-	0.8 – 1.12 @ Zero
AGC Intensity			Hz	150,000 – 300,000 Hz
Motor speed			%	80 – 100 %

**Note :** บิดเครื่องให้อยู่ในระหว่างนำ part มาเปลี่ยน

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**PETRO-INSTRUMENTS CORP.,LTD.**

**O<sub>3</sub> Analyzer**

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09040068	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	31.0	27.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG, ppb	-0.5	-0.9	ppb	0 to 60
O <sub>3</sub> COEF	1.191	1.269	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.2	9.2	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	32.7	32.4	°C	5 - 50 °C
Bench Lamp Temp	53.5	53.5	°C	50 - 60 °C
Pressure	744.5	743.6	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.719	0.731	L/min	0.6 ± 0.2 L/min
Cell-B	0.641	0.649	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	74.9	26.3	ppb	Record only
Cell-B	132.3	29.2	ppb	Record only
O <sub>3</sub>	28.7	28.9	ppb	Record only
Lamp intensity				
Cell A	51529	51855	Hz	45,000 – 150,000 Hz
Cell B	102020	102546	Hz	45,000 – 150,000 Hz

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	NM7K7YND	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.833	1.806	ppm	0-25 ppm
NMHC reading	0.175	0.196	ppm	0-25 ppm
THC reading	2.008	2.002	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.833	1.806	ppm	0-25 ppm
NMHC reading	0.175	0.196	ppm	0-25 ppm
THC reading	2.008	2.002	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-40	-40	-	-3500 to 3500
Span calibration coefficient	0.574	0.574	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	70	70	-	-3500 to 3500
Span calibration coefficient	0.560	0.560	-	0.50000 to 2.00000
Analog input				
Detector temp	42.4	42.5	°C	Ambient Temp + (5 – 15 °C)
Detector pressure	79.0	78.8	kPa	80 kPa ± 4 kPa
Ambient	100.9	100.8	kPa	Current Atmospheric pressure
Purifier temp	413.2	413.4	°C	390-430 °C
Purifier pressure	9.8	9.7	kPa	8 kPa -25 kPa
NMC cutter temp	185.7	185.9	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351402	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.423	0.390	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG, ppm	1.958	1.987	ppm	0 to 60
CO COEF	1.001	0.996	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.1	24.1	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	18.2	18.5	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.7	-106.7	Vdc	-100 to -110 Vdc
Temperatures				
Internal	32.3	31.9	°C	
Bench	48.4	48.4	°C	
Pressure	741.4	741.1	mmHg	760 ± 100 mmHg
Flow	0.772	0.805	L/min	1 ± 0.3 L/min
S/R Ratio	1.1408700	1.1409200	-	1.140 – 1.180
AGC intensity	200941	201085	Hz	200,000 ±50,000 Hz
Motor speed	100.02	100.04	%	100 ± 5%

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**TEOM 1405**

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)						
Total mass (µg)						
Filter Loading (0-100%)						
Frequency(150-400Hz)						
Noise (µg)						
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)						
Ambient pressure (ATM)						
Ambient dew point (°C)						
Ambient relative humidity (%)						
Cap temperature(°C)						
Case temperature(°C)						
PM2.5 air tube temp. (°C)						
PM Coarse tube temp. (°C)						
PM2.5 path flow rate(L/m)						
PM coarse path flow rate(L/m)						
By pass flow rate(L/m)						
Total flow(L/m)						
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

Note : เครื่อง ยกเลิกไปซ่อมที่ บริษัท pico

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**PETRO-INSTRUMENTS CORP.,LTD.**

VOC Analyzer				
Equipment :	VOCs analyzer.	Model :	GC866	
Serial Number :	#21541009	Manufacturer :	CHOMATOTECH	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Reading				
1-3 BUTADIENE	91.15	91.14	ug/m3	0-320 ug/m3
BENZENE	3.2	3.19	ug/m3	0-320 ug/m3
CYCLOHEXANE	1.22	1.22	ug/m3	0-320 ug/m3
TOLUENE	0.88	0.88	ug/m3	0-320 ug/m3
ETHYLBENZENE	0.00	0.00	ug/m3	0-320 ug/m3
M&P XYLENES	44.26	44.26	ug/m3	0-320 ug/m3
STYRENE	0.00	0.00	ug/m3	0-320 ug/m3
O-XYLENE	21.24	21.24	ug/m3	0-320 ug/m3
Diagnostics				
Carrier pressure	611	610	hPa	500 Between 700
Ambiance pressure Non sampling step	1011	1011	hPa	>1000 hPa
Critical pressure Non sampling step	1011	1011	hPa	> 1000 hPa
Ambiance pressure sampling step	1006	1006	hPa	> 1000 hPa
Critical pressure sampling step	1011	1011	hPa	> 950 hPa
Flow rate	25	25	ml/min	> 30 ml/min
RT Time				
1-3 BUTADIENE	8-40	8-40	sec	
BENZENE	435-465	435-465	sec	
CYCLOHEXANE	564-594	564-594	sec	
TOLUENE	695-779	695-779	sec	
ETHYLBENZENE	940-955	940-955	sec	
M&P XYLENES	956-989	956-989	sec	
STYRENE	980-996	980-996	sec	
O-XYLENE	995-1023	995-1023	sec	
Base Sensitivity	95	95	-	
Molar Volume Used	-	-	dm3	
Sample Volume	324.5	324.5	ml	
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

All analyzer.							
Equipment :	All analyzer.	Model :	42i, 43i , 48i , 49i , 410i, APHA-370				
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba				
Standard gas concentration			Dilutor detail				
Sulfur Dioxide (SO <sub>2</sub> )	45.03	ppm	Manufacturer :	Thermo			
Nitric Oxide (NO)	44.74	ppm	Model :	146i			
Methane (CH <sub>4</sub> )	499.1	ppm	Serial number :	0630318396			
Carbon Monoxide (CO)	4521	ppm					
Cylinder NO. :	CC6535						
Expiration Date :	13 Aug 2023						
BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	8.10	8.10	400.0	385.0	-3.75	Invalid
NO <sub>x</sub> (ppb)	0.0	8.60	8.60	400.0	382.0	-4.50	Invalid
SO <sub>2</sub> (ppb)	0.0	1.70	1.70	400.0	388.0	-3.00	Valid
CO(ppm)	0.0	0.20	0.20	40.1	40.3	0.50	Valid
O3(ppb)	0.0	0.50	0.50	400.0	365.0	-8.75	Invalid
CH4(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
THC(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.20	0.20	400.0	399.0	-0.25	Valid
NO <sub>x</sub> (ppb)	0.0	1.00	1.00	400.0	401.0	0.25	Valid
SO <sub>2</sub> (ppb)	0.0	2.10	2.10	400.0	401.0	0.25	Valid
CO(ppm)	0.0	0.20	0.20	40.1	40.1	0.00	Valid
O3(ppb)	0.0	0.70	0.70	400.0	399.0	-0.25	Valid
CH4(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
THC(ppm)	0.0	0.01	0.01	4.50	4.52	0.44	Valid
Remark :							





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**PETRO-INSTRUMENTS CORP.,LTD.**

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Techno IRPC	Inside Station
	
Lamp Sampling Box	Replace Filter
	
Gas STD	Gas H2
	

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**PETRO-INSTRUMENTS CORP.,LTD.**

AQMs Log Sheet	Replace Silica gel
	
ถังดับเพลิง	อุปกรณ์ทำความสะอาด
	
EXP xxx-xxx-xxxx	
Clean sampling set	

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**PETRO-INSTRUMENTS CORP.,LTD.**

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Technology Station	E-mail address/Fax. :	<a href="mailto:wirasak.k@irpc.co.th">wirasak.k@irpc.co.th</a>
Working Date :	04 August 2022	Working Hour :	6 Hours

**Service Report**

**Working Scope:**

Service Station

**Physical Checking:**

- ตรวจเช็ค Data logger พบว่าทำงานได้ปกติ
- ตรวจเช็ค Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจเช็ค ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจเช็ค เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจเช็ค เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจเช็ค การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

**Correction working:**

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

**Part Replacement:**

- Sample filter 47 mm. 7 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

**Addition Recommended:**

- ตรวจเช็คถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- TEOM ยกเครื่องกลับไปยังที่ บริษัท PICO

-- End --

Serviced by :	ชินธร สุทธิโรจน์	Serviced Date :	04 August 2022
Approved by:		Approved Date :	04 August 2022

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**PETRO-INSTRUMENTS CORP.,LTD.**

**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0620617608	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	5.6	6.2	ppb	
NO <sub>2</sub> reading	6.5	9.7	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. Ppb	48.8	48.8	ppb	0 to 60
NO <sub>2</sub> BKG. Ppb	47.6	47.6	ppb	0 to 60
NO COEF.	1.150	1.150	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On	-	On/Off
PMT Supply	On	On	-	On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>	-	NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	925.7	925.7	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.8	14.8	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	39.8	38.9	°C	15 °C to 45 °C
Chamber	46.5	46.3	°C	45 °C ± 2 °C
Cooler	-0.5	-0.5	°C	(0.3 °C ± 2 °C
Converter	324.7	323.9	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	259.9	258.1	mmHg	250 ± 100 mmHg
Flow	0.677	0.681	L/min	0.5 to 1.00 L/min

Note :

**PETRO-INSTRUMENTS CORP.,LTD.**

**General Checking**

Equipment :	AQMs Technology	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1450/34 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1900/30 psi	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0620617611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	2.6	12.8	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	56.8	56.9	ppb	0 to 60
SO <sub>2</sub> COEF.	0.848	0.848	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	70	70	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-593.1	-593.1		
Flash Supply	878	877		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.6	23.6	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	33.5	32.9	°C	15°C to 45°C
Chamber	44.9	45.0	°C	45°C ± 2°C
Pressure	737.9	737.3	mmHg	750 ± 100 mmHg
Flow	0.584	0.582	L/min	0.5 to 1.00 L/min
Lamp intensity	89	88	%	40 – 100 %

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
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CO <sub>2</sub> Analyzer				
Equipment :	Carbon Dioxide analyzer.	Model :	410I	
Serial Number :	0908235308	Manufacturer :	Thermo Electron	
Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading			ppm	
Range			ppm	0 to 100 ppm
Averaging Time			Sec	10 to 300 Sec
Calibration Factors				
CO <sub>2</sub> BKG. ppm			ppm	0 to 60
CO <sub>2</sub> COEF			-	1.0 ± 0.3
Instrument Controls				
Temp Correction			-	On/Off
Pressure Correction			-	On/Off
Baud Rate			bps	9600 to 115000 bps
Instrument ID			-	0 to 99
Screen Brightness			%	0 to 100 %
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-3.3 Supply			Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-15.0 Supply			Vdc	-15.0 ± 2 Vdc
-18.0 IR Supply			Vdc	18.0 ± 2 Vdc
18 MOT Supply			Vdc	24.0 ± 2 Vdc
Temperatures				
Internal			°C	15°C to 45°C
Chamber			°C	50°C ± 2°C
Pressure			mmHg	760 ± 100 mmHg
Flow			L/min	1.00 ± 0.3 L/min
S/R Ratio			-	0.8 – 1.12 @ Zero
AGC Intensity			Hz	150,000 – 300,000 Hz
Motor speed			%	80 – 100 %
Note :	ปิดเครื่องให้อยู่ในระหว่างนำ part มาเปลี่ยน			

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O <sub>3</sub> Analyzer					
Equipment :		Ozone Analyzer.	Model :		49i
Serial Number :		CM09040068	Manufacturer :		Thermo Electron
Diagnostic Test Value					
Parameter	Observed Value		Unit	Nominal Range	
	Before	After			
Sample reading	29.2	10.4	ppb		
Range	500	500	ppb	50 to 1000 ppb	
Averaging Time	30	30	Sec	10 to 300 Sec	
Calibration Factors					
O <sub>3</sub> BKG. ppb	-0.9	-0.9	ppb	0 to 60	
O <sub>3</sub> COEF	1.269	1.269	-	1.0 ± 0.3	
Instrument Controls					
Temp Compensation	On	On	-	On/Off	
Pressure Compensation	On	On	-	On/Off	
Baud Rate	9600	9600	bps	1200 to 115200 bps	
Instrument ID	49	49	-	0 to 99	
Screen Contrast	40	40	%	0 to 100 %	
Service Mode	Off	Off	-	On/Off, Up to used	
Diagnostics					
Voltages					
Motherboard voltages:					
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc	
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc	
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc	
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc	
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc	
Interface board voltages:					
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc	
5.0 Supply	4.9	4.9	Vdc	5.0 ± 0.5 Vdc	
15.0 Supply	14.7	14.7	Vdc	15.0 ± 0.5 Vdc	
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 0.5 Vdc	
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc	
Photo Lamp	9.2	9.2	Vdc	≈ 9.6 Vdc	
Temperatures					
Bench Temp	32.3	31.4	°C	5 - 50 °C	
Bench Lamp Temp	53.5	53.5	°C	50 - 60 °C	
Pressure	745.7	745.7	mmHg	760 ± 100 mmHg	
Flow					
Cell-A	0.720	0.728	L/min	0.6 ± 0.2 L/min	
Cell-B	0.637	0.646	L/min	0.6 ± 0.2 L/min	
CELL A/B O <sub>3</sub>					
Cell-A	2.5	-67.2	ppb	Record only	
Cell-B	58.0	97.2	ppb	Record only	
O <sub>3</sub>	30.8	13.7	ppb	Record only	
Lamp Intensity					
Cell A	51036	50151	Hz	45,000 – 150,000 HZ	
Cell B	104732	102292	Hz	45,000 - 150,000 HZ	
Note :					

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CO Analyzer				
Equipment :	CO analyzer.	Model :	48I	
Serial Number :	1201351402	Manufacturer :	Thermo Electron	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.375	0.431	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	1.985	1.984	ppm	0 to 60
CO COEF	0.996	0.996	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.1	24.1	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	19.9	20.1	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.8	-106.8	Vdc	-100 to -110 Vdc
Temperatures				
Internal	32.0	31.5	°C	
Bench	48.3	48.2	°C	
Pressure	743.5	741.7	mmHg	760 ± 100 mmHg.
Flow	0.762	0.803	L/min	1 ± 0.3 L/min
S/R Ratio	1.1409100	1.1407500	-	1.140 – 1.180
AGC intensity	201055	201034	Hz	200,000 ±50,000 Hz
Motor speed	100.01	100.02	%	100 ± 5%
Note :				

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THC Analyzer				
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370	
Serial Number :	NM7K7YND	Manufacturer :	Horiba	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.820	1.708	ppm	0-25 ppm
NMHC reading	0.169	0.271	ppm	0-25 ppm
THC reading	1.989	1.979	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.820	1.708	ppm	0-25 ppm
NMHC reading	0.169	0.271	ppm	0-25 ppm
THC reading	1.989	1.979	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-40	-40	-	-3500 to 3500
Span calibration coefficient	0.574	0.574	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	70	70	-	-3500 to 3500
Span calibration coefficient	0.560	0.560	-	0.50000 to 2.00000
Analog Input				
Detector temp	42.0	41.8	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	79.1	79.0	kPa	80 kPa ± 4 kPa
Ambient	101.0	100.9	kPa	Current Atmospheric pressure
Purifier temp	413.3	413.3	°C	390-430 °C
Purifier pressure	9.8	9.8	kPa	8 kPa -25 kPa
NMC cutter temp	235.2	235.3	°C	230-260 °C
DC-24V	24.0	24.0	V.	24V ± 0.5 V
DC-5V	4.9	4.9	V.	5V ± 0.5 V
Note :				

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TEOM 1405

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A22771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)						
Total mass (µg)						
Filter Loading (0-100%)						
Frequency(150-400Hz)						
Noise (µg)						
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)						
Ambient pressure (ATM)						
Ambient dew point (°C)						
Ambient relative humidity (%)						
Cap temperature(°C)						
Case temperature(°C)						
PM2.5 air tube temp. (°C)						
PM Coarse tube temp. (°C)						
PM2.5 path flow rate(L/m)						
PM coarse path flow rate(L/m)						
By pass flow rate(L/m)						
Total flow(L/m)						
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

Note : เครื่อง ออกกักเก็บฝุ่นที่ บริษัท pico

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PETRO-INSTRUMENTS CORP.,LTD.

All analyzer.

Equipment :	All analyzer.	Model :	42i, 43i, 48i, 49i, 410i, APHA-370
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba

Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	45.03 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.74 ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.1 ppm	Serial number :	0630318396
Carbon Monoxide (CO)	4521 ppm		
Cylinder NO. :	CC6535		
Expiration Date :	13 Aug 2023		

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0			400.0			
NO <sub>x</sub> (ppb)	0.0			400.0			
SO <sub>2</sub> (ppb)	0.0			400.0			
CO(ppm)	0.0			40.1			
O3(ppb)	0.0			400.0			
CH4(ppm)	0.0			4.50			
THC(ppm)	0.0			4.50			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.60	0.60	400.0	402.0	0.50	Valid
NO <sub>x</sub> (ppb)	0.0	1.40	1.40	400.0	404.0	1.00	Valid
SO <sub>2</sub> (ppb)	0.0	1.20	1.20	400.0	399.0	-0.25	Valid
CO(ppm)	0.0	0.20	0.20	40.1	40.0	-0.25	Valid
O3(ppb)	0.0	0.90	0.90	400.0	398.0	-0.50	Valid
CH4(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
THC(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid

Remark : ไม่ทำ Auto cal. เนื่องจากมีลมที่ Zero Air (จากการเปิด)

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PETRO-INSTRUMENTS CORP.,LTD.

VOC Analyzer

Equipment :	VOCs analyzer.	Model :	GC866
Serial Number :	#21541009	Manufacturer :	CHOMATOTECH

Parameter	Diagnostic test value		Unit	Nominal range
	Before	After		
Reading				
1-3 BUTADIENE	12.81	48.47	ug/m3	0-320 ug/m3
BENZENE	3.2	7.39	ug/m3	0-320 ug/m3
CYCLOHEXANE	4.27	1.61	ug/m3	0-320 ug/m3
TOLUENE	0.62	196.45	ug/m3	0-320 ug/m3
ETHYLBENZENE	40.51	31.32	ug/m3	0-320 ug/m3
M&P XYLENES	44.23	50.47	ug/m3	0-320 ug/m3
STYRENE	0.00	4.19	ug/m3	0-320 ug/m3
O-XYLENE	47.46	33.73	ug/m3	0-320 ug/m3
Diagnostics				
Carrier pressure	611	610	hPa	500 Between 700
Ambiance pressure Non sampling step	1011	1011	hPa	>1000 hPa
Critical pressure Non sampling step	1011	1011	hPa	> 1000 hPa
Ambiance pressure sampling step	1006	1006	hPa	> 1000 hPa
Critical pressure sampling step	1011	1011	hPa	> 950 hPa
Flow rate	25	25	ml/min	> 30 ml/min
RT Time				
1-3 BUTADIENE	8-40	8-40	sec	
BENZENE	435-465	435-465	sec	
CYCLOHEXANE	564-594	564-594	sec	
TOLUENE	695-779	695-779	sec	
ETHYLBENZENE	940-955	940-955	sec	
M&P XYLENES	956-989	956-989	sec	
STYRENE	980-996	980-996	sec	
O-XYLENE	995-1023	995-1023	sec	
Base Sensitivity	95	95	-	
Molar Volume Used	-	-	dm3	
Sample Volume	324.5	324.5	ml	

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

<p>Stations Techno IRPC</p> 	<p>Inside Station</p> 
<p>Lamp Sampling Box</p> 	<p>Replace Filter</p> 
<p>Gas STD</p> 	<p>Gas H2</p> 

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<p><b>AQMs Log Sheet</b></p> 	<p><b>Replace Silica gel</b></p> 
<p><b>ถังดับเพลิง</b></p>  <p>EXP ๖๐๔-๙๐-๙๐๐๙</p>	<p><b>อุปกรณ์ทำความสะอาด</b></p>
<p><b>Clean sampling set</b></p>	

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General Checking

Equipment :	AQMs Technology	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1250/34 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1900/30 psi	

Note :

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Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Technology Station	E-mail address/Fax :	<a href="mailto:wirasak.k@rpc.co.th">wirasak.k@rpc.co.th</a>
Working Date :	22 August 2022	Working Hour :	6 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacement:

- Sample filter 47 mm. 7 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- TEOM ยกเครื่องกลับไปยังแผนที่ บริษัท PICO

-- End --

Serviced by :	ชินโรส มุขโรจน์	Serviced Date :	22 August 2022
Approved by :		Approved Date :	22 August 2022

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NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0620617608	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	10.2	5.8	ppb	
NO <sub>2</sub> reading	12.1	8.5	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. Ppb	48.8	48.8	ppb	0 to 60
NO <sub>2</sub> BKG. Ppb	47.6	47.6	ppb	0 to 60
NO COEF.	1.150	1.150	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	925.7	925.7	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.8	14.8	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	40.3	40.5	°C	15 °C to 45 °C
Chamber	46.3	46.5	°C	45 °C ± 2 °C
Cooler	-2.0	-2.0	°C	(13 °C ± 2 °C
Converter	326.3	324.7	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	261.1	261.3	mmHg	250 ± 100 mmHg
Flow	0.676	0.675	L/min	0.5 to 1.00 L/min

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0620617611	Manufacturer :	Thermo Electron

**Diagnostic test value**

Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	2.4	5.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	56.7	56.7	ppb	0 to 60
SO <sub>2</sub> COEF	0.848	0.848	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	70	70	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-593.5	-593.1		
Flash Supply	875	875		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.6	23.6	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	34.2	34.5	°C	15°C to 45°C
Chamber	44.8	44.9	°C	45°C ± 2°C
Pressure	737.4	737.4	mmHg	750 ± 100 mmHg
Flow	0.584	0.583	L/min	0.5 to 1.00 L/min
Lamp Intensity	89	89	%	40 – 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**O<sub>3</sub> Analyzer**

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09040068	Manufacturer :	Thermo Electron

**Diagnostic Test Value**

Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	7.9	6.7	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.9	-0.9	ppb	0 to 60
O <sub>3</sub> COEF	1.269	1.269	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.2	9.2	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	32.8	32.8	°C	5 - 50 °C
Bench Lamp Temp	53.5	53.3	°C	50 - 60 °C
Pressure	745.4	745.6	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.726	0.720	L/min	0.6 ± 0.2 L/min
Cell-B	0.651	0.641	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	105.7	87.4	ppb	Record only
Cell-B	85.3	103.2	ppb	Record only
O <sub>3</sub>	10.5	12.8	ppb	Record only
Lamp Intensity				
Cell A	46362	46343	Hz	45,000 – 150,000 HZ
Cell B	98281	98212	Hz	45,000 - 150,000 HZ

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO<sub>2</sub> Analyzer**

Equipment :	Carbon Dioxide analyzer.	Model :	410i
Serial Number :	0908235308	Manufacturer :	Thermo Electron

**Diagnostic Test Value**

Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading			ppm	
Range			ppm	0 to 100 ppm
Averaging Time			Sec	10 to 300 Sec
Calibration Factors				
CO <sub>2</sub> BKG. ppm			ppm	0 to 60
CO <sub>2</sub> COEF			-	1.0 ± 0.3
Instrument Controls				
Temp Correction			-	On/Off
Pressure Correction			-	On/Off
Baud Rate			bps	9600 to 115000 bps
Instrument ID			-	0 to 99
Screen Brightness			%	0 to 100 %
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-3.3 Supply			Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-15.0 Supply			Vdc	-15.0 ± 2 Vdc
-18.0 IR Supply			Vdc	18.0 ± 2 Vdc
18 MOT Supply			Vdc	24.0 ± 2 Vdc
Temperatures				
Internal			°C	15°C to 45°C
Chamber			°C	50°C ± 2°C
Pressure			mmHg	760 ± 100 mmHg
Flow			L/min	1.00 ± 0.3 L/min
S/R Ratio			-	0.8 – 1.12 @ Zero
AGC Intensity			Hz	150,000 – 300,000 Hz
Motor speed			%	80 – 100 %

**Note :** ปิดเครื่องให้อยู่ในระหว่างนำ part มาเปลี่ยน

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351402	Manufacturer :	Thermo Electron

**Diagnostic test value**

Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.541	0.473	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	1.984	1.984	ppm	0 to 60
CO COEF	0.996	0.996	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.1	24.1	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	17.5	19.7	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.8	-106.8	Vdc	-100 to -110 Vdc
Temperatures				
Internal	34.0	34.2	°C	
Bench	48.0	48.1	°C	
Pressure	741.7	740.9	mmHg	760 ± 100 mmHg.
Flow	0.815	0.801	L/min	1 ± 0.3 L/min
S/R Ratio	1.1405900	1.1402400	-	1.140 – 1.180
AGC intensity	200647	200656	Hz	200,000 ±50,000 Hz
Motor speed	100.01	100.01	%	100 ± 5%

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer				
Equipment :	Total hydrocarbon analyzer.		Model :	APHA-370
Serial Number :	NM7K7YND		Manufacturer :	Horiba
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	2.114	2.077	ppm	0-25 ppm
NMHC reading	0.249	0.257	ppm	0-25 ppm
THC reading	2.363	2.334	ppm	0-25 ppm
Analyzer reading				
CH4 reading	2.114	2.077	ppm	0-25 ppm
NMHC reading	0.249	0.257	ppm	0-25 ppm
THC reading	2.363	2.334	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-40	-40	-	-3500 to 3500
Span calibration coefficient	0.574	0.574	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	70	70	-	-3500 to 3500
Span calibration coefficient	0.560	0.560	-	0.50000 to 2.00000
Analog Input				
Detector temp	42.7	42.7	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	79.2	79.3	kPa	80 kPa ± 4 kPa
Ambient	100.9	101.0	kPa	Current Atmospheric pressure
Purifier temp	413.3	413.5	°C	390-430 °C
Purifier pressure	9.8	9.8	kPa	8 kPa -25 kPa
NMC cutter temp	235.8	235.6	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

VOC Analyzer				
Equipment :	VOCs analyzer.		Model :	GC866
Serial Number :	#21541009		Manufacturer :	CHOMATOTECH
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Reading				
1-3 BUTADIENE	12.81	48.47	ug/m3	0-320 ug/m3
BENZENE	3.2	7.39	ug/m3	0-320 ug/m3
CYCLOHEXANE	4.27	1.61	ug/m3	0-320 ug/m3
TOLUENE	0.62	196.45	ug/m3	0-320 ug/m3
ETHYLBENZENE	40.51	31.32	ug/m3	0-320 ug/m3
M&P XYLENES	44.23	50.47	ug/m3	0-320 ug/m3
STYRENE	0.00	4.19	ug/m3	0-320 ug/m3
O-XYLENE	47.46	33.73	ug/m3	0-320 ug/m3
Diagnostics				
Carrier pressure	611	610	hPa	500 Between 700
Ambiance pressure Non sampling step	1011	1011	hPa	>1000 hPa
Critical pressure Non sampling step	1011	1011	hPa	> 1000 hPa
Ambiance pressure sampling step	1006	1006	hPa	> 1000 hPa
Critical pressure sampling step	1011	1011	hPa	> 950 hPa
Flow rate	25	25	ml/min	> 30 ml/min
RT Time				
1-3 BUTADIENE	8-40	8-40	sec	
BENZENE	435-465	435-465	sec	
CYCLOHEXANE	564-594	564-594	sec	
TOLUENE	695-779	695-779	sec	
ETHYLBENZENE	940-955	940-955	sec	
M&P XYLENES	956-989	956-989	sec	
STYRENE	980-996	980-996	sec	
O-XYLENE	995-1023	995-1023	sec	
Base Sensitivity	95	95	-	
Molar Volume Used	-	-	dm3	
Sample Volume	324.5	324.5	ml	
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

TEOM 1405

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)						
Total mass (µg)						
Filter Loading (0-100%)						
Frequency(150-400Hz)						
Noise (µg)						
System Status						
Operatine mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)						
Ambient pressure (ATM)						
Ambient dew point (°C)						
Ambient relative humidity (%)						
Cap temperature(°C)						
Case temperature(°C)						
PM2.5 air tube temp. (°C)						
PM Coarse tube temp. (°C)						
PM2.5 path flow rate(L/m)						
PM coarse path flow rate(L/m)						
By pass flow rate(L/m)						
Total flow(L/m)						
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

Note :เครื่อง ออกกักเก็บฝุ่นที่ บริษัท pico

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**PETRO-INSTRUMENTS CORP.,LTD.**

All analyzer.							
Equipment :	All analyzer.		Model :	42i, 43i , 48i , 49i , 410i, APHA-370			
Serial Number :	--		Manufacturer :	Thermo Electron,Horiba			
Standard gas concentration			Dilutor detail				
Sulfur Dioxide (SO <sub>2</sub> )	45.03	ppm	Manufacturer :	Thermo			
	44.74	ppm		Model :	146i		
	499.1	ppm	Serial number :		0630318396		
	Carbon Monoxide (CO)	4521		ppm			
Cylinder NO. :	CC6535						
Expiration Date :	13 Aug 2023						
BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0			400.0			
NO <sub>x</sub> (ppb)	0.0			400.0			
SO <sub>2</sub> (ppb)	0.0			400.0			
CO(ppm)	0.0			40.1			
O3(ppb)	0.0			400.0			
CH4(ppm)	0.0			4.50			
THC(ppm)	0.0			4.50			
AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.20	0.20	400.0	398.0	-0.50	Valid
NO <sub>x</sub> (ppb)	0.0	1.00	1.00	400.0	402.0	0.50	Valid
SO <sub>2</sub> (ppb)	0.0	1.60	1.60	400.0	401.0	0.25	Valid
CO(ppm)	0.0	0.20	0.20	40.1	40.0	-0.25	Valid
O3(ppb)	0.0	0.70	0.70	400.0	402.0	0.50	Valid
CH4(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
THC(ppm)	0.0	0.01	0.01	4.50	4.52	0.44	Valid
Remark : ไม่ทำ Auto cal. เนื่องจากมีลมรบกวนที่ Zero Air (รถการนำเข้)							

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Techno IRPC	Inside Station
	
Lamp Sampling Box	Replace Filter
	
Gas STD	Gas H2
	

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AQMs Log Sheet	Replace Silica gel
	
ถังดับเพลิง	อุปกรณ์ทำความสะอาด
	
EXP 200-100-1000	
Clean sampling set	

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บริษัท เพโทร-อินสตรูเมนต์ จำกัด

PETRO-INSTRUMENTS CORP., LTD.

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SERVICE REPORT

Job No./เลขที่รายงาน :	JID2100310	Customer name/ ชื่อลูกค้า :	IRPC
Equipment /อุปกรณ์ :	Zero Air Supply	Station name/ชื่อสถานี :	Technology Station
Manufacturer/ผู้ผลิต :	Thermo	Location/ที่ตั้ง :	IRPC
Model /รุ่น :	1160	Contact name/ชื่อผู้ติดต่อ :	Khun Wirasak Khumsuk
Serial No./เลขหมายประจำเครื่อง :	-	Telephone /โทรศัพท์ :	081-803-0475
Working date/วันที่ปฏิบัติงาน :	31 August 2022	E-mail address/fax. :	wirasak.k@ipc.co.th
Working Hour/ชั่วโมงทำงาน :	6 Hr.	Mileage/ระยะทาง :	1600 km.

SCOPE OF WORK (ขอบเขตของงาน)	<input checked="" type="checkbox"/> Urgent <input type="checkbox"/> Service <input type="checkbox"/> Other
FUNCTION CHECK & CORRECT ACTION (ตรวจสอบการทำงานและการแก้ไข)	<p>1. ทำการตรวจเช็ค Zero Air Supply Thermo Model 1160 พบว่า เกิดการ leak บริเวณ Pressure Regulator ตรวจเช็คพบว่า Pressure Regulator เสีย</p>   <p>ตรวจเช็คพบว่ามีการ leak บริเวณ Pressure Regulator</p>



บริษัท เพโทร-อินสตรูเมนต์ จำกัด

PETRO-INSTRUMENTS CORP., LTD.

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	Pressure Regulator(Relieving type, 0-100 psi output range)			
<u>PART REPLACEMENT</u> (รายการเปลี่ยน)	- Pressure Regulator P/N 86P745 = 1 ea.			
<u>RECOMMENDATION</u> (คำแนะนำ)				
Test By :	Mr. Chinoros Mukkaroj	PICO	Test Date :	31 August 2022
Customer Approve By :		EGAT	Approve Date :	
Approved By :		PICO	Approved Date :	31 August 2022

**PETRO-INSTRUMENTS CORP.,LTD.**

Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Technology Station	E-mail address/Fax :	<a href="mailto:wirasak.k@irpc.co.th">wirasak.k@irpc.co.th</a>
Working Date :	04 September 2022	Working Hour :	6 Hours

**Service Report**

**Working Scope:**

Service Station

**Physical Checking:**

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ, เครื่อง VOC นำกลับมาแก้ไขเนื่องจากใช้ N2 มากผิดปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่า WD, WS, TEMP, RH Sensor เสีย
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

**Correction working:**

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

**Part Replacement:**

- Sample filter 47 mm. 7 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

**Addition Recommended:**

- ตรวจสอบระดับเบลินในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- TEOM ยืมเครื่องกลับป้อนที่ บริษัท PICO

-- End --

Serviced by :	ชินโรส มุขโรจน์	Serviced Date :	04 September 2022
Approved by:		Approved Date :	04 September 2022

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**PETRO-INSTRUMENTS CORP.,LTD.**

**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0620617608	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	6.6	16.6	ppb	
NO <sub>2</sub> reading	8.6	18.8	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. Ppb	48.8	48.8	ppb	0 to 60
NO <sub>2</sub> BKG. Ppb	47.6	47.6	ppb	0 to 60
NO COEF.	1.150	1.150	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On	-	On/Off
PMT Supply	On	On	-	On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>	-	NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	926.1	926.1	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.8	14.8	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	40.1	40.4	°C	15 °C to 45 °C
Chamber	49.0	49.5	°C	45 °C ± 2 °C
Cooler	99.9	99.9	°C	(0.3 °C ± 2 °C
Converter	324.2	324.5	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	262.9	263.2	mmHg	250 ± 100 mmHg
Flow	0.681	0.677	L/min	0.5 to 1.00 L/min

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**General Checking**

Equipment :	AQMs Technology	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1050/34 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1900/30 psi	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0620617611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	4.0	2.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	56.7	56.7	ppb	0 to 60
SO <sub>2</sub> COEF.	0.848	0.848	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	70	70	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-593.5	-593.5		
Flash Supply	880	879		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.6	23.6	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	34.3	34.6	°C	15°C to 45°C
Chamber	45.3	45.2	°C	45°C ± 2°C
Pressure	738.8	739.1	mmHg	750 ± 100 mmHg
Flow	0.485	0.485	L/min	0.5 to 1.00 L/min
Lamp intensity	89	88	%	40 – 100 %

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

CO <sub>2</sub> Analyzer				
Equipment :	Carbon Dioxide analyzer.	Model :	410I	
Serial Number :	0908235308	Manufacturer :	Thermo Electron	
Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading			ppm	
Range			ppm	0 to 100 ppm
Averaging Time			Sec	10 to 300 Sec
Calibration Factors				
CO <sub>2</sub> BKG. ppm			ppm	0 to 60
CO <sub>2</sub> COEF			-	1.0 ± 0.3
Instrument Controls				
Temp Correction			-	On/Off
Pressure Correction			-	On/Off
Baud Rate			bps	9600 to 115000 bps
Instrument ID			-	0 to 99
Screen Brightness			%	0 to 100 %
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-3.3 Supply			Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-15.0 Supply			Vdc	-15.0 ± 2 Vdc
-18.0 IR Supply			Vdc	18.0 ± 2 Vdc
18 MOT Supply			Vdc	24.0 ± 2 Vdc
Temperatures				
Internal			°C	15°C to 45°C
Chamber			°C	50°C ± 2°C
Pressure			mmHg	760 ± 100 mmHg
Flow			L/min	1.00 ± 0.3 L/min
S/R Ratio			-	0.8 – 1.12 @ Zero
AGC Intensity			Hz	150,000 – 300,000 Hz
Motor speed			%	80 – 100 %
Note :	ปิดเครื่องให้อยู่ในระหว่างนำ part มาเปลี่ยน			

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**PETRO-INSTRUMENTS CORP.,LTD.**

O <sub>3</sub> Analyzer					
Equipment :		Ozone Analyzer.	Model :		49i
Serial Number :		CM09040068	Manufacturer :		Thermo Electron
Diagnostic Test Value					
Parameter	Observed Value		Unit	Nominal Range	
	Before	After			
Sample reading	10.0	8.1	ppb		
Range	500	500	ppb	50 to 1000 ppb	
Averaging Time	30	30	Sec	10 to 300 Sec	
Calibration Factors					
O <sub>3</sub> BKG. ppb	-0.9	-0.9	ppb	0 to 60	
O <sub>3</sub> COEF	1.269	1.269	-	1.0 ± 0.3	
Instrument Controls					
Temp Compensation	On	On	-	On/Off	
Pressure Compensation	On	On	-	On/Off	
Baud Rate	9600	9600	bps	1200 to 115200 bps	
Instrument ID	49	49	-	0 to 99	
Screen Contrast	40	40	%	0 to 100 %	
Service Mode	Off	Off	-	On/Off, Up to used	
Diagnostics					
Voltages					
Motherboard voltages:					
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc	
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc	
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc	
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc	
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc	
Interface board voltages:					
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc	
5.0 Supply	4.9	4.9	Vdc	5.0 ± 0.5 Vdc	
15.0 Supply	14.7	14.7	Vdc	15.0 ± 0.5 Vdc	
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 0.5 Vdc	
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc	
Photo Lamp	9.2	9.2	Vdc	≈ 9.6 Vdc	
Temperatures					
Bench Temp	32.7	32.8	°C	5 - 50 °C	
Bench Lamp Temp	53.5	53.5	°C	50 - 60 °C	
Pressure	746.9	747.8	mmHg	760 ± 100 mmHg	
Flow					
Cell-A	0.726	0.737	L/min	0.6 ± 0.2 L/min	
Cell-B	0.644	0.649	L/min	0.6 ± 0.2 L/min	
CELL A/B O <sub>3</sub>					
Cell-A	9.9	3.6	ppb	Record only	
Cell-B	14.0	9.3	ppb	Record only	
O <sub>3</sub>	11.9	6.4	ppb	Record only	
Lamp Intensity					
Cell A	45388	45451	Hz	45,000 – 150,000 HZ	
Cell B	98099	98259	Hz	45,000 - 150,000 HZ	
Note :					

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**PETRO-INSTRUMENTS CORP.,LTD.**

CO Analyzer				
Equipment :	CO analyzer.	Model :	48I	
Serial Number :	1201351402	Manufacturer :	Thermo Electron	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.487	0.423	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	1.983	1.983	ppm	0 to 60
CO COEF	0.996	0.996	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.1	24.1	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	18.5	19.5	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.8	-106.8	Vdc	-100 to -110 Vdc
Temperatures				
Internal	34.1	34.8	°C	
Bench	48.3	47.9	°C	
Pressure	744.1	743.2	mmHg	760 ± 100 mmHg.
Flow	0.827	0.826	L/min	1 ± 0.3 L/min
S/R Ratio	1.1406400	1.1403600	-	1.140 – 1.180
AGC intensity	200873	200864	Hz	200,000 ±50,000 Hz
Motor speed	100.03	100.01	%	100 ± 5%
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer				
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370	
Serial Number :	NM7K7YND	Manufacturer :	Horiba	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.865	1.948	ppm	0-25 ppm
NMHC reading	0.265	0.281	ppm	0-25 ppm
THC reading	2.130	2.229	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.865	1.948	ppm	0-25 ppm
NMHC reading	0.265	0.281	ppm	0-25 ppm
THC reading	2.130	2.229	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-40	-40	-	-3500 to 3500
Span calibration coefficient	0.574	0.574	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	70	70	-	-3500 to 3500
Span calibration coefficient	0.560	0.560	-	0.50000 to 2.00000
Analog Input				
Detector temp	41.6	41.8	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	79.4	79.4	kPa	80 kPa ± 4 kPa
Ambient	101.2	101.2	kPa	Current Atmospheric pressure
Purifier temp	413.1	413.1	°C	390-430 °C
Purifier pressure	9.8	9.8	kPa	8 kPa -25 kPa
NMC cutter temp	185.7	186.2	°C	230-260 °C
DC-24V	24.0	24.0	V.	24V ± 0.5 V
DC-5V	4.9	4.9	V.	5V ± 0.5 V
Note :				

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PETRO-INSTRUMENTS CORP.,LTD.

TEOM 1405

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A22771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)						
Total mass (µg)						
Filter Loading (0-100%)						
Frequency(150-400Hz)						
Noise (µg)						
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)						
Ambient pressure (ATM)						
Ambient dew point (°C)						
Ambient relative humidity (%)						
Cap temperature(°C)						
Case temperature(°C)						
PM2.5 air tube temp. (°C)						
PM Coarse tube temp. (°C)						
PM2.5 path flow rate(L/m)						
PM coarse path flow rate(L/m)						
By pass flow rate(L/m)						
Total flow(L/m)						
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

Note : เครื่อง ออกกักเก็บฝุ่นที่ บริษัท pico

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PETRO-INSTRUMENTS CORP.,LTD.

All analyzer.

Equipment :	All analyzer.	Model :	42i, 43i, 48i, 49i, 410i, APHA-370
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba

Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	45.03	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.74	ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.1	ppm	Serial number :	0630318396
Carbon Monoxide (CO)	4521	ppm		
Cylinder NO. :	CC6535			
Expiration Date :	13 Aug 2023			

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0			400.0			
NO <sub>x</sub> (ppb)	0.0			400.0			
SO <sub>2</sub> (ppb)	0.0			400.0			
CO(ppm)	0.0			40.1			
O3(ppb)	0.0			400.0			
CH4(ppm)	0.0			4.50			
THC(ppm)	0.0			4.50			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0		0.00	400.0			Valid
NO <sub>x</sub> (ppb)	0.0		0.00	400.0			Valid
SO <sub>2</sub> (ppb)	0.0		0.00	400.0			Valid
CO(ppm)	0.0		0.00	40.1			Valid
O3(ppb)	0.0		0.00	400.0			Valid
CH4(ppm)	0.0		0.00	4.50			Valid
THC(ppm)	0.0		0.00	4.50			Valid

Remark : ไม่ทำ Auto cal. เนื่องจากมีลมรบกวนที่ Zero Air (รถการปนเปื้อน)

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PETRO-INSTRUMENTS CORP.,LTD.

VOC Analyzer

Equipment :	VOCs analyzer.	Model :	GC866
Serial Number :	#21541009	Manufacturer :	CHOMATOTECH

Parameter		Diagnostic test value		Unit	Nominal range
		Before	After		
Reading					
1-3 BUTADIENE		12.81	48.47	ug/m3	0-320 ug/m3
BENZENE		3.2	7.39	ug/m3	0-320 ug/m3
CYCLOHEXANE		4.27	1.61	ug/m3	0-320 ug/m3
TOLUENE		0.62	196.45	ug/m3	0-320 ug/m3
ETHYLBENZENE		40.51	31.32	ug/m3	0-320 ug/m3
M&P XYLENES		44.23	50.47	ug/m3	0-320 ug/m3
STYRENE		0.00	4.19	ug/m3	0-320 ug/m3
O-XYLENE		47.46	33.73	ug/m3	0-320 ug/m3
Diagnostics					
Carrier pressure		611	610	hPa	500 Between 700
Ambiance pressure Non sampling step		1011	1011	hPa	>1000 hPa
Critical pressure Non sampling step		1011	1011	hPa	> 1000 hPa
Ambiance pressure sampling step		1006	1006	hPa	> 1000 hPa
Critical pressure sampling step		1011	1011	hPa	> 950 hPa
Flow rate		25	25	ml/min	> 30 ml/min
RT Time					
1-3 BUTADIENE		8-40	8-40	sec	
BENZENE		435-465	435-465	sec	
CYCLOHEXANE		564-594	564-594	sec	
TOLUENE		695-779	695-779	sec	
ETHYLBENZENE		940-955	940-955	sec	
M&P XYLENES		956-989	956-989	sec	
STYRENE		980-996	980-996	sec	
O-XYLENE		995-1023	995-1023	sec	
Base Sensitivity		95	95	-	
Molar Volume Used		-	-	dm3	
Sample Volume		324.5	324.5	ml	

Note :




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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

<p>Stations Techno IRPC</p> 	<p>Inside Station</p> 
<p>Lamp Sampling Box</p> 	<p>Replace Filter</p> 
<p>Gas STD</p> 	<p>Gas H2</p> 

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<p><b>AQMs Log Sheet</b></p> 	<p><b>Replace Silica gel</b></p> 
<p><b>ถังดับเพลิง</b></p>  <p>EXP ๖๐๕-๙๐-๙๐๐๕</p>	<p><b>อุปกรณ์ทำความสะอาด</b></p>
<p><b>Clean sampling set</b></p>	

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General Checking

Equipment :	AQMs Technology	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	900/34 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1900/30 psi	

Note :

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Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Technology Station	E-mail address/Fax :	<a href="mailto:wirasak.k@rpc.co.th">wirasak.k@rpc.co.th</a>
Working Date :	17 September 2022	Working Hour :	6 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ, เครื่อง VOC น่าจะสกปรกแต่ไม่เนื่องจากใช้ N2 มากผิดปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่า WD, WS, TEMP, RH Sensor เสีย
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacement:

- Sample filter 47 mm. 7 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- TEOM ยกเครื่องกลับไปยังห้อง บริษัท PICO

-- End --

Serviced by :	ชินโรส มุขโรจน์	Serviced Date :	17 September 2022
Approved by :		Approved Date :	17 September 2022

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NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0620617608	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	4.8	3.1	ppb	
NO <sub>2</sub> reading	6.1	4.7	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. Ppb	48.8	48.8	ppb	0 to 60
NO <sub>2</sub> BKG. Ppb	47.6	47.6	ppb	0 to 60
NO COEF.	1.150	1.150	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	926.1	926.1	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.8	14.8	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	40.0	39.9	°C	15 °C to 45 °C
Chamber	49.5	49.4	°C	45 °C ± 2 °C
Cooler	99.9	99.9	°C	13 °C ± 2 °C
Converter	326.3	323.9	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	263.8	262.9	mmHg	250 ± 100 mmHg
Flow	0.671	0.667	L/min	0.5 to 1.00 L/min

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0620617611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	5.1	5.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	56.7	56.8	ppb	0 to 60
SO <sub>2</sub> COEF	0.848	0.848	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	70	70	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-593.9	-593.9		
Flash Supply	875	874		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.6	23.6	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	34.1	33.7	°C	15°C to 45°C
Chamber	45.0	45.0	°C	45°C ± 2°C
Pressure	737.3	736.7	mmHg	750 ± 100 mmHg
Flow	0.484	0.482	L/min	0.5 to 1.00 L/min
Lamp Intensity	89	88	%	40 – 100 %

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**O<sub>3</sub> Analyzer**

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09040068	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	16.3	18.6	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	-0.9	-0.9	ppb	0 to 60
O <sub>3</sub> COEF	1.269	1.269	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.2	9.2	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	32.5	32.1	°C	5 - 50 °C
Bench Lamp Temp	53.4	53.4	°C	50 - 60 °C
Pressure	745.1	744.8	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.731	0.723	L/min	0.6 ± 0.2 L/min
Cell-B	0.639	0.643	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	279.0	64.5	ppb	Record only
Cell-B	-248.0	-32.4	ppb	Record only
O <sub>3</sub>	15.2	16.4	ppb	Record only
Lamp Intensity				
Cell A	47029	46162	Hz	45,000 – 150,000 HZ
Cell B	104191	102375	Hz	45,000 - 150,000 HZ

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

**CO<sub>2</sub> Analyzer**

Equipment :	Carbon Dioxide analyzer.	Model :	410i
Serial Number :	0908235308	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading			ppm	
Range			ppm	0 to 100 ppm
Averaging Time			Sec	10 to 300 Sec
Calibration Factors				
CO <sub>2</sub> BKG. ppm			ppm	0 to 60
CO <sub>2</sub> COEF			-	1.0 ± 0.3
Instrument Controls				
Temp Correction			-	On/Off
Pressure Correction			-	On/Off
Baud Rate			bps	9600 to 115000 bps
Instrument ID			-	0 to 99
Screen Brightness			%	0 to 100 %
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-3.3 Supply			Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-15.0 Supply			Vdc	-15.0 ± 2 Vdc
-18.0 IR Supply			Vdc	18.0 ± 2 Vdc
18 MOT Supply			Vdc	24.0 ± 2 Vdc
Temperatures				
Internal			°C	15°C to 45°C
Chamber			°C	50°C ± 2°C
Pressure			mmHg	760 ± 100 mmHg
Flow			L/min	1.00 ± 0.3 L/min
S/R Ratio			-	0.8 – 1.12 @ Zero
AGC Intensity			Hz	150,000 – 300,000 Hz
Motor speed			%	80 – 100 %

Note : ปิดเครื่องให้อยู่ในระหว่างนำ part มาเปลี่ยน

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**PETRO-INSTRUMENTS CORP.,LTD.**

**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351402	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.545	0.554	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	1.985	1.987	ppm	0 to 60
CO COEF	0.996	0.996	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.1	24.1	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	21.3	18.4	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.7	-106.7	Vdc	-100 to -110 Vdc
Temperatures				
Internal	32.4	32.6	°C	
Bench	48.2	48.5	°C	
Pressure	742.3	740.5	mmHg	760 ± 100 mmHg.
Flow	0.825	0.824	L/min	1 ± 0.3 L/min
S/R Ratio	1.1406300	1.1406100	-	1.140 – 1.180
AGC intensity	201092	201124	Hz	200,000 ±50,000 Hz
Motor speed	100.01	100.02	%	100 ± 5%

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	NM7K7YND	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.857	1.832	ppm	0-25 ppm
NMHC reading	0.161	0.169	ppm	0-25 ppm
THC reading	2.018	2.001	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.857	1.832	ppm	0-25 ppm
NMHC reading	0.161	0.169	ppm	0-25 ppm
THC reading	2.018	2.001	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-40	-40	-	-3500 to 3500
Span calibration coefficient	0.574	0.574	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	70	70	-	-3500 to 3500
Span calibration coefficient	0.560	0.560	-	0.50000 to 2.00000
Analog Input				
Detector temp	41.5	41.3	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	78.9	78.8	kPa	80 kPa ± 4 kPa
Ambient	100.9	100.8	kPa	Current Atmospheric pressure
Purifier temp	413.1	413.2	°C	390-430 °C
Purifier pressure	9.8	9.7	kPa	8 kPa -25 kPa
NMC cutter temp	185.5	185.7	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**VOC Analyzer**

Equipment :	VOCs analyzer.	Model :	GC866
Serial Number :	#21541009	Manufacturer :	CHOMATOTECH

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Reading				
1-3 BUTADIENE	12.81	48.47	ug/m3	0-320 ug/m3
BENZENE	3.2	7.39	ug/m3	0-320 ug/m3
CYCLOHEXANE	4.27	1.61	ug/m3	0-320 ug/m3
TOLUENE	0.62	196.45	ug/m3	0-320 ug/m3
ETHYLBENZENE	40.51	31.32	ug/m3	0-320 ug/m3
M&P XYLENES	44.23	50.47	ug/m3	0-320 ug/m3
STYRENE	0.00	4.19	ug/m3	0-320 ug/m3
O-XYLENE	47.46	33.73	ug/m3	0-320 ug/m3
Diagnostics				
Carrier pressure	611	610	hPa	500 Between 700
Ambiance pressure Non sampling step	1011	1011	hPa	>1000 hPa
Critical pressure Non sampling step	1011	1011	hPa	> 1000 hPa
Ambiance pressure sampling step	1006	1006	hPa	> 1000 hPa
Critical pressure sampling step	1011	1011	hPa	> 950 hPa
Flow rate	25	25	ml/min	> 30 ml/min
RT Time				
1-3 BUTADIENE	8-40	8-40	sec	
BENZENE	435-465	435-465	sec	
CYCLOHEXANE	564-594	564-594	sec	
TOLUENE	695-779	695-779	sec	
ETHYLBENZENE	940-955	940-955	sec	
M&P XYLENES	956-989	956-989	sec	
STYRENE	980-996	980-996	sec	
O-XYLENE	995-1023	995-1023	sec	
Base Sensitivity	95	95	-	
Molar Volume Used	-	-	dm3	
Sample Volume	324.5	324.5	ml	

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**TEOM 1405**

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)						
Total mass (µg)						
Filter Loading (0-100%)						
Frequency(150-400Hz)						
Noise (µg)						
System Status	Fully Operational			Fully Operational		
Operating mode	AK protocol			AK protocol		
RS232 mode	0.99			0.99		
Vacuum pump pressure(ATM)	Unlocked			Unlocked		
Protection level	192.168.1.101			192.168.1.101		
IP address	1.57			1.57		
Instrument firmware version						
Ambient temperature (°C)						
Ambient pressure (ATM)						
Ambient dew point (°C)						
Ambient relative humidity (%)						
Cap temperature(°C)						
Case temperature(°C)						
PM2.5 air tube temp. (°C)						
PM Coarse tube temp. (°C)						
PM2.5 path flow rate(L/m)						
PM coarse path flow rate(L/m)						
By pass flow rate(L/m)						
Total flow(L/m)						
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

**Note :** เครื่องนี้ ออกมาเพื่อใช้กับ บริษัท pico

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**PETRO-INSTRUMENTS CORP.,LTD.**
**All analyzer.**

Equipment :	All analyzer.	Model :	42i, 43i , 48i , 49i , 410i, APHA-370
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba

Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	45.03	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.74	ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.1	ppm	Serial number :	0630318396
Carbon Monoxide (CO)	4521	ppm		
Cylinder NO. :	CC6535			
Expiration Date :	13 Aug 2023			

**BEFORE CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0			400.0			
NO <sub>x</sub> (ppb)	0.0			400.0			
SO <sub>2</sub> (ppb)	0.0			40.1			
CO(ppm)	0.0			400.0			
O3(ppb)	0.0			4.50			
CH4(ppm)	0.0			4.50			
THC(ppm)	0.0						

**AFTER CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0		0.00	400.0			Valid
NO <sub>x</sub> (ppb)	0.0		0.00	400.0			Valid
SO <sub>2</sub> (ppb)	0.0		0.00	400.0			Valid
CO(ppm)	0.0		0.00	40.1			Valid
O3(ppb)	0.0		0.00	400.0			Valid
CH4(ppm)	0.0		0.00	4.50			Valid
THC(ppm)	0.0		0.00	4.50			Valid

**Remark :** ไม่ทำ Auto cal. เนื่องจากมีลมรบกวนที่ Zero Air (รถการณ่ไปเจอ)

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Techno IRPC 	Inside Station 
Lamp Sampling Box 	Replace Filter 
Gas STD 	Gas H2 

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บริษัท เพทโร-อินสตรูเมนต์ จำกัด

PETRO-INSTRUMENTS CORP., LTD.

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#### SERVICE REPORT

Job No./เลขที่ของงาน :	JID2100311	Customer name/ ชื่อลูกค้า :	IRPC
Equipment / อุปกรณ์ :	AQMs station	Station name/ ชื่อสถานี :	Techno
Manufacturer/ผู้ผลิต :	-	Location/ที่ตั้ง :	Rayong
Model / รุ่น :	-	Contact name/ ชื่อผู้ติดต่อ :	K. Wirasak Khumsuk
Serial No./เลขหมายประจำเครื่อง :	-	Telephone / โทรศัพท์ :	081-803-0475
Working date/วันที่ปฏิบัติงาน :	06 October 2022	E-Mail.	wirasak.k@irpc.co.th
Working Hour/ชั่วโมงทำงาน :	12 Hr.	Mileage/ระยะทาง :	300 Km.

<b>SCOPE OF WORK</b> (ขอบเขตของงาน)	<input type="checkbox"/> Service <input checked="" type="checkbox"/> Urgent: CM Konnong station <input type="checkbox"/> Other
<b>FUNCTION CHECK &amp; CORRECT ACTION</b> (ตรวจสอบการทำงานและการแก้ไข)	<ul style="list-style-type: none"> <li>- Data Logger ทำงานปกติ</li> <li>- Zero Air Regulator เลื่อน</li> <li>- Calibrator ทำงานปกติ</li> <li>- SO2 Analyzer ทำงานปกติ</li> <li>- NOx Analyzer Alarm Cooler Temperature</li> <li>- Power Supply 12 VDC สำหรับชุด MET เลื่อน</li> <li>- WD Sensor เลื่อน</li> <li>- WS Sensor เลื่อน</li> <li>- TEMP Sensor เลื่อน</li> <li>- RH Sensor เลื่อน</li> <li>- BP Sensor ทำงานปกติ</li> <li>- ทำการเปลี่ยนอะไหล่ดังนี้               <ul style="list-style-type: none"> <li>1. Regulator for Zero (Part PICO) = 1 ea.</li> <li>2. Cooler for Nox Analyzer (Part IRPC) = 1 ea.</li> <li>3. Supply for MET (Part IRPC) = 1 ea.</li> </ul> </li> </ul>

AQMs Log Sheet 	Replace Silica gel 
ถังดับเพลิง 	อุปกรณ์ทำความสะอาด 
Clean sampling set 	

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<b>PART REPLACEMENT</b> (รายการเปลี่ยนอะไหล่)	<p>รายการเปลี่ยนอะไหล่</p> <ul style="list-style-type: none"> <li>1. Regulator for Zero (Part PICO) P/N - = 1 ea.</li> <li>2. Cooler for Nox Analyzer (Part IRPC) P/N 9995 = 1 ea.</li> <li>3. Supply for MET (Part IRPC) P/N S-35-12 = 1 ea.</li> </ul>
<b>RECOMMENDATION</b> (คำแนะนำ)	



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Action By :	Mr. Pattaraphong	PICO	Date :	06 October 2022
Customer Approve By :		IRPC	Approve Date :	
Approved By :		PICO	Approved Date :	





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SERVICE REPORT			
Job No./เลขที่ของงาน :	JID2100311	Customer name/ ชื่อลูกค้า :	IRPC
Equipment /อุปกรณ์ :	VOC	Station name/ชื่อสถานี :	Techno
Manufacturer/ผู้ผลิต :	Chromatotec	Location/สถานที่ :	Rayong
Model /รุ่น :	GC866	Contact name/ชื่อผู้ติดต่อ :	K. Wirasak Khumsuk
Serial No./เลขหมายประจำเครื่อง :	-	Telephone /โทรศัพท์ :	081-803-0475
Working date/วันที่ปฏิบัติงาน :	11-12 October 2022	E-Mail:	wirasak.k@irpc.co.th
Working Hour/ชั่วโมงทำงาน :	12 Hr.	Mileage/ระยะทาง :	300 Km.
<b>SCOPE OF WORK</b> (ขอบเขตของงาน)			
<input type="checkbox"/> Service <input checked="" type="checkbox"/> Urgent: CM Konnong station <input type="checkbox"/> Other			
<b>FUNCTION CHECK &amp; CORRECT ACTION</b> (ตรวจสอบการทำงานและการแก้ไข)			
วันที่ 6 ตุลาคม 2565 นำเครื่อง VOC กลับมาแก้ไข VOC ไซ N2 มากผิดปกติ 150-200 PSI ต่อวัน			
- จากการตรวจเช็คพบ Pneumatic Actuator 6 port ชำรุด			
			
- เปลี่ยน Pneumatic Actuator 6 port ใหม่ 1 ชุด			
			
- ติดตั้งเครื่องตรวจวัดวันที่ 12 ตุลาคม 2565			
<b>PART REPLACEMENT</b> (รายการเปลี่ยนอะไหล่)			
รายการเปลี่ยนอะไหล่ Pneumatic Actuator 6 port (Part PICO) P/N CS/PN/00005-0002 = 1 ea.			
<b>RECOMMENDATION</b> (คำแนะนำ)			

Action By :	Mr. Peeraphon Puangpoonol	PICO	Date :	12 October 2022
Customer Approve By :		IRPC	Approve Date :	
Approved By :		PICO	Approved Date :	

## PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Technology Station	E-mail address/Fax :	<a href="mailto:wirasak.k@irpc.co.th">wirasak.k@irpc.co.th</a>
Working Date :	10 October 2022	Working Hour :	6 Hours

### Service Report

#### Working Scope:

Service Station

#### Physical Checking:

- ตรวจเช็ค Data logger พบว่าทำงานได้ปกติ
- ตรวจเช็ค Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Reading of all analyzers และ Met sensor พบว่า WD, WS, TEMP, RH Sensor เสีย
- ตรวจเช็ค H<sub>2</sub> Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจเช็ค เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจเช็ค เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจเช็ค การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

#### Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

#### Part Replacement:

- Sample filter 47 mm. 7 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

#### Addition Recommended:

- ตรวจเช็คถังเก็บแก๊สในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- TEOM ยกเครื่องกลับไปซ่อมที่ บริษัท PICO

-- End --

Serviced by :	ชีโนรส มุขโรจน์	Serviced Date :	10 October 2022
Approved by :		Approved Date :	10 October 2022

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## PETRO-INSTRUMENTS CORP.,LTD.

### General Checking

Equipment :	AQMs Technology	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	600/34 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1900/30 psi	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0620617608	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	0.7	2.0	ppb	
NO <sub>2</sub> reading	0.8	5.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. Ppb	27.1	33.9	ppb	0 to 60
NO <sub>2</sub> BKG. Ppb	27.3	32.6	ppb	0 to 60
NO COEF.	1.090	1.263	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.010	1.010	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On	On/Off	On
PMT Supply	On	On	On/Off	On
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-841.8	-841.8	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.8	14.8	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	38.4	36.3	°C	15 °C to 45 °C
Chamber	49.6	49.4	°C	45 °C ± 2 °C
Cooler	-2.8	-3.1	°C	(-13 °C ± 2 °C
Converter	325.3	325.5	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	265.4	289.9	mmHg	250 ± 100 mmHg
Flow	0.653	0.572	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO<sub>2</sub> Analyzer**

Equipment :	Carbon Dioxide analyzer.	Model :	410i
Serial Number :	0908235308	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading			ppm	
Range			ppm	0 to 100 ppm
Averaging Time			Sec	10 to 300 Sec
Calibration Factors				
CO <sub>2</sub> BKG. ppm			ppm	0 to 60
CO <sub>2</sub> COEF	-	-	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	-	-	On/Off	On/Off
Pressure Correction	-	-	On/Off	On/Off
Baud Rate			bps	9600 to 115000 bps
Instrument ID	-	-		0 to 99
Screen Brightness			%	0 to 100 %
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-3.3 Supply			Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-15.0 Supply			Vdc	-15.0 ± 2 Vdc
-18.0 IR Supply			Vdc	18.0 ± 2 Vdc
18 MOT Supply			Vdc	24.0 ± 2 Vdc
Temperatures				
Internal			°C	15 °C to 45 °C
Chamber			°C	50 °C ± 2 °C
Pressure			mmHg	760 ± 100 mmHg
Flow			L/min	1.00 ± 0.3 L/min
S/R Ratio			-	0.8 - 1.12 @ Zero
AGC Intensity			Hz	150,000 - 300,000 Hz
Motor speed			%	80 - 100 %

**Note :** บิดเครื่องให้อยู่ในระหว่างนำ part มาเปลี่ยน

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0620617611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	4.0	1.6	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	56.9	59.9	ppb	0 to 60
SO <sub>2</sub> COEF	0.848	0.853	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	70	70	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-593.5	-593.5		
Flash Supply	875	881		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.6	23.6	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	32.5	31.5	°C	15 °C to 45 °C
Chamber	44.9	45.3	°C	45 °C ± 2 °C
Pressure	739.1	738.8	mmHg	750 ± 100 mmHg
Flow	0.482	0.481	L/min	0.5 to 1.00 L/min
Lamp intensity	89	89	%	40 - 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**O<sub>3</sub> Analyzer**

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09040068	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	29.8	28.5	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	0.0	-2.0	ppb	0 to 60
O <sub>3</sub> COEF	1.230	1.175	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	10.1	10.1	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	31.5	29.9	°C	5 - 50 °C
Bench Lamp Temp	53.4	53.4	°C	50 - 60 °C
Pressure	743.6	747.5	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.731	0.728	L/min	0.6 ± 0.2 L/min
Cell-B	0.639	0.643	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	125.7	-105.3	ppb	Record only
Cell-B	-54.7	132.7	ppb	Record only
O <sub>3</sub>	35.5	13.7	ppb	Record only
Lamp Intensity				
Cell A	45748	45098	Hz	45,000 - 150,000 HZ
Cell B	105820	104407	Hz	45,000 - 150,000 HZ

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**CO Analyzer**

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351402	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.533	0.226	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	1.969	2.358	ppm	0 to 60
CO COEF	0.988	1.021	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.1	24.1	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	18.7	19.4	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.7	-106.7	Vdc	-100 to -110 Vdc
Temperatures				
Internal	33.6	33.5	°C	
Bench	47.9	48.0	°C	
Pressure	741.4	744.4	mmHg	760 ± 100 mmHg
Flow	0.794	0.757	L/min	1 ± 0.3 L/min
S/R Ratio	1.1405200	1.1405300	-	1.140 – 1.180
AGC intensity	200710	200698	Hz	200,000 ±50,000 Hz
Motor speed	100.03	100.01	%	100 ± 5%

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**TEOM 1405**

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)						
Total mass (µg)						
Filter Loading (0-100%)						
Frequency(150-400Hz)						
Noise (µg)						
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)						
Ambient pressure (ATM)						
Ambient dew point (°C)						
Ambient relative humidity (%)						
Cap temperature(°C)						
Case temperature(°C)						
PM2.5 air tube temp. (°C)						
PM Coarse tube temp. (°C)						
PM2.5 path flow rate(L/m)						
PM coarse path flow rate(L/m)						
By pass flow rate(L/m)						
Total flow(L/m)						
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

**Note :**

เครื่อง ออกถึงไปซ่อมที่ บริษัท pico

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**PETRO-INSTRUMENTS CORP.,LTD.**
**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	NM7K7YND	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.946	1.876	ppm	0-25 ppm
NMHC reading	0.253	0.260	ppm	0-25 ppm
THC reading	2.199	2.136	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.946	1.876	ppm	0-25 ppm
NMHC reading	0.253	0.260	ppm	0-25 ppm
THC reading	2.199	2.136	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-40	-40	-	-3500 to 3500
Span calibration coefficient	0.574	0.574	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	70	70	-	-3500 to 3500
Span calibration coefficient	0.560	0.560	-	0.50000 to 2.00000
Analog Input				
Detector temp	40.9	40.5	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	79.1	78.9	kPa	80 kPa ± 4 kPa
Ambient	101.2	101.0	kPa	Current Atmospheric pressure
Purifier temp	413.1	413.3	°C	390-430 °C
Purifier pressure	9.8	9.8	kPa	8 kPa -25 kPa
NMC cutter temp	185.2	184.3	°C	230-260 °C
DC 24V	24.0	24.0	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**VOC Analyzer**

Equipment :	VOCs analyzer.	Model :	GC866
Serial Number :	#21541009	Manufacturer :	CHOMATOTECH







Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Reading				
1-3 BUTADIENE	12.81	48.47	ug/m3	0-320 ug/m3
BENZENE	3.2	7.39	ug/m3	0-320 ug/m3
CYCLOHEXANE	4.27	1.61	ug/m3	0-320 ug/m3
TOLUENE	0.62	196.45	ug/m3	0-320 ug/m3
ETHYLBENZENE	40.51	31.32	ug/m3	0-320 ug/m3
M&P XYLENES	44.23	50.47	ug/m3	0-320 ug/m3
STYRENE	0.00	4.19	ug/m3	0-320 ug/m3
O-XYLENE	47.46	33.73	ug/m3	0-320 ug/m3
Diagnostics				
Carrier pressure	611	610	hPa	500 Between 700
Ambiance pressure Non sampling step	1011	1011	hPa	>1000 hPa
Critical pressure Non sampling step	1011	1011	hPa	> 1000 hPa
Ambiance pressure sampling step	1006	1006	hPa	> 1000 hPa
Critical pressure sampling step	1011	1011	hPa	> 950 hPa
Flow rate	25	25	ml/min	> 30 ml/min
RT Time				
1-3 BUTADIENE	8-40	8-40	sec	
BENZENE	435-465	435-465	sec	
CYCLOHEXANE	564-594	564-594	sec	
TOLUENE	695-779	695-779	sec	
ETHYLBENZENE	940-955	940-955	sec	
M&P XYLENES	956-989	956-989	sec	
STYRENE	980-996	980-996	sec	
O-XYLENE	995-1023	995-1023	sec	
Base Sensitivity	95	95	-	
Molar Volume Used	-	-	dm3	
Sample Volume	324.5	324.5	ml	





**Note :**


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All analyzer.							
Equipment :	All analyzer.	Model :	42i, 43i , 48i , 49i , 410i, APHA-370				
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba				
Standard gas concentration							
Sulfur Dioxide (SO <sub>2</sub> )	45.03	ppm					
Nitric Oxide (NO)	44.74	ppm					
Methane (CH <sub>4</sub> )	499.1	ppm					
Carbon Monoxide (CO)	4521	ppm					
Cylinder NO. :	CC6535						
Expiration Date :	13 Aug 2023						
Dilutor detail							
Manufacturer :	Thermo						
Model :	146i						
Serial number :	0630318396						
BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0			400.0			
NO <sub>x</sub> (ppb)	0.0			400.0			
SO <sub>2</sub> (ppb)	0.0			400.0			
CO(ppm)	0.0			40.1			
O <sub>3</sub> (ppb)	0.0			400.0			
CH <sub>4</sub> (ppm)	0.0			4.50			
THC(ppm)	0.0			4.50			
AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.50	0.50	400.0	400.0	0.00	Valid
NO <sub>x</sub> (ppb)	0.0	1.50	1.50	400.0	405.0	1.25	Valid
SO <sub>2</sub> (ppb)	0.0	2.10	2.10	400.0	398.0	-0.50	Valid
CO(ppm)	0.0	0.10	0.10	40.1	39.9	-0.50	Valid
O <sub>3</sub> (ppb)	0.0	0.60	0.60	400.0	401.0	0.25	Valid
CH <sub>4</sub> (ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
THC(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid

Remark : ไม่ทำ Auto cal. เนื่องจากมีลมที่ Zero Air (รถสวนไฟ)

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
<b>Stations Techno IRPC</b> 	<b>Inside Station</b> 
<b>Lamp Sampling Box</b> 	<b>Replace Filter</b> 
<b>Gas STD</b> 	<b>Gas H2</b> 

<b>หัววัดฝุ่น</b> 	<b>Replace Silica gel</b> 
<b>ถังดับเพลิง</b>  <p>EXP xxx-xxx-xxxx</p>	<b>อุปกรณ์ทำความสะอาด</b> 
<b>Clean sampling set</b>	

Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Technology Station	E-mail address/Fax :	<a href="mailto:wirasak.k@irpc.co.th">wirasak.k@irpc.co.th</a>
Working Date :	22 October 2022	Working Hour :	6 Hours
Service Report			
<b>Working Scope:</b>			
Service Station			
<b>Physical Checking:</b>			
<ul style="list-style-type: none"> <li>- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ</li> <li>- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่า WD, WS, TEMP, RH Sensor เสีย</li> <li>- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ</li> <li>- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ เครื่องวัดฝุ่น PM-10 &amp; PM-2.5 พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ</li> <li>- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี</li> </ul>			
<b>Correction working:</b>			
Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.		
Replace sample filter 47 mm.	Drain water for pump of Zero Air.		
<b>Part Replacement:</b>			
Sample filter 47 mm.	7 ea.	(Part Support by IRPC)	
Silica gel.	P/N: 6998	1/2 Bottle.	(Part Support by IRPC)
<b>Addition Recommended:</b>			
<ul style="list-style-type: none"> <li>- ตรวจสอบถังดับเพลิงในสถานีพบว่าหมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่</li> <li>- TEOM ยกเครื่องถังไปซ่อมที่ บริษัท PICO</li> </ul>			
-- End --			
Serviced by :	ชินโรส มุขโรจน์	Serviced Date :	22 October 2022
Approved by :		Approved Date :	22 October 2022

**PETRO-INSTRUMENTS CORP.,LTD.**

**General Checking**

Equipment :	AQMs Technology	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 3 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	500/34 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	-	1900/30 psi	

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0620617611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	5.2	2.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG. ppb	60.0	59.1	ppb	0 to 60
SO <sub>2</sub> COEF.	0.853	0.851	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	70	70	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ±/ 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ±/ 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ±/ 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ±/ 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 ±/ 1 Vdc
Interface board voltages:				
PMT Supply	-593.5	-593.5		
Flash Supply	868	870		
3.3 Supply	3.2	3.2	Vdc	3.3 ±/ 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 ±/ 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 ±/ 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ±/ 1 Vdc
24.0 Supply	23.6	23.6	Vdc	24.0 ±/ 1 Vdc
Temperatures				
Internal	30.7	34.3	°C	15°C to 45°C
Chamber	44.4	45.0	°C	45°C ± 2°C
Pressure	739.1	738.9	mmHg	750 ± 100 mmHg
Flow	0.479	0.484	L/min	0.5 to 1.00 L/min
Lamp intensity	88	89	%	40 – 100 %

**Note :** เปลี่ยน power supply 1 ตัว

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**PETRO-INSTRUMENTS CORP.,LTD.**

**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0620617608	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	1.7	5.3	ppb	
NO <sub>x</sub> reading	4.8	6.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. Ppb	29.3	31.9	ppb	0 to 60
NO <sub>x</sub> BKG. Ppb	24.1	31.2	ppb	0 to 60
NO COEF.	0.969	1.020	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-878.4	-878.4	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.8	14.8	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	36.2	38.7	°C	15 °C to 45 °C
Chamber	49.3	49.4	°C	45°C ± 2 °C
Cooler	-2.9	-2.9	°C	(-13) °C ± 2 °C
Converter	325.9	326.6	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	290.7	291.1	mmHg	250 ± 100 mmHg
Flow	0.601	0.603	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

**CO<sub>2</sub> Analyzer**

Equipment :	Carbon Dioxide analyzer.	Model :	410i
Serial Number :	0908235308	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading			ppm	
Range			ppm	0 to 100 ppm
Averaging Time			Sec	10 to 300 Sec
Calibration Factors				
CO <sub>2</sub> BKG. ppm			ppm	0 to 60
CO <sub>2</sub> COEF	-	-	-	1.0 ± 0.3
Instrument Controls				
Temp Correction			-	On/Off
Pressure Correction			-	On/Off
Baud Rate			bps	9600 to 115000 bps
Instrument ID			-	0 to 99
Screen Brightness			%	0 to 100 %
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-3.3 Supply			Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply			Vdc	3.3 ± 1 Vdc
5.0 Supply			Vdc	5.0 ± 1 Vdc
15.0 Supply			Vdc	15.0 ± 2 Vdc
24.0 Supply			Vdc	24.0 ± 2 Vdc
-15.0 Supply			Vdc	-15.0 ± 2 Vdc
-18.0 IR Supply			Vdc	18.0 ± 2 Vdc
18 MOT Supply			Vdc	24.0 ± 2 Vdc
Temperatures				
Internal			°C	15°C to 45°C
Chamber			°C	50°C ± 2°C
Pressure			mmHg	760 ± 100 mmHg
Flow			L/min	1.00 ± 0.3 L/min
S/R Ratio			-	0.8 – 1.12 @ Zero
AGC Intensity			Hz	150,000 – 300,000 Hz
Motor speed			%	80 – 100 %

**Note :** ปิดเครื่องให้อยู่ในระหว่างนำ part มาเปลี่ยน

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**PETRO-INSTRUMENTS CORP.,LTD.**
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**O<sub>3</sub> Analyzer**
**CO Analyzer**

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09040068	Manufacturer :	Thermo Electron

Equipment :	CO analyzer.	Model :	48i
Serial Number :	1201351402	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	29.8	22.0	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O <sub>3</sub> BKG. ppb	10.0	-1.5	ppb	0 to 60
O <sub>3</sub> COEF	0.995	1.029	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	49	49	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 ± 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 0.5 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	11.1	11.1	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	32.0	32.8	°C	5 - 50 °C
Bench Lamp Temp	53.4	53.5	°C	50 - 60 °C
Pressure	747.8	747.8	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.719	0.723	L/min	0.6 ± 0.2 L/min
Cell-B	0.636	0.639	L/min	0.6 ± 0.2 L/min
CELL A/B O <sub>3</sub>				
Cell-A	152.5	-126.4	ppb	Record only
Cell-B	-86.9	69.3	ppb	Record only
O <sub>3</sub>	31.8	28.4	ppb	Record only
Lamp intensity				
Cell A	54477	54340	Hz	45,000 - 150,000 HZ
Cell B	130522	130252	Hz	45,000 - 150,000 HZ

**Note :**

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Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.584	0.430	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	0.000	0.028	ppm	0 to 60
CO COEF	1.021	1.014	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	-	On/Off
Pressure Compensation	On	On	-	On/Off
Baud Rate	9600	9600	bps	1200 to 115200 bps
Instrument ID	48	48	-	0 to 99
Screen Contrast	40	40	%	0 to 100 %
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.1	24.1	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vd
5.0 Supply	4.9	4.9	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.0	15.0	Vdc	15.0 +/- 1 Vdc
24.0 Supply	24.0	23.8	Vdc	24.0 +/- 1 Vdc
-15.0 Supply	-15.1	-15.1	Vdc	-15.0 ± 1.0 Vdc
18.0 IR Supply	18.1	18.1	Vdc	18.0 ± 1.0 Vdc
18.0 MOT Supply	19.1	18.0	Vdc	18.0 ± 5.0 Vdc
Bias Supply	-106.7	-106.7	Vdc	-100 to -110 Vdc
Temperatures				
Internal	33.5	34.2	°C	
Bench	48.0	48.3	°C	
Pressure	745.2	744.7	mmHg	760 ± 100 mmHg
Flow	0.813	0.796	L/min	1 ± 0.3 L/min
S/R Ratio	1.1400300	1.1401600	-	1.140 ± 1.180
AGC intensity	200889	200699	Hz	200,000 ±50,000 Hz
Motor speed	100.01	100.01	%	100 ± 5%

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
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**THC Analyzer**
**TEOM 1405**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	NM7K7YND	Manufacturer :	Horiba

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	2.145	1.992	ppm	0-25 ppm
NMHC reading	0.223	0.295	ppm	0-25 ppm
THC reading	2.368	2.287	ppm	0-25 ppm
Analyzer reading				
CH4 reading	2.145	1.992	ppm	0-25 ppm
NMHC reading	0.223	0.295	ppm	0-25 ppm
THC reading	2.368	2.287	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-40	-40	-	-3500 to 3500
Span calibration coefficient	0.574	0.574	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	70	70	-	-3500 to 3500
Span calibration coefficient	0.560	0.560	-	0.50000 to 2.00000
Analog input				
Detector temp	42.1	42.2	°C	Ambient Temp +(5 - 15 °C)
Detector pressure	79.4	79.2	kPa	80 kPa ± 4 kPa
Ambient	101.2	101.2	kPa	Current Atmospheric pressure
Purifier temp	413.3	413.2	°C	390-430 °C
Purifier pressure	9.8	9.7	kPa	8 kPa -25 kPa
NMC cutter temp	185.7	185.5	°C	230-260 °C
DC.24V	24.0	24.0	V.	24V ± 0.5 V
DC.5V	4.9	4.9	V.	5V ± 0.5 V

**Note :**

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)						
Total mass (µg)						
Filter Loading (0-100%)						
Frequency(150-400Hz)						
Noise (µg)						
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)						
Ambient pressure (ATM)						
Ambient dew point (°C)						
Ambient relative humidity (%)						
Cap temperature(°C)						
Case temperature(°C)						
PM2.5 air tube temp. (°C)						
PM Coarse tube temp. (°C)						
PM2.5 path flow rate(L/m)						
PM coarse path flow rate(L/m)						
By pass flow rate(L/m)						
Total flow(L/m)						
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

**Note :** เครื่อง ยกเลิกไปซ่อมที่ บริษัท pico

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PETRO-INSTRUMENTS CORP.,LTD.

VOC Analyzer				
Equipment :	VOCs analyzer.	Model :	GC866	
Serial Number :	#21541009	Manufacturer :	CHOMATOTECH	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Reading				
1-3 BUTADIENE	1.27	0.77	ug/m3	0-320 ug/m3
BENZENE	5.78	4.74	ug/m3	0-320 ug/m3
CYCLOHEXANE	0.00	0.00	ug/m3	0-320 ug/m3
TOLUENE	7.77	5.85	ug/m3	0-320 ug/m3
ETHYLBENZENE	0.00	11.95	ug/m3	0-320 ug/m3
M&P XYLENES	8.12	3.37	ug/m3	0-320 ug/m3
STYRENE	0.00	0.00	ug/m3	0-320 ug/m3
O-XYLENE	10.15	3.70	ug/m3	0-320 ug/m3
Diagnostics				
Carrier pressure	610	610	hPa	500 Between 700
Ambiance pressure Non sampling step	1011	1011	hPa	>1000 hPa
Critical pressure Non sampling step	1011	1011	hPa	> 1000 hPa
Ambiance pressure sampling step	1006	1006	hPa	> 1000 hPa
Critical pressure sampling step	1011	1011	hPa	> 950 hPa
Flow rate	25	25	ml/min	> 30 ml/min
RT Time				
1-3 BUTADIENE	8-40	8-40	sec	
BENZENE	435-465	435-465	sec	
CYCLOHEXANE	564-594	564-594	sec	
TOLUENE	695-779	695-779	sec	
ETHYLBENZENE	940-955	940-955	sec	
M&P XYLENES	956-989	956-989	sec	
STYRENE	980-996	980-996	sec	
O-XYLENE	995-1023	995-1023	sec	
Base Sensitivity	95	95	-	
Molar Volume Used	-	-	dm3	
Sample Volume	324.5	324.5	ml	
Note :				



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PETRO-INSTRUMENTS CORP.,LTD.

All analyzer.							
Equipment :	All analyzer.	Model :	42i, 43i , 48i , 49i , 410i, APHA-370				
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba				
Standard gas concentration			Dilutor detail				
Sulfur Dioxide (SO <sub>2</sub> )	45.03	ppm	Manufacturer :	Thermo			
Nitric Oxide (NO)	44.74	ppm	Model :	146i			
Methane (CH <sub>4</sub> )	499.1	ppm	Serial number :	0630318396			
Carbon Monoxide (CO)	4521	ppm					
Cylinder NO. :	CC6535						
Expiration Date :	13 Aug 2023						
BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0			400.0			
NO <sub>x</sub> (ppb)	0.0			400.0			
SO <sub>2</sub> (ppb)	0.0			400.0			
CO(ppm)	0.0			40.1			
O3(ppb)	0.0			400.0			
CH4(ppm)	0.0			4.50			
THC(ppm)	0.0			4.50			
AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.40	0.40	400.0	400.0	0.00	Valid
NO <sub>x</sub> (ppb)	0.0	1.30	1.30	400.0	400.0	0.00	Valid
SO <sub>2</sub> (ppb)	0.0	1.10	1.10	400.0	401.0	0.25	Valid
CO(ppm)	0.0	0.10	0.10	40.1	40.0	-0.25	Valid
O3(ppb)	0.0	1.40	1.40	400.0	397.0	-0.75	Valid
CH4(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
THC(ppm)	0.0	0.01	0.01	4.50	4.50	0.00	Valid
Remark : ไม่ทำ Auto cal. เนื่องจากมีลมรบกวนที่ Zero Air (จากการแก้ไข)							







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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Techno IRPC	Inside Station
	
Lamp Sampling Box	Replace Filter
	
Gas STD	Gas H2
	

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PETRO-INSTRUMENTS CORP.,LTD.

หัวฉีดฝุ่น	Replace Silica gel
	
ถังดับเพลิง	อุปกรณ์ทำความสะอาด
	
EXP xxx-xxx-xxxx	
Clean sampling set	replace power supply of SO2
	

7/409 Soi Vibhavadi-Rangsit 36, Vibhavadi-Rangsit Rd., Chatuchak, Chatuchak, Bangkok 10900, Thailand  
TEL: (662) 939 5711 (12 Lines), 513 2333 (12 Lines), 513 9575-9 FAX: (662) 513 3730, 939 4207-8  
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รายงานฉบับที่ 3 : รายงานผลการดูแล ตรวจสอบ บำรุงรักษาและปรับแต่งเครื่องมือและอุปกรณ์ในสถานีตรวจวัดคุณภาพอากาศ และหน่วยตรวจวัดคุณภาพอากาศแบบเคลื่อนที่ทั้ง 9 หน่วย  
ครั้งที่ 2 : ตั้งแต่วันที่ 1 กรกฎาคม 2565 ถึงวันที่ 31 ตุลาคม 2565

## สถานีตรวจวัดฯบริเวณ อนามัยบ้านก้นหนอง

ใบสั่งซื้อ/ส่งจ้างเลขที่ 3100170564 Job No : JID2200310	 บริษัท เพทโร-อินสตรูเมนต์ จำกัด	
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### PETRO-INSTRUMENTS CORP.,LTD.

#### General Checking

Equipment :	AQMs Ban Konnong	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 6 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1800/18 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	>500 psi	1750/22 psi	

Note :

### PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Ban Konnong Station	E-mail address/Fax :	wirasak.k@irpc.co.th
Working Date :	01 July 2022	Working Hour :	5 Hours.

#### Service Report

##### Working Scope:

Service station AQMs.

##### Physical Checking:

- ตรวจเช็ค Data logger พบว่าทำงานได้ปกติ
- ตรวจเช็ค Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจเช็ค ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจเช็ค เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจเช็ค เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจเช็ค การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

##### Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

##### Part Replacement:

- Sample filter 47 mm. 3 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

##### Addition Recommended:

- Data logger พบว่าไม่สามารถใช้งานได้ จึงนำ Data logger ของสถานี BUS มาใช้งานแทนชั่วคราว
- ตรวจเช็คคัสกับเพลิงในสถานีพบว่า พบคัสอยู่การใช้งานแล้ว (แนะนำเปลี่ยนใหม่)

— End —

Serviced by :	จิโรส มุขโรจน์	Serviced Date :	01 July 2022
Approved by :		Approved Date :	01 July 2022

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### PETRO-INSTRUMENTS CORP.,LTD.

#### NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0926737614	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	0.9	1.1	ppb	
NO <sub>x</sub> reading	2.8	2.5	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. PPB	22.4	22.3	ppb	0 to 60
NO <sub>x</sub> BKG. PPB	21.6	21.7	ppb	0 to 60
NO COEF.	0.811	0.809	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	0.995	-	1.0 ± 0.3
NO COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>2</sub>	NO/NO <sub>x</sub>		NO/NO <sub>2</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	Off	Off	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-1069.3	-1069.3	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.2	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	36.1	36.8	°C	15°C to 45°C
Chamber	46.9	47.0	°C	45°C ± 2 °C
Cooler	-3.0	-2.9	°C	(-3)°C ± 2 °C
Converter	324.7	322.9	°C	325°C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	227.9	226.3	mmHg	250 ± 100 mmHg
Flow	0.827	0.826	L/min	0.5 to 1.00 L/min

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

SO <sub>2</sub> Analyzer				
Equipment :	Sulfur Dioxide analyzer.	Model :	43i	
Serial Number :	0926737611	Manufacturer :	Thermo Electron	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	1.2	0.2	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG PPB	20.3	20.9	ppb	0 to 60
SO <sub>2</sub> COEF	0.919	0.923	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-690.4	-690.4		
Flash Supply	889	889		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	35.9	36.4	°C	15°C to 45°C
Chamber	44.9	45.1	°C	45°C ± 2°C
Pressure	722.6	721.4	mmHg	750 ± 100 mmHg
Flow	0.528	0.528	L/min	0.5 to 1.00 L/min
Lamp intensity	91	91	%	40 – 100 %
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer				
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370	
Serial Number :	PRL3X300	Manufacturer :	Horiba	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH <sub>4</sub> reading	1.571	1.590	ppm	0-25 ppm
NMHC reading	0.103	0.045	ppm	0-25 ppm
THC reading	1.674	1.635	ppm	0-25 ppm
Analyzer reading				
CH <sub>4</sub> reading	1.571	1.590	ppm	0-25 ppm
NMHC reading	0.103	0.045	ppm	0-25 ppm
THC reading	1.674	1.635	ppm	0-25 ppm
Calibration Factors				
CH <sub>4</sub>				
Zero calibration coefficient	50	50	-	-3500 to 3500
Span calibration coefficient	1.0250	1.0250	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	100	100	-	-3500 to 3500
Span calibration coefficient	1.1580	1.1580	-	0.50000 to 2.00000
Analog Input				
Detector temp	42.5	42.7	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	77.8	77.7	kPa	80 kPa ± 4 kPa
Ambient	101.3	101.2	kPa	Current Atmospheric pressure
Purifier temp	417.9	418.1	°C	390-430 °C
Purifier pressure	12.4	12.5	kPa	8 kPa -25 kPa
NMC cutter temp	249.8	250.1	°C	230-260 °C
DC 24V	23.9	23.9	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

TEOM 1405						
Equipment :	PM2.5/PM coarse		Model :	1405		
Serial Number :	1405A22771403		Manufacturer :	Thermo		
Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m <sup>3</sup> )	11.73	8.68	12.02	-3.23	2.13	-1.11
Total mass (µg)	10.99	5.74	12.45	3.60	3.42	7.01
Filter Loading (0-100%)	48.81	20.22		48.98	20.74	
Frequency(150-400Hz)	264.2004	275.1041		264.2212	275.1137	
Noise (µg)	0.003	0.003		0.003	0.003	
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99					
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature(°C)	30.21			30.10		
Ambient pressure (ATM)	0.987			0.985		
Ambient dew point (°C)	27.02			26.84		
Ambient relative humidity (%)	78.66			78.63		
Cap temperature(°C)	40.00			40.00		
Case temperature(°C)	40.00			40.00		
PM2.5 air tube temp. (°C)	40.00			40.00		
PM Coarse tube temp. (°C)	40.00			40.00		
PM2.5 path flow rate(L/m)	3.00			3.00		
PM coarse path flow rate(L/m)	1.67			1.67		
By pass flow rate(L/m)	12.00			11.99		
Total flow(L/m)	16.69			16.68		
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

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**PETRO-INSTRUMENTS CORP.,LTD.**

SINGLE-POINT GAS CALIBRATION							
All analyzer.							
Equipment :	All analyzer.		Model :	42i, 43i , APHA-370			
Serial Number :	--		Manufacturer :	Thermo Electron,Horiba			
Standard gas concentration							
Sulfur Dioxide (SO <sub>2</sub> )	44.91	ppm	Manufacturer :	Thermo			
Nitric Oxide (NO)	44.83	ppm	Model :	146i			
Methane (CH <sub>4</sub> )	499.5	ppm	Serial number :	0926737588			
Carbon Monoxide (CO)	4526	ppm					
Cylinder NO. :	CC457501						
Expiration Date :	13 Aug 2023						
BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.60	0.60	400.00	400.00	0.00	Valid
NO <sub>x</sub> (ppb)	0.0	1.80	1.80	400.00	407.00	1.75	Valid
SO <sub>2</sub> (ppb)	0.0	1.40	1.40	400.00	397.00	-0.75	Valid
CH <sub>4</sub> (ppm)	0.0			4.000			
THC (ppm)	0.0			4.000			
AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.50	0.50	400.00	398.00	-0.50	Valid
NO <sub>x</sub> (ppb)	0.0	1.10	1.10	400.00	402.00	0.50	Valid
SO <sub>2</sub> (ppb)	0.0	1.20	1.20	400.00	401.00	0.25	Valid
CH <sub>4</sub> (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid
THC (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid
Note : Before calibration invalid because air condition fail.							

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
<b>Stations Techno IRPC</b> 	<b>Inside Station</b> 
<b>Lamp Sampling Box</b> 	<b>Replace Filter</b> 
<b>Gas H2</b> 	<b>Gas STD</b> 

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
<b>Replace Silica gel</b> 	<b>AQMs Log Sheet</b> 
<b>ถังดับเพลิง</b>  EXP :xx-xx-xxxx	<b>อุปกรณ์ทำความสะอาด</b> 
<b>Clean sampling set</b> 	

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Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Ban Konnong Station	E-mail address/Fax :	wirasak.k@irpc.co.th
Working Date :	18 July 2022	Working Hour :	5 Hours.

#### Service Report

##### Working Scope:

Service station AQMs.

##### Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

##### Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

##### Part Replacement:

- Sample filter 47 mm. 3 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

##### Addition Recommended:

- Data logger พบว่าไม่สามารถใช้งานได้ จึงนำ Data logger ของสถานี BUS มาใช้แทนทันที
- ตรวจสอบถังดับเพลิงในสถานีพบว่าหมดอายุการใช้งานแล้ว (แนะนำให้เปลี่ยนใหม่)

-- End --

Serviced by :	จิรุต ฐะโรจน์	Serviced Date :	18 July 2022
Approved by:		Approved Date :	18 July 2022

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#### General Checking

Equipment :	AQMs Ban Konnong	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 6 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1550/17 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	>500 psi	1750/20 psi	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

NO-NO <sub>2</sub> -NO <sub>x</sub> Analyzer				
Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.		Model :	42i
Serial Number :	0926737614		Manufacturer :	Thermo Electron
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	1.9	1.0	ppb	
NO <sub>x</sub> reading	8.0	4.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. PPB	22.3	22.2	ppb	0 to 60
NO <sub>x</sub> BKG. PPB	21.7	21.6	ppb	0 to 60
NO COEF.	0.809	0.803	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	0.995	0.995	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On		On/Off
Pressure Compensation	Off	Off		On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off		On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-1069.3	-1069.3	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.2	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	35.5	37.1	°C	15 °C to 45 °C
Chamber	46.9	46.9	°C	45 °C ± 2 °C
Cooler	-3.0	-3.0	°C	(-3) °C ± 2 °C
Converter	324.5	321.8	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	229.1	228.1	mmHg	250 ± 100 mmHg
Flow	0.828	0.828	L/min	0.5 to 1.00 L/min
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

SO <sub>2</sub> Analyzer				
Equipment :	Sulfur Dioxide analyzer.	Model :	43i	
Serial Number :	0926737611	Manufacturer :	Thermo Electron	
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	3.3	2.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG PPB	20.9	20.4	ppb	0 to 60
SO <sub>2</sub> COEF	0.923	0.918	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-690.4	-690.4		
Flash Supply	891	890		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	35.5	36.5	°C	15°C to 45°C
Chamber	45.0	45.3	°C	45°C ± 2°C
Pressure	726.2	725.1	mmHg	750 ± 100 mmHg
Flow	0.529	0.529	L/min	0.5 to 1.00 L/min
Lamp intensity	91	91	%	40 – 100 %
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer				
Equipment :	Total hydrocarbon analyzer.		Model :	APHA-370
Serial Number :	PRL3X300		Manufacturer :	Horiba
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.706	1.723	ppm	0-25 ppm
NMHC reading	0.137	0.020	ppm	0-25 ppm
THC reading	1.843	1.743	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.706	1.723	ppm	0-25 ppm
NMHC reading	0.137	0.020	ppm	0-25 ppm
THC reading	1.843	1.743	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	50	50	-	-3500 to 3500
Span calibration coefficient	1.0250	1.0250	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	100	100	-	-3500 to 3500
Span calibration coefficient	1.1580	1.1580	-	0.50000 to 2.00000
Analog Input				
Detector temp	42.5	43.1	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	78.2	78.2	kPa	80 kPa ± 4 kPa
Ambient	101.8	101.8	kPa	Current Atmospheric pressure
Purifier temp	418.0	418.3	°C	390-430 °C
Purifier pressure	12.4	12.3	kPa	8 kPa -25 kPa
NMC cutter temp	250.2	250.2	°C	230-260 °C
DC.24V	23.9	23.9	V.	24V ± 0.5 V
DC.5V	4.9	4.9	V.	5V ± 0.5 V
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

TEOM 1405						
Equipment :	PM2.5/PM coarse		Model :	1405		
Serial Number :	1405A227771403		Manufacturer :	Thermo		
Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)	9.81	5.18	14.99	14.78	8.93	16.56
Total mass (µg)	6.26	3.49	12.35	7.33	3.51	14.21
Filter Loading (0-100%)	50.24	20.42		51.14	20.55	
Frequency(150-400Hz)	264.1281	274.8798		264.2572	275.1137	
Noise (µg)	0.005	0.002		0.005	0.003	
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)	31.55			32.02		
Ambient pressure (ATM)	0.992			0.995		
Ambient dew point (°C)	26.89			27.02		
Ambient relative humidity (%)	72.59			73.43		
Cap temperature(°C)	40.00			40.00		
Case temperature(°C)	40.00			40.00		
PM2.5 air tube temp. (°C)	40.00			40.00		
PM Coarse tube temp. (°C)	40.00			40.00		
PM2.5 path flow rate(L/m)	3.00			3.00		
PM coarse path flow rate(L/m)	1.67			1.67		
By pass flow rate(L/m)	12.00			12.00		
Total flow(L/m)	16.67			16.67		
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

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PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION			
All analyzer.			
Equipment :	All analyzer.	Model :	42i, 43i , APHA-370
Serial Number :	---	Manufacturer :	Thermo Electron,Horiba
Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.91 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.83 ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.5 ppm	Serial number :	0926737588
Carbon Monoxide (CO)	4526 ppm		
Cylinder NO. :	CC457501		
Expiration Date :	13 Aug 2023		

BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	1.20	1.20	400.00	413.00	3.25	Valid
NO <sub>x</sub> (ppb)	0.0	1.00	1.00	400.00	419.00	4.75	Valid
SO <sub>2</sub> (ppb)	0.0	0.60	0.60	400.00	400.00	0.00	Valid
CH <sub>4</sub> (ppm)	0.0			4.000			
THC (ppm)	0.0			4.000			

AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.40	0.40	400.00	401.00	0.25	Valid
NO <sub>x</sub> (ppb)	0.0	1.00	1.00	400.00	403.00	0.75	Valid
SO <sub>2</sub> (ppb)	0.0	0.90	0.90	400.00	402.00	0.50	Valid
CH <sub>4</sub> (ppm)	0.0	0.01	0.01	4.000	3.990	-0.25	Valid
THC (ppm)	0.0	0.02	0.02	4.000	4.000	0.00	Valid

Note : Before calibration invalid because air condition fail.






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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Techno IRPC 	Inside Station 
Lamp Sampling Box 	Replace Filter 
Gas H2 	Gas STD 


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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Replace Silica gel 	AQMs Log Sheet 
ถังดับเพลิง 	อุปกรณ์ทำความสะอาด 
Clean sampling set 	

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PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Ban Konngong Station	E-mail address/Fax :	wirasak.k@irpc.co.th
Working Date :	02 August 2022	Working Hour :	5 Hours.
Service Report			
Working Scope:			
Service station AQMs.			
Physical Checking:			
<ul style="list-style-type: none"> <li>- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ</li> <li>- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ</li> <li>- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ</li> <li>- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ เครื่องวัดฝุ่น PM-10 &amp; PM-2.5 พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ</li> <li>- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ</li> <li>- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี</li> </ul>			
Correction working:			
Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.		
Replace sample filter 47 mm.	Drain water for pump of Zero Air.		
Part Replacement:			
Sample filter 47 mm.	3 ea.	(Part Support by IRPC)	
Silica gel.	P/N: 6998	1/2 Bottle.	(Part Support by IRPC)
Addition Recommended:			
<ul style="list-style-type: none"> <li>- Data logger พบว่าไม่สามารถใช้งานได้ จึงนำ Data logger ของสถานี BUS มาใช้งานแทนชั่วคราว</li> <li>- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว (แนะนำเปลี่ยนใหม่)</li> </ul>			
- End -			
Serviced by :	ชินโรส มุขโรจน์	Serviced Date :	02 August 2022
Approved by :		Approved Date :	02 August 2022

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**PETRO-INSTRUMENTS CORP.,LTD.**
**General Checking**

Equipment :	AQMs Ban Konhong	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 6 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1350/17 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	>500 psi	1700/20 psi	

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0926737611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.4	1.5	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG PPB	20.4	19.8	ppb	0 to 60
SO <sub>2</sub> COEF.	0.918	0.898	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltagess				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-690.4	-690.4		
Flash Supply	887	888		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	34.7	32.9	°C	15°C to 45°C
Chamber	45.2	45.1	°C	45°C ± 2°C
Pressure	727.3	727.6	mmHg	750 ± 100 mmHg
Flow	0.530	0.529	L/min	0.5 to 1.00 L/min
Lamp intensity	91	91	%	40 – 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0926737614	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	1.1	0.4	ppb	
NO <sub>x</sub> reading	2.5	2.6	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. PPB	22.1	23.6	ppb	0 to 60
NO <sub>x</sub> BKG. PPB	21.5	22.5	ppb	0 to 60
NO COEF.	0.803	0.842	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	0.995	0.995	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On	On/Off	On/Off
PMT Supply	On	On	On/Off	On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	Off	Off	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltagess				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-1070.4	-1070.4	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.2	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	35.2	33.4	°C	15°C to 45°C
Chamber	47.1	47.0	°C	45°C ± 2 °C
Cooler	-3.0	-3.0	°C	(-13)°C ± 2 °C
Converter	322.1	321.6	°C	325°C ± 5 °C
Converter Set	325.0	325.0	°C	325°C
Pressure	229.9	229.9	mmHg	250 ± 100 mmHg
Flow	0.824	0.821	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**THC Analyzer**

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	PRL3X300	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.770	1.784	ppm	0-25 ppm
NMHC reading	0.278	0.407	ppm	0-25 ppm
THC reading	2.048	2.191	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.770	1.784	ppm	0-25 ppm
NMHC reading	0.278	0.407	ppm	0-25 ppm
THC reading	2.048	2.191	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	50	50	-	-3500 to 3500
Span calibration coefficient	1.0250	1.0250	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	100	100	-	-3500 to 3500
Span calibration coefficient	1.1580	1.1580	-	0.50000 to 2.00000
Analog Input				
Detector temp	41.4	42.0	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	78.3	78.3	kPa	80 kPa ± 4 kPa
Ambient	102.0	101.9	kPa	Current Atmospheric pressure
Purifier temp	418.0	418.2	°C	390-430 °C
Purifier pressure	12.3	12.2	kPa	8 kPa -25 kPa
NMC cutter temp	249.6	249.8	°C	230-260 °C
DC.24V	23.9	23.9	V.	24V ± 0.5 V
DC.5V	4.9	4.9	V.	5V ± 0.5 V

**Note :**

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PETRO-INSTRUMENTS CORP.,LTD.

TEOM 1405

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)	2.60	5.03	7.63	-0.95	3.52	2.57
Total mass (µg)	1.96	4.99	6.95	2.12	5.01	7.13
Filter Loading (0-100%)	52.69	20.01		53.71	21.03	
Frequency(150-400Hz)	264.0523	274.4375		264.0531	274.4364	
Noise (µg)	0.004	0.002		0.004	0.001	
<b>System Status</b>						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)	27.61			28.14		
Ambient pressure (ATM)	0.992			0.993		
Ambient dew point (°C)	26.34			26.92		
Ambient relative humidity (%)	88.07			88.35		
Cap temperature(°C)	40.00			40.00		
Case temperature(°C)	40.00			40.00		
PM2.5 air tube temp. (°C)	40.00			40.00		
PM Coarse tube temp. (°C)	40.00			40.00		
PM2.5 path flow rate(L/m)	3.01			3.01		
PM coarse path flow rate(L/m)	1.67			1.67		
By pass flow rate(L/m)	12.03			12.00		
Total flow(L/m)	16.71			16.68		
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

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PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION

All analyzer.

Equipment :	All analyzer.	Model :	42i, 43i , APHA-370
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba

Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.91	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.83	ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.5	ppm	Serial number :	0926737588
Carbon Monoxide (CO)	4526	ppm		
Cylinder NO. :	CC457501			
Expiration Date :	13 Aug 2023			

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	1.20	1.20	400.00	389.00	(2.75)	Valid
NO <sub>x</sub> (ppb)	0.0	1.80	1.80	400.00	393.00	(1.75)	Valid
SO <sub>2</sub> (ppb)	0.0	0.80	0.80	400.00	399.00	-0.25	Valid
CH <sub>4</sub> (ppm)	0.0			4.000			
THC (ppm)	0.0			4.000			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	1.10	1.10	400.00	397.00	-0.75	Valid
NO <sub>x</sub> (ppb)	0.0	1.70	1.70	400.00	401.00	0.25	Valid
SO <sub>2</sub> (ppb)	0.0	0.90	0.90	400.00	403.00	0.75	Valid
CH <sub>4</sub> (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid
THC (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid

Note : Before calibration invalid because air condition fail.

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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Techno IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas H2



Gas STD



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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Replace Silica gel



AQMs Log Sheet



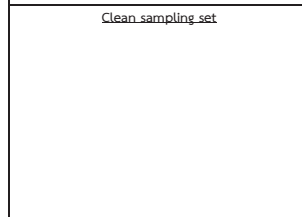
ถังดับเพลิง



EXP :xx-xx-xxxx

อุปกรณ์ทำความสะอาด

Clean sampling set



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**PETRO-INSTRUMENTS CORP.,LTD.**

Job Number :	JID2100311	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Ban Konnong Station	E-mail address/Fax :	wirasak.k@irpc.co.th
Working Date :	18 August 2022	Working Hour :	5 Hours.

**Service Report**
**Working Scope:**

Service station AQMs.

**Physical Checking:**

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่าปกติ
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่าทำงานได้ปกติ
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

**Correction working:**

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.
Clean sampling set.	


**Part Replacement:**

- Sample filter 47 mm. 3 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

**Addition Recommended:**

- Data logger พบว่าไม่สามารถใช้งานได้ จึงนำ Data logger ของสถานี BUS มาใช้งานแทนชั่วคราว
- ตรวจสอบเช็คถังเก็บเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว (แนะนำเปลี่ยนใหม่)

— End —

Serviced by :	จิโนรส มุกโรจน์	Serviced Date :	18 August 2022
Approved by:		Approved Date :	18 August 2022

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**PETRO-INSTRUMENTS CORP.,LTD.**
**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0926737614	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	2.1	3.1	ppb	
NO <sub>x</sub> reading	5.4	7.0	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. PPB	23.7	23.4	ppb	0 to 60
NO <sub>x</sub> BKG. PPB	22.6	22.8	ppb	0 to 60
NO COEF.	0.842	0.831	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	0.995	0.995	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On	On/Off	On
PMT Supply	On	On	On/Off	On
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>	NO/NO <sub>x</sub> , NO, NO <sub>x</sub>	
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	On/Off	On
Pressure Compensation	Off	Off	On/Off	On
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-1070.4	-1070.4	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.2	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	35.6	37.4	°C	15°C to 45°C
Chamber	46.2	46.9	°C	45°C ± 2°C
Cooler	-3.0	-3.0	°C	(-3)°C ± 2°C
Converter	324.7	326.0	°C	325°C ± 5°C
Converter Set	325.0	325.0	°C	325°C
Pressure	231.6	233.2	mmHg	250 ± 100 mmHg
Flow	0.814	0.815	L/min	0.5 to 1.00 L/min

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**General Checking**

Equipment :	AQMs Ban Konnong	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	On Mobile			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 6 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1100/17 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	>500 psi	1650/20 psi	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0926737611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	3.6	7.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG PPB	19.7	21.2	ppb	0 to 60
SO <sub>2</sub> COEF	0.898	0.938	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-690.4	-690.4		
Flash Supply	891	889		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	35.5	36.5	°C	15°C to 45°C
Chamber	45.2	44.9	°C	45°C ± 2°C
Pressure	725.1	723.9	mmHg	750 ± 100 mmHg
Flow	0.529	0.529	L/min	0.5 to 1.00 L/min
Lamp intensity	91	91	%	40 – 100 %

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer				
Equipment :	Total hydrocarbon analyzer.		Model :	APHA-370
Serial Number :	PRL3X300		Manufacturer :	Horiba
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.754	1.743	ppm	0-25 ppm
NMHC reading	0.223	0.326	ppm	0-25 ppm
THC reading	1.977	2.069	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.754	1.743	ppm	0-25 ppm
NMHC reading	0.223	0.326	ppm	0-25 ppm
THC reading	1.977	2.069	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	50	50	-	-3500 to 3500
Span calibration coefficient	1.0250	1.0250	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	100	100	-	-3500 to 3500
Span calibration coefficient	1.1580	1.1580	-	0.50000 to 2.00000
Analog Input				
Detector temp	42.3	42.6	°C	Ambient Temp +(5 ~ 15 °C)
Detector pressure	78.1	77.9	kPa	80 kPa ± 4 kPa
Ambient	101.7	101.6	kPa	Current Atmospheric pressure
Purifier temp	418.0	418.3	°C	390-430 °C
Purifier pressure	12.3	12.4	kPa	8 kPa -25 kPa
NMC cutter temp	250.2	250.1	°C	230-260 °C
DC 24V	23.9	23.9	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

TEOM 1405						
Equipment :	PM2.5/PM coarse		Model :	1405		
Serial Number :	1405A227771403		Manufacturer :	Thermo		
Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)	4.92	4.41	9.32	3.27	3.91	7.19
Total mass (µg)	5.30	4.85	10.15	5.05	4.68	9.73
Filter Loading (0-100%)	55.75	21.85		54.52	21.03	
Frequency(150-400Hz)	263.9901	273.7139		263.9891	273.7112	
Noise (µg)	0.003	0.003		0.004	0.003	
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature(°C)	30.80			30.75		
Ambient pressure (ATM)	0.990			0.989		
Ambient dew point (°C)	26.17			26.61		
Ambient relative humidity (%)	72.63			74.71		
Cap temperature(°C)	40.00			40.00		
Case temperature(°C)	40.00			40.00		
PM2.5 air tube temp. (°C)	40.00			40.00		
PM Coarse tube temp. (°C)	40.00			40.00		
PM2.5 path flow rate(L/m)	3.01			3.01		
PM coarse path flow rate(L/m)	1.68			1.67		
By pass flow rate(L/m)	12.02			12.02		
Total flow(L/m)	16.71			16.70		
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

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**PETRO-INSTRUMENTS CORP.,LTD.**

SINGLE-POINT GAS CALIBRATION			
All analyzer.			
Equipment :	All analyzer.	Model :	42i, 43i , APHA-370
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba
Standard gas concentration			Dilutor detail
Sulfur Dioxide (SO <sub>2</sub> )	44.91	ppm	Manufacturer : Thermo
Nitric Oxide (NO)	44.83	ppm	Model : 146i
Methane (CH <sub>4</sub> )	499.5	ppm	Serial number : 0926737588
Carbon Monoxide (CO)	4526	ppm	
Cylinder NO. :	CC457501		
Expiration Date :	13 Aug 2023		

**BEFORE CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.70	0.70	400.00	402.00	0.50	Valid
NO <sub>x</sub> (ppb)	0.0	2.10	2.10	400.00	406.00	1.50	Valid
SO <sub>2</sub> (ppb)	0.0	2.10	2.10	400.00	386.00	-3.50	Valid
CH4 (ppm)	0.0			4.000			
THC (ppm)	0.0			4.000			

**AFTER CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.80	0.80	400.00	398.00	-0.50	Valid
NO <sub>x</sub> (ppb)	0.0	1.80	1.80	400.00	402.00	0.50	Valid
SO <sub>2</sub> (ppb)	0.0	0.90	0.90	400.00	402.00	0.50	Valid
CH4 (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid
THC (ppm)	0.0	0.02	0.02	4.000	4.000	0.00	Valid






Note : Before calibration invalid because air condition fail.

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**PETRO-INSTRUMENTS CORP.,LTD.**

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Techno IRPC	Inside Station
	
Lamp Sampling Box	Replace Filter
	
Gas H2	Gas STD
	

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
<p>Replace Silica gel</p> 	<p>AQMs Log Sheet</p> 
<p>ถังดับเพลิง</p>  <p>EXP :xx-xx-xxxx</p>	<p>อุปกรณ์ทำความสะอาด</p> 
<p>Clean sampling set</p> 	

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 Website <http://www.pico.co.th> E-mail-address: [gshe@pico.co.th](mailto:gshe@pico.co.th)

Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Ban Konnong Station	E-mail address/Fax :	wirasak.k@irpc.co.th
Working Date :	01 September 2022	Working Hour :	5 Hours.

#### Service Report

Working Scope:

Service station AQMs.

#### Physical Checking:

- ตรวจเช็ค Data Logger(ของสถานี BUS นำมาใช้แทนเซ็นเซอร์) พบว่าทำงานได้ปกติ
- ตรวจเช็ค Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Reading of all analyzers และ Met sensor พบว่า WS Sensor มีอาการค่าตรวจวัดค้างบ่อย, Rain gauge และ SRAD Sensor ชั่วชุด
- ตรวจเช็ค ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Dilutor และ Zero Air พบว่า Zero Air ๓๕๐ Converter เสีย
- ตรวจเช็ค เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่า cooler ของ PM-Coarse ชั่วชุด ,FDMS Board สักวงจร ,RH/Temp sensor ชั่วชุด
- ตรวจเช็ค เครื่อง THC analyzer พบว่าทำงานได้ปกติ(ค่าการตรวจวัดผิดปกติ ร่อนานเครื่องกลับมาตรวจเช็คที่บริษัท)
- ตรวจเช็ค การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

#### Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.


#### Part Replacement:

- Sample filter 47 mm. 3 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

#### Addition Recommended:

- ตรวจเช็คถังดับเพลิงในสถานีพบว่า หมดยอายุการใช้งานแล้ว (แนะนำให้เปลี่ยนใหม่)

– End –

Serviced by :	ชินโรส มุกโรจน์	Serviced Date :	01 September 2022
Approved by :		Approved Date :	01 September 2022

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General Checking			
Equipment :	AQMs Ban Konnong	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 6 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	950/17 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	>500 psi	1700/20 psi	

Note :

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#### NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0926737614	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	2.4	2.5	ppb	
NO <sub>x</sub> reading	10.9	9.5	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. PPB	23.3	22.9	ppb	0 to 60
NO <sub>x</sub> BKG. PPB	22.7	22.3	ppb	0 to 60
NO COEF.	0.831	0.821	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	0.995	0.995	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>2</sub>	NO/NO <sub>x</sub>		NO/NO <sub>2</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	Off	Off	-	On/Off
Screen Contrast	40	40	✓	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-1070.0	-1070.0	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.2	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	34.0	32.7	°C	15 °C to 45 °C
Chamber	49.8	50.0	°C	45 °C ± 2 °C
Cooler	-3.0	-3.0	°C	(-3) °C ± 2 °C
Converter	325.3	323.4	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	232.7	231.6	mmHg	250 ± 100 mmHg
Flow	0.809	0.805	L/min	0.5 to 1.00 L/min

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

SO <sub>2</sub> Analyzer				
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	10.7	5.4	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG PPB	21.3	21.2	ppb	0 to 60
SO <sub>2</sub> COEF	0.938	0.930	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-690.4	-690.4		
Flash Supply	891	890		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	33.8	32.4	°C	15°C to 45°C
Chamber	45.2	44.8	°C	45°C ± 2°C
Pressure	725.4	724.8	mmHg	750 ± 100 mmHg
Flow	0.429	0.429	L/min	0.5 to 1.00 L/min
Lamp intensity	91	91	%	40 – 100 %

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer				
Equipment :	Total hydrocarbon analyzer.		Model :	APHA-370
Serial Number :	PRL3X300		Manufacturer :	Horiba
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.796	1.825	ppm	0-25 ppm
NMHC reading	0.290	0.425	ppm	0-25 ppm
THC reading	2.086	2.250	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.796	1.825	ppm	0-25 ppm
NMHC reading	0.290	0.425	ppm	0-25 ppm
THC reading	2.086	2.250	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	50	50	-	-3500 to 3500
Span calibration coefficient	1.0250	1.0250	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	100	100	-	-3500 to 3500
Span calibration coefficient	1.1580	1.1580	-	0.50000 to 2.00000
Analog Input				
Detector temp	40.4	40.0	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	78.0	77.9	kPa	80 kPa ± 4 kPa
Ambient	101.7	101.5	kPa	Current Atmospheric pressure
Purifier temp	418.2	417.9	°C	390-430 °C
Purifier pressure	12.2	12.2	kPa	8 kPa - 25 kPa
NMC cutter temp	250.3	249.9	°C	230-260 °C
DC 24V	23.9	23.9	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

TEOM 1405						
Equipment : PM2.5/PM coarse						
Serial Number : 1405A227771403						
Model : 1405						
Manufacturer : Thermo						
Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m <sup>3</sup> )	2.96	4.09	7.06	8.57	4.63	13.19
Total mass (µg)	7.14	7.34	14.48	7.14	7.34	14.48
Filter Loading (0-100%)	56.57	21.65		57.79	22.26	
Frequency(150-400Hz)	263.9222	273.0247		263.9233	273.0244	
Noise (µg)	0.003	0.003		0.003	0.002	
System Status	Fully Operational			Fully Operational		
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature(°C)	30.46			31.51		
Ambient pressure (ATM)	0.988			0.987		
Ambient dew point (°C)	27.83			27.67		
Ambient relative humidity (%)	81.61			76.21		
Cap temperature(°C)	40.00			40.00		
Case temperature(°C)	40.00			40.00		
PM2.5 air tube temp. (°C)	40.00			40.00		
PM Coarse tube temp. (°C)	40.00			40.00		
PM2.5 path flow rate(L/m)	3.00			3.00		
PM coarse path flow rate(L/m)	1.67			1.67		
By pass flow rate(L/m)	11.99			12.01		
Total flow(L/m)	16.66			16.68		
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

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**PETRO-INSTRUMENTS CORP.,LTD.**

SINGLE-POINT GAS CALIBRATION				
All analyzer.				
Equipment :	All analyzer.		Model :	42i, 43i , APHA-370
Serial Number :	--		Manufacturer :	Thermo Electron,Horiba
Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.91	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.83	ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.5	ppm	Serial number :	0926737588
Carbon Monoxide (CO)	4526	ppm		
Cylinder NO. :	CC457501			
Expiration Date :	13 Aug 2023			

**BEFORE CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	2.50	2.50	400.00	418.00	4.50	Valid
NO <sub>x</sub> (ppb)	0.0	3.00	3.00	400.00	422.00	5.50	Valid
SO <sub>2</sub> (ppb)	0.0	0.40	0.40	400.00	393.00	-1.75	Valid
CH <sub>4</sub> (ppm)	0.0			4.000			
THC (ppm)	0.0			4.000			

**AFTER CALIBRATION RESULT**






PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.70	0.70	400.00	401.00	0.25	Valid
NO <sub>x</sub> (ppb)	0.0	0.90	0.90	400.00	403.00	0.75	Valid
SO <sub>2</sub> (ppb)	0.0	1.00	1.00	400.00	401.00	0.25	Valid
CH <sub>4</sub> (ppm)	0.0	0.01	0.01	4.000	3.990	-0.25	Valid
THC (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid

Note : Before calibration invalid because air condition fail.

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Techno IRPC 	Inside Station 
Lamp Sampling Box 	Replace Filter 
Gas H2 	Gas STD 

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Replace Silica gel 	AQMs Log Sheet 
ถังดับเพลิง  EXP :xx-xx-xxxx	อุปกรณ์ทำความสะอาด 
Clean sampling set 	

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Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Ban Konnong Station	E-mail address/Fax :	wirasak.k@irpc.co.th
Working Date :	16 September 2022	Working Hour :	5 Hours.

#### Service Report

##### Working Scope:

Service station AQMs.

##### Physical Checking:

- ตรวจสอบ Data logger (ของสถานี BUS นำมาใช้แทนหน่วยตรวจ) พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่า WS Sensor มีอาการค่าตรวจวัดค้างบ่อย, Rain gauge และ SRAD Sensor ช้าสุด
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่า Zero Air เติบ Converter เสีย
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่า cooler ของ PM-Coarse ช้าสุด, FDMS Board สักดวงจาง, RH/Temp sensor ช้าสุด
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ (ค่าการตรวจวัดผิดปกติ รอนานเครื่องสั่นมาตรวจเช็คที่บริษัท)
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

##### Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

##### Part Replacement:

- Sample filter 47 mm. 3 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

##### Addition Recommended:

- Data logger พบว่าไม่สามารถใช้งานได้ จึงนำ Data logger ของสถานี BUS มาใช้แทนหน่วยตรวจ
- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว (และนำไปเปลี่ยนใหม่)

-- End --

Serviced by :	ชินรุต มุขโจน	Serviced Date :	16 September 2022
Approved by:		Approved Date :	16 September 2022

7/409 Soi Vibhavadi-Rangsit 36, Vibhavadi-Rangsit Rd., Chatuchak, Bangkok 10900, Thailand  
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#### General Checking

Equipment :	AQMs Ban Konnong	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 6 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	800/17 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	>500 psi	1700/20 psi	

Note :

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**PETRO-INSTRUMENTS CORP.,LTD.**

NO-NO <sub>2</sub> -NO <sub>x</sub> Analyzer			
Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0926737614	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	1.8	1.9	ppb	
NO <sub>x</sub> reading	2.5	2.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. PPB	23.1	23.1	ppb	0 to 60
NO <sub>x</sub> BKG. PPB	22.5	22.8	ppb	0 to 60
NO COEF.	0.821	0.825	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	0.995	0.995	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On	On/Off	
PMT Supply	On	On	On/Off	
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>	NO/NO <sub>x</sub> , NO, NO <sub>x</sub>	
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	Off	Off	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics				
Voltagess				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-1070.0	-1070.0	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.2	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	35.8	34.4	°C	15°C to 45°C
Chamber	50.2	50.2	°C	45°C ± 2 °C
Cooler	-2.9	-3.0	°C	(-13)°C ± 2 °C
Converter	324.7	323.9	°C	325°C ± 5 °C
Converter Set	325.0	325.0	°C	325°C
Pressure	235.2	234.4	mmHg	250 ± 100 mmHg
Flow	0.809	0.807	L/min	0.5 to 1.00 L/min
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

SO <sub>2</sub> Analyzer			
Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0926737611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.7	1.6	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG PPB	21.0	20.8	ppb	0 to 60
SO <sub>2</sub> COEF	0.930	0.928	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics				
Voltagess				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-690.4	-690.4		
Flash Supply	889	888		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	35.3	34.0	°C	15°C to 45°C
Chamber	44.9	44.8	°C	45°C ± 2 °C
Pressure	727.1	726.6	mmHg	750 ± 100 mmHg
Flow	0.429	0.429	L/min	0.5 to 1.00 L/min
Lamp intensity	91	91	%	40 – 100 %
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer			
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	PRL3X300	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.746	1.743	ppm	0-25 ppm
NMHC reading	0.155	0.296	ppm	0-25 ppm
THC reading	1.901	2.039	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.746	1.743	ppm	0-25 ppm
NMHC reading	0.155	0.296	ppm	0-25 ppm
THC reading	1.901	2.039	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	50	50	-	-3500 to 3500
Span calibration coefficient	1.0250	1.0250	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	100	100	-	-3500 to 3500
Span calibration coefficient	1.1580	1.1580	-	0.50000 to 2.00000
Analog Input				
Detector temp	41.5	40.8	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	78.2	78.1	kPa	80 kPa ± 4 kPa
Ambient	101.9	101.8	kPa	Current Atmospheric pressure
Purifier temp	418.0	418.2	°C	390-430 °C
Purifier pressure	12.4	12.3	kPa	8 kPa -25 kPa
NMC cutter temp	249.8	250.3	°C	230-260 °C
DC.24V	23.9	23.9	V.	24V ± 0.5 V
DC.5V	4.9	4.9	V.	5V ± 0.5 V
Note :				

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**PETRO-INSTRUMENTS CORP.,LTD.**

TEOM 1405			
Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)	-0.86	6.36	5.50	8.06	3.76	12.82
Total mass (µg)	6.79	8.02	14.81	6.63	7.91	14.55
Filter Loading (0-100%)	61.47	23.28		58.63	22.87	
Frequency(150-400Hz)	263.8448	272.3221		263.8439	272.3205	
Noise (µg)	0.004	0.003		0.002	0.002	
System Status	Fully Operational			Fully Operational		
Operating mode	AK protocol			AK protocol		
RS232 mode	0.99			0.99		
Vacuum pump pressure(ATM)	Unlocked			Unlocked		
Protection level	192.168.1.101			192.168.1.101		
IP address	1.57			1.57		
Instrument firmware version						
Ambient temperature (°C)	-274.09			-274.09		
Ambient pressure (ATM)	0.991			0.990		
Ambient dew point (°C)	-273.15			-273.15		
Ambient relative humidity (%)	0.17			0.17		
Cap temperature(°C)	40.00			40.00		
Case temperature(°C)	40.00			40.00		
PM2.5 air tube temp. (°C)	40.00			40.00		
PM Coarse tube temp. (°C)	40.00			40.00		
PM2.5 path flow rate(L/m)	3.00			3.00		
PM coarse path flow rate(L/m)	1.67			1.67		
By pass flow rate(L/m)	12.00			11.98		
Total flow(L/m)	16.67			16.65		
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

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PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION			
All analyzer.			
Equipment :	All analyzer.	Model :	42i, 43i , APHA-370
Serial Number :	---	Manufacturer :	Thermo Electron,Horiba
Standard gas concentration		Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.91 ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.83 ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.5 ppm	Serial number :	0926737588
Carbon Monoxide (CO)	4526 ppm		
Cylinder NO. :	CC457501		
Expiration Date :	13 Aug 2023		

BEFORE CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.90	0.90	400.00	402.00	0.50	Valid
NO <sub>x</sub> (ppb)	0.0	2.10	2.10	400.00	408.00	2.00	Valid
SO <sub>2</sub> (ppb)	0.0	0.20	0.20	400.00	394.00	-1.50	Valid
CH <sub>4</sub> (ppm)	0.0			4.000			
THC (ppm)	0.0			4.000			

AFTER CALIBRATION RESULT							
PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.60	0.60	400.00	399.00	-0.25	Valid
NO <sub>x</sub> (ppb)	0.0	1.80	1.80	400.00	401.00	0.25	Valid
SO <sub>2</sub> (ppb)	0.0	0.70	0.70	400.00	400.00	0.00	Valid
CH <sub>4</sub> (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid
THC (ppm)	0.0	0.02	0.02	4.000	4.000	0.00	Valid

Note : Before calibration invalid because air condition fail.






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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
<b>Stations Techno IRPC</b> 	<b>Inside Station</b> 
<b>Lamp Sampling Box</b> 	<b>Replace Filter</b> 
<b>Gas H2</b> 	<b>Gas STD</b> 

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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
<b>Replace Silica gel</b> 	<b>AQMs Log Sheet</b> 
<b>ถังดับเพลิง</b>  <p>EXP :xx-xx-xxxx</p>	<b>อุปกรณ์หัวความสะอาด</b> 
<b>Clean sampling set</b> 	

PETRO-INSTRUMENTS CORP.,LTD.

Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Ban Konngong Station	E-mail address/Fax :	wirasak.k@irpc.co.th
Working Date :	03 October 2022	Working Hour :	5 Hours.

Service Report

Working Scope:

Service station AQMs.

Physical Checking:

- ตรวจสอบ Data logger(ของสถานี BUS นำมาใช้แทนเซ็นเซอร์) พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่า WS Sensor มีอาการค่าตรวจวัดจั้งบ่อย, Rain guage และ SRAD Sensor ชั่วครู่
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่า Zero Air ภาา Converter เสีย
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่า cooler ของ PM-Coarse ชั่วครู่ ,FDMS Board สักดวง ,RH/Temp sensor ชั่วครู่
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ(ทำการตรวจวัดผิดปกติ รอนำเครื่องกลับมาตรวจเช็คที่บริษัท)
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacement:

- Sample filter 47 mm. 3 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว (แนะนำให้เปลี่ยนใหม่)

— End —

Serviced by :	ชิวโรส มุทโธจน์	Serviced Date :	03 October 2022
Approved by :		Approved Date :	03 October 2022

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PETRO-INSTRUMENTS CORP.,LTD.

General Checking			
Equipment :	AQMs Ban Konhong	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	On Mobile			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 6 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	600/17 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	>500 psi	1650/20 psi	

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

SO <sub>2</sub> Analyzer			
Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0926737611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	1.9	2.2	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
SO <sub>2</sub> BKG PPB	20.8	20.2	ppb	0 to 60
SO <sub>2</sub> COEF	0.928	0.914	-	1.0 ± 0.3
Instrument Controls				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
Communication setting				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
Diagnostics Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
Interface board voltages:				
PMT Supply	-690.8	-690.8		
Flash Supply	891	890		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 +/- 1 Vdc
Temperatures				
Internal	34.3	34.1	°C	15°C to 45°C
Chamber	44.8	45.1	°C	45°C ± 2°C
Pressure	725.7	725.1	mmHg	750 ± 100 mmHg
Flow	0.429	0.429	L/min	0.5 to 1.00 L/min
Lamp intensity	90	91	%	40 – 100 %

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

NO-NO <sub>2</sub> -NO <sub>x</sub> Analyzer			
Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0926737614	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	0.7	1.2	ppb	
NO <sub>x</sub> reading	3.3	2.8	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. PPB	23.1	21.6	ppb	0 to 60
NO <sub>x</sub> BKG. PPB	22.8	21.2	ppb	0 to 60
NO COEF.	0.825	0.782	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	0.995	0.995	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
Instrument Controls				
Ozonator	On	On		On/Off
PMT Supply	On	On		On/Off
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>		NO/NO <sub>x</sub> , NO, NO <sub>x</sub>
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	-	On/Off
Pressure Compensation	Off	Off	-	On/Off
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	-	On/Off, Up to used
Diagnostics Voltages				
Motherboard voltages:				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
Interface board voltages:				
PMT Supply	-1070.0	-1070.0	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.2	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	34.5	34.5	°C	15°C to 45°C
Chamber	50.2	50.2	°C	45°C ± 2 °C
Cooler	-2.9	-3.0	°C	(-13)°C ± 2 °C
Converter	322.9	326.6	°C	325°C ± 5 °C
Converter Set	325.0	325.0	°C	325°C
Pressure	235.2	235.5	mmHg	250 ± 100 mmHg
Flow	0.799	0.804	L/min	0.5 to 1.00 L/min

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

THC Analyzer			
Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	PRL3X300	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.771	1.751	ppm	0-25 ppm
NMHC reading	0.323	0.331	ppm	0-25 ppm
THC reading	2.094	2.082	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.771	1.751	ppm	0-25 ppm
NMHC reading	0.323	0.331	ppm	0-25 ppm
THC reading	2.094	2.082	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	50	50	-	-3500 to 3500
Span calibration coefficient	1.0250	1.0250	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	130	130	-	-3500 to 3500
Span calibration coefficient	1.1580	1.1580	-	0.50000 to 2.00000
Analog Input				
Detector temp	40.7	41.0	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	77.9	77.9	kPa	80 kPa ± 4 kPa
Ambient	101.7	101.6	kPa	Current Atmospheric pressure
Purifier temp	417.9	417.9	°C	390-430 °C
Purifier pressure	12.3	12.3	kPa	8 kPa -25 kPa
NMC cutter temp	250.2	250.3	°C	230-260 °C
DC.24V	23.9	23.9	V.	24V ± 0.5 V
DC.5V	4.9	4.9	V.	5V ± 0.5 V

Note : ค่าการตรวจวัดผิดปกติ รอกการนำเครื่องกลับมาตรวจเช็คที่บริษัท

Note :

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PETRO-INSTRUMENTS CORP.,LTD.

TEOM 1405

Equipment :	PM2.5/PM coarse	Model :	1405
Serial Number :	1405A227771403	Manufacturer :	Thermo

Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)	-3.49	5.90	2.41	22.85	-1.68	21.17
Total mass (µg)	5.35	6.06	11.41	5.99	5.88	11.67
Filter Loading (0-100%)	64.53	25.12		63.31	24.30	
Frequency(150-400Hz)	263.7597	271.5483		263.7586	271.5467	
Noise (µg)	0.006	0.002		0.004	0.002	
<b>System Status</b>						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)	-274.09			-274.09		
Ambient pressure (ATM)	0.989			0.989		
Ambient dew point (°C)	-273.15			-273.15		
Ambient relative humidity (%)	0.17			0.17		
Cap temperature(°C)	40.00			40.00		
Case temperature(°C)	40.00			40.00		
PM2.5 air tube temp. (°C)	40.00			40.00		
PM Coarse tube temp. (°C)	40.00			40.00		
PM2.5 path flow rate(L/m)	2.99			3.00		
PM coarse path flow rate(L/m)	1.67			1.67		
By pass flow rate(L/m)	11.98			12.01		
Total flow(L/m)	16.64			16.68		
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

Note : cooler ของ PM-Coarse ขำรุ้ด ,FDMS Board ถัดจวจร ,RH/Temp sensor ขำรุ้ด

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PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION

All analyzer.

Equipment :	All analyzer.	Model :	42i, 43i , APHA-370
Serial Number :	--	Manufacturer :	Thermo Electron,Horiba

Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.91	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.83	ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.5	ppm	Serial number :	0926737588
Carbon Monoxide (CO)	4526	ppm		
Cylinder NO. :	CC457501			
Expiration Date :	13 Aug 2023			

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.20	0.20	400.00	425.00	6.25	Valid
NO <sub>x</sub> (ppb)	0.0	0.90	0.90	400.00	430.00	7.50	Valid
SO <sub>2</sub> (ppb)	0.0	1.20	1.20	400.00	387.00	-3.25	Valid
CH <sub>4</sub> (ppm)	0.0			4.000			
THC (ppm)	0.0			4.000			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.90	0.90	400.00	400.00	0.00	Valid
NO <sub>x</sub> (ppb)	0.0	1.20	1.20	400.00	402.00	0.50	Valid
SO <sub>2</sub> (ppb)	0.0	0.70	0.70	400.00	404.00	1.00	Valid
CH <sub>4</sub> (ppm)	0.0	0.01	0.01	4.000	3.980	-0.50	Valid
THC (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid

Note : Before calibration invalid because air condition fail.

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PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Techno IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas H2



Gas STD



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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Replace Silica gel



AQMs Log Sheet



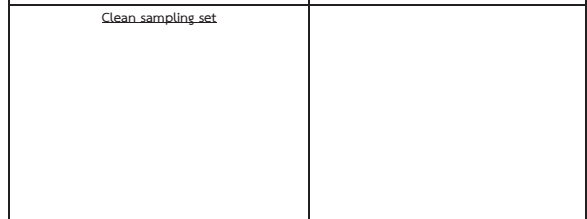
ถังดับเพลิง



EXP :xx-xx-xxxx

อุปกรณ์ทำความสะอาด

Clean sampling set



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### SERVICE REPORT

Job No./เลขที่ของงาน :	JID2100311	Customer name/ ชื่อลูกค้า :	IRPC
Equipment /อุปกรณ์ :	AQMs station	Station name/ชื่อสถานี :	Konnong
Manufacturer/ผู้ผลิต :	-	Location/สถานที่ :	Rayong
Model /รุ่น :	-	Contact name/ชื่อผู้ติดต่อ :	K. Wirasak Khumsuk
Serial No./เลขหมายประจำเครื่อง :	-	Telephone /โทรศัพท์ :	081-803-0475
Working date/วันที่ปฏิบัติงาน :	07 October 2022	E-Mail.	wirasak.k@irpc.co.th
Working Hour/ชั่วโมงทำงาน :	12 Hr.	Mileage/ระยะทาง :	300 Km.

SCOPE OF WORK (ขอบเขตของงาน)	<input type="checkbox"/> Service <input checked="" type="checkbox"/> Urgent: CM Konnong station <input type="checkbox"/> Other
---------------------------------	--

### FUNCTION CHECK & CORRECT ACTION

(ตรวจสอบการทำงานและกรณแก้ไข)

- Data Logger ทำงานปกติ
- Zero Air เตา Converter เสร็จ
- Calibrator ทำงานปกติ
- SO2 Analyzer ทำงานปกติ
- NOx Analyzer ทำงานปกติ
- PM-10 & PM-2.5 Analyzer THERMO TEOM1405 DF ตรวจเช็คพบ
- Cooler ของ PM-Coarse ชำรุด



- FDMS Board สวิตจอร์ ไม่สามารถจ่ายแรงดัน 12 VDC ได้



- RH/TEMP Sensor ชำรุด



- ทำการเปลี่ยนอะไหล่ดังนี้

1. TEOM Cooler = 1 ea.
2. FDMS Board = 1 ea.
3. RH/TEMP Sensor = 1 ea.

- หลังการเปลี่ยนอะไหล่ ทดสอบการทำงานของเครื่อง พบว่าเครื่องทำงานปกติ

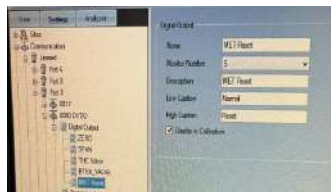
TEOM Data				
System Status	TEOM Data	PM 2.5	PM Coarse	PM 10
MC (µg/m³)	0.00	0.00	0.00	0.00
1-Hr MC (µg/m³)	0.00	0.00	0.00	0.00
8-Hr MC (µg/m³)	0.00	0.00	0.00	0.00
12-Hr MC (µg/m³)	0.00	0.00	0.00	0.00
24-Hr MC (µg/m³)	0.00	0.00	0.00	0.00
Settings	Filter loading: 20.01 %	20.01 %	9.38 %	
	Frequency: 140.000 Hz	140.000 Hz	140.000 Hz	
Service	Notes	Notes	Notes	
Fully operational Normal status 10/07/2022 10:04				

- HC Analyzer ค่าการตรวจวัดผิดปกติ รอการนำเครื่องกลับมาตรวจเช็คที่บริษัทฯ

- GAS H2 Pressure ในถังโกลนด์ เหลือ Pressure ประมาณ 400 PSI



- WS Sensor
- ตรวจเช็คข้อมูลของ WS พบว่า Sensor มีการค่าตรวจวัดค้างบ่อยครั้ง ทำการแก้ไขโดยการติดตั้งชุด Relay สำหรับ Reset ไฟเลี้ยงของ Sensor เพื่อทำการ Auto power reset ในกรณีที่ค่าการตรวจวัดของ Sensor ค้าง



- WD Sensor ทำงานปกติ
- TEMP Sensor ทำงานปกติ
- RH Sensor ทำงานปกติ
- BP Sensor ทำงานปกติ
- RAIN GUAGE ชำรุด
- SRAD Sensor ชำรุด

### PART REPLACEMENT

(รายการเปลี่ยนอะไหล่)

#### รายการเปลี่ยนอะไหล่

1. Conditioner Assembly (Part PICO) P/N: 56-009871 = 1 EA.
2. FDMS Controller Board (Part PICO) P/N: 50-010448 = 1 EA.
3. Temp/Humidity Sensor (Part IRPC) P/N: 51-010792 = 1 EA.
4. Relay 12 VDC = 1 EA.

### RECOMMENDATION

(คำแนะนำ)

- ควรเปลี่ยนอะไหล่และอุปกรณ์ ดังนี้

1. RAIN GUAGE = 1 set.
2. SRAD Sensor = 1 set.
3. CONVERTER ASSEMBLY (Zero air) P/N: 8186-01 = 1 set.

Action By :	Mr. Narongchai Junsommit	PICO	Date :	07 October 2022
Customer Approve By :		IRPC	Approve Date :	
Approved By :		PICO	Approved Date :	

**PETRO-INSTRUMENTS CORP.,LTD.**

Job Number :	JID2200310	Customer Name :	IRPC
Equipment :	AQMs Station.	Contact Name :	Khun Wirasak Khumsuk
Model :	AQMs Station.	Telephone Number :	081-803-0475
Serial Number :	Ban Konnong Station	E-mail address/Fax :	wirasak.k@irpc.co.th
Working Date :	18 October 2022	Working Hour :	5 Hours.

**Service Report**
**Working Scope:**

Service station AQMs.

**Physical Checking:**

- ตรวจสอบ Data logger(ของสถานี) BUS นำมาใช้งานแทนชั่วคราว) พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่า WS Sensor มีอาการค่าตรวจวัดคั้งบ้อย, Rain guage และ SRAD Sensor ชั่วครู่
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่า Zero Air เตา Converter เสีย
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 & PM-2.5 พบว่า cooler ของ PM-Coarse ชั่วครู่ ,FDMS Board สักดวงจวร ,RH/Temp sensor ชั่วครู่
- ตรวจสอบ เครื่อง THC analyzer พบว่าทำงานได้ปกติ(ทำการตรวจวัดผิดปกติ ร่อนน้ำเครื่องเกินมาตรฐานตรวจเช็คทั้งบริษัท)
- ตรวจสอบ การทำงานของระบบไฟฟ้า และ UPS พบว่าทำงานได้ปกติ
- ทำความสะอาดภายในสถานี และ บริเวณรอบสถานี

**Correction working:**

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO <sub>x</sub> Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

**Part Replacement:**

- Sample filter 47 mm. 3 ea. (Part Support by IRPC)
- Silica gel. P/N# 6998 1/2 Bottle. (Part Support by IRPC)

**Addition Recommended:**

- ตรวจสอบระดับเบ็งในสถานีพบว่า หมดอายุการใช้งานแล้ว (แนะนำให้เปลี่ยนใหม่)

— End —

Serviced by :	ชินโรส มุขโรจน์	Serviced Date :	18 October 2022
Approved by:		Approved Date :	18 October 2022

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**PETRO-INSTRUMENTS CORP.,LTD.**
**General Checking**

Equipment :	AQMs Ban Konnong	Model :	-
Serial Number :	-	Manufacturer :	-

Item	Description	Set-Point Value	Status & Value	Remark
	<b>On Mobile</b>			
1	Air conditioner operation	OK	OK	
2	Station temperature	25-27 °C	25-27 °C	
3	Lighting system	OK	OK	
4	Lamp in sampling box	OK	OK	
5	Sampling probe	Clean	Clean	
6	Blower	OK	OK	
7	Drain liquid in tank	Drain	Drain	
8	Compressor tank set pressure	80 psi	80 psi	
9	Zero air compressor operation	OK	OK	
10	Silica gel for dry air of NO <sub>x</sub> analyzer	OK	OK	
11	UPS 6 KVA	OK	OK	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	350/17 psi	
16	Standard gas#1 (NO,SO <sub>2</sub> ,HC,CO)	>500 psi	1650/20 psi	

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**NO-NO<sub>2</sub>-NO<sub>x</sub> Analyzer**

Equipment :	NO-NO <sub>2</sub> -NO <sub>x</sub> analyzer.	Model :	42i
Serial Number :	0926737614	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
<b>Sample reading</b>				
NO reading	0.3	0.8	ppb	
NO <sub>x</sub> reading	2.1	2.4	ppb	
<b>Range</b>	500	500	ppb	50 to 1000 ppb
<b>Averaging Time</b>	30	30	Sec	10 to 300 Sec
<b>Calibration Factors</b>				
NO BKG. PPB	24.3	26.9	ppb	0 to 60
NO <sub>x</sub> BKG. PPB	24.4	26.6	ppb	0 to 60
NO COEF.	0.875	0.961	-	1.0 ± 0.3
NO <sub>x</sub> COEF.	1.010	1.006	-	1.0 ± 0.3
NO <sub>2</sub> COEF.	1.000	1.000	-	1.0 ± 0.3
<b>Instrument Controls</b>				
Ozonator	On	On	On/Off	On
PMT Supply	On	On	On/Off	On
Auto/Manual Mode	NO/NO <sub>x</sub>	NO/NO <sub>x</sub>	NO/NO <sub>x</sub> , NO, NO <sub>x</sub>	
Baud Rate	9600	9600	bps	1200 to 9600
Temp Compensation	On	On	On/Off	On
Pressure Compensation	Off	Off	On/Off	On
Screen Contrast	40	40	%	0 to 100
Service Mode	Off	Off	On/Off, Up to used	
<b>Diagnostics Voltages</b>				
<b>Motherboard voltages:</b>				
3.3 Supply	3.3	3.3	Vdc	3.3 ± 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 1 Vdc
-3.3 Supply	-3.2	-3.2	Vdc	-3.3 ± 1 Vdc
<b>Interface board voltages:</b>				
PMT Supply	-1069.7	-1069.7	Vdc	-400 to -1200 Vdc
3.3 Supply	3.3	3.2	Vdc	3.3 ± 1 Vdc
5.0 Supply	4.9	4.9	Vdc	5.0 ± 1 Vdc
15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
P15.0 Supply	14.9	14.9	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.8	23.8	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
<b>Temperatures</b>				
Internal	36.8	38.0	°C	15°C to 45°C
Chamber	49.9	50.1	°C	45°C ± 2 °C
Cooler	-3.0	-3.0	°C	(-3)°C ± 2 °C
Converter	326.8	322.9	°C	325°C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
<b>Pressure</b>	238.3	237.2	mmHg	250 ± 100 mmHg
<b>Flow</b>	0.807	0.804	L/min	0.5 to 1.00 L/min

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**
**SO<sub>2</sub> Analyzer**

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	0926737611	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
<b>Sample reading</b>	0.3	1.3	ppb	
<b>Range</b>	500	500	ppb	50 to 1000 ppb
<b>Averaging Time</b>	30	30	Sec	10 to 300 Sec
<b>Calibration Factors</b>				
SO <sub>2</sub> BKG PPB	22.2	19.4	ppb	0 to 60
SO <sub>2</sub> COEF	0.950	0.865	-	1.0 ± 0.3
<b>Instrument Controls</b>				
Temp Correction	On	On	On/Off	On
Pressure Correction	On	On	On/Off	On
Flash Lamp	On	On	On/Off	On
<b>Communication setting</b>				
Baud Rate	9600	9600	bps	9600 to 115000
Instrument ID	43	43	-	0 to 99
Screen Brightness	50	50	%	0 to 100
Service Mode	Off	Off	On/Off	Up to used
<b>Diagnostics Voltages</b>				
<b>Motherboard voltages:</b>				
3.3 Supply	3.3	3.3	Vdc	3.3 +/- 1 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 +/- 1 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 +/- 1 Vdc
-3.3 Supply	-3.1	-3.1	Vdc	- 3.3 +/- 1 Vdc
<b>Interface board voltages:</b>				
PMT Supply	-690.4	-690.4		
Flash Supply	892	891		
3.3 Supply	3.2	3.2	Vdc	3.3 +/- 1 Vd
5.0 Supply	5.0	5.0	Vdc	5.0 +/- 1 Vdc
15.0 Supply	14.7	14.7	Vdc	15.0 +/- 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 +/- 1 Vdc
24.0 Supply	23.4	23.4	Vdc	24.0 +/- 1 Vdc
<b>Temperatures</b>				
Internal	36.9	37.7	°C	15°C to 45°C
Chamber	45.2	45.2	°C	45°C ± 2°C
<b>Pressure</b>	727.9	727.3	mmHg	750 ± 100 mmHg
<b>Flow</b>	0.430	0.431	L/min	0.5 to 1.00 L/min
<b>Lamp intensity</b>	91	91	%	40 – 100 %

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

THC Analyzer				
Equipment :	Total hydrocarbon analyzer.		Model :	APHA-370
Serial Number :	PRL3X300		Manufacturer :	Horiba
Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	1.971	1.977	ppm	0-25 ppm
NMHC reading	0.071	0.047	ppm	0-25 ppm
THC reading	2.042	2.024	ppm	0-25 ppm
Analyzer reading				
CH4 reading	1.971	1.977	ppm	0-25 ppm
NMHC reading	0.071	0.047	ppm	0-25 ppm
THC reading	2.042	2.024	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	50	50	-	-3500 to 3500
Span calibration coefficient	1.0250	1.0250	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	130	130	-	-3500 to 3500
Span calibration coefficient	1.1580	1.1580	-	0.50000 to 2.00000
Analog Input				
Detector temp	43.1	42.9	°C	Ambient Temp +(5 ~ 15 °C)
Detector pressure	78.3	78.3	kPa	80 kPa ± 4 kPa
Ambient	102.1	102.1	kPa	Current Atmospheric pressure
Purifier temp	418.0	418.2	°C	390-430 °C
Purifier pressure	12.3	12.5	kPa	8 kPa -25 kPa
NMC cutter temp	250.3	249.8	°C	230-260 °C
DC 24V	23.9	23.9	V.	24V ± 0.5 V
DC 5V	4.9	4.9	V.	5V ± 0.5 V

**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

TEOM 1405						
Equipment :	PM2.5/PM coarse		Model :	1405		
Serial Number :	1405A227771403		Manufacturer :	Thermo		
Detail	Before			After		
TEOM Data	PM2.5	PM coarse	PM10	PM2.5	PM coarse	PM10
MC (µg/m3)	32.75	10.91	43.66	28.26	8.80	37.06
Total mass (µg)	32.09	11.65	43.74	32.34	11.45	43.79
Filter Loading (0-100%)	33.70	213.68		33.49	13.89	
Frequency(150-400Hz)	264.9091	276.8423		264.9071	276.8334	
Noise (µg)	0.003	0.006		0.005	0.003	
System Status						
Operating mode	Fully Operational			Fully Operational		
RS232 mode	AK protocol			AK protocol		
Vacuum pump pressure(ATM)	0.99			0.99		
Protection level	Unlocked			Unlocked		
IP address	192.168.1.101			192.168.1.101		
Instrument firmware version	1.57			1.57		
Ambient temperature (°C)	29.88			31.53		
Ambient pressure (ATM)	0.994			0.994		
Ambient dew point (°C)	20.91			20.94		
Ambient relative humidity (%)	59.07			50.87		
Cap temperature(°C)	40.00			40.00		
Case temperature(°C)	40.00			40.00		
PM2.5 air tube temp. (°C)	40.00			40.00		
PM Coarse tube temp. (°C)	40.00			40.00		
PM2.5 path flow rate(L/m)	3.00			3.01		
PM coarse path flow rate(L/m)	1.67			1.68		
By pass flow rate(L/m)	11.98			12.01		
Total flow(L/m)	16.65			16.70		
Volumetric flow control	Passive			Passive		
Standard temperature(°C)	25.00			25.00		
Report to the following condition	Standard			Standard		
Standard pressure(ATM)	1.00			1.00		

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**PETRO-INSTRUMENTS CORP.,LTD.**

SINGLE-POINT GAS CALIBRATION				
All analyzer.				
Equipment :	All analyzer.		Model :	42i, 43i , APHA-370
Serial Number :	--		Manufacturer :	Thermo Electron,Horiba
Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO <sub>2</sub> )	44.91	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.83	ppm	Model :	146i
Methane (CH <sub>4</sub> )	499.5	ppm	Serial number :	0926737588
Carbon Monoxide (CO)	4526	ppm		
Cylinder NO. :	CC457501			
Expiration Date :	13 Aug 2023			

**BEFORE CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.50	0.50	400.00	414.00	3.50	Valid
NO <sub>x</sub> (ppb)	0.0	0.60	0.60	400.00	431.00	7.75	Valid
SO <sub>2</sub> (ppb)	0.0	-0.10	-0.10	400.00	383.00	-4.25	Valid
CH4 (ppm)	0.0			4.000			
THC (ppm)	0.0			4.000			

**AFTER CALIBRATION RESULT**

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	0.90	0.90	400.00	400.00	0.00	Valid
NO <sub>x</sub> (ppb)	0.0	1.20	1.20	400.00	402.00	0.50	Valid
SO <sub>2</sub> (ppb)	0.0	0.70	0.70	400.00	404.00	1.00	Valid
CH4 (ppm)	0.0	0.01	0.01	4.000	3.980	-0.50	Valid
THC (ppm)	0.0	0.01	0.01	4.000	4.000	0.00	Valid


**Note :**

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**PETRO-INSTRUMENTS CORP.,LTD.**

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
Stations Techno IRPC	Inside Station
	
Lamp Sampling Box	Replace Filter
	
Gas H2	Gas STD
	

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ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา	
<p>Replace Silica gel</p> 	<p>AQMs Log Sheet</p> 
<p>ถังดับเพลิง</p>  <p>EXP :xx-xx-xxxx</p>	<p>อุปกรณ์ทำความสะอาด</p>
<p>Clean sampling set</p>	

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## รายงานแผนการดำเนินงาน

รายงานผลการดำเนินงานสถานีตรวจวัดคุณภาพอากาศ  
สถานีตรวจวัดคุณภาพอากาศวัดปลวกเกตุ (VOCs)  
สถานีตรวจวัดคุณภาพอากาศวัดเนินพุทรา (Fence Line)  
ชุดวัดความเร็วลม และทิศทางลม ที่ WH40 (Ultra Sonic)

ระหว่างวันที่ 1 เมษายน 2565 – 31 มีนาคม 2566

บริษัท ไออาร์พีซี จำกัด (มหาชน)



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จัดทำโดย  
บริษัท สิทธีพรแอสโซซิเอต จำกัด



### รายงานฉบับที่ 1

#### แผนการดำเนินงาน

(ระยะเวลาดำเนินงาน 365 วัน)

ภายใน 30 วัน หลังจากบริษัท ไออาร์พีซี ให้เริ่มดำเนินงาน  
ตามใบสั่งจ้างเลขที่ 3100178020

- 1) สถานี วัดปลวกเกตุ (เฉพาะเครื่องตรวจวัดสารอินทรีย์ระเหยง่าย)
- 2) สถานี วัดเนินพุทรา (Fence Line) และอุตุนิมวิทยา
- 3) สถานีตรวจวัดทิศทางและความเร็วลมระดับสูง WH40 (Ultra Sonic)

## รายงานแผนการดำเนินงาน

ตามใบสั่งจ้างเลขที่ 3100178020

(รายงานฉบับที่ 1 ภายใน 30 วัน นับตั้งแต่วันที่เริ่มงานในสัญญา)

### บทนำ

บริษัท ไออาร์พีซี จำกัด (มหาชน) ได้จัดตั้งระบบเครือข่ายการติดตามตรวจสอบคุณภาพอากาศในจังหวัดระยอง เพื่อติดตามตรวจสอบสภาพปัญหามลพิษทางอากาศที่เกิดขึ้นในพื้นที่อำเภอเมืองจังหวัดระยอง เพื่อเฝ้าระวังสภาพปัญหาและศึกษาการเปลี่ยนแปลงของคุณภาพอากาศที่เกิดขึ้นในพื้นที่ อันจะเป็นข้อมูลสำคัญที่จะนำไปใช้ในการกำหนดมาตรการในการแก้ปัญหาและป้องกันปัญหาที่เกิดขึ้น หรืออาจจะเกิดขึ้น และใช้ประเมินผลการดำเนินการ และคาดการณ์สภาพการเปลี่ยนแปลงของคุณภาพอากาศในบรรยากาศที่เกิดขึ้น โดยในปัจจุบันมีสถานีตรวจวัดคุณภาพอากาศทั้งหมด 5 สถานี สำหรับนำเข้าสู่ข้อมูลมาประกอบการประเมิน การเฝ้าระวังสภาพปัญหาและใช้ในระบบคาดการณ์คุณภาพอากาศในบรรยากาศ

สถานีตรวจวัดคุณภาพอากาศในบรรยากาศ ประกอบด้วยเครื่องมือตรวจวัดสารพิษทางอากาศ ได้แก่ เครื่องตรวจวัดสารอินทรีย์ระเหยง่ายแบบแตรรายสาร โดยใช้หลักการ GC FID/PID เครื่องตรวจวัดมลสารแบบแนวรั้วเขต (fence Line) กลุ่ม ก๊าซออกไซด์ของไนโตรเจน ก๊าซซัลเฟอร์ไดออกไซด์ ก๊าซโอโซน และเครื่องมือตรวจวัดสภาพอากาศทางอุตุนิมวิทยา ได้แก่ ทิศทางลม ความเร็วลม แบบอัลตราโซนิก อุณหภูมิ ความกดอากาศ ความชื้นสัมพัทธ์ปริมาณ รังสีดวงอาทิตย์ โดยเครื่องมือตรวจวัดดังกล่าวเป็นเครื่องมือที่ทันสมัยมีระบบการทำงานที่ได้มาตรฐานสากล ทำงานได้อย่างต่อเนื่อง ตลอดเวลาจึงจำเป็นต้องใช้ผู้มีความรู้ ความชำนาญเฉพาะด้านดูแล บำรุงรักษา ปรับแต่ง และตรวจสอบการทำงานของเครื่องมืออย่างใกล้ชิดและสม่ำเสมอ ดังนั้น การดูแลบำรุงรักษาและปรับแต่งเครื่องมือและอุปกรณ์ที่ติดตั้งในสถานดังกล่าว จึงจำเป็นต้องจ้างเอกชนเข้าดำเนินการแทน ซึ่งการดำเนินการในลักษณะนี้นิยมทำกันในกลุ่มและระดับประเทศที่มีการติดตั้ง สถานีในลักษณะเดียวกันเพราะเป็นการลดภาระเรื่องบุคลากรและสามารถใช้ผู้ที่มีความรู้ความชำนาญทางด้านนี้โดยเฉพาะมาดำเนินการแทน ทำให้เครื่องมือและอุปกรณ์มีความสมบูรณ์และมีประสิทธิภาพในการทำงาน

โดย บริษัท สิทธีพรแอสโซซิเอต จำกัด

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graph TD
    A[นายนายวิโชค เอกพงษ์ประเสริฐ  
หัวหน้าโครงการ] --> B[นายอิน เล้งเล็ก  
ผู้ควบคุมงาน]
    B --> C[นายเศรษฐี จันภิรมย์  
วิศวกรซ่อมบำรุง]
    B --> D[นางสาววาลี สุขสวัสดิ์  
ประสานงานลูกค้า]
    B --> E[นายพอล ป่านวิ  
เจ้าหน้าที่จัดท่าอากาศยาน]
    C --> F[นายประเสริฐ จุลภาพ  
วิศวกรซ่อมบำรุง]
    E --> G[นางสาววิจิตาภา ปุณสวัสดิ์  
เจ้าหน้าที่จัดท่าอากาศยาน]
    G --> H[นายกฤษฎา เกียรติพิชัย  
เจ้าหน้าที่คอมพิวเตอร์]
  
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[illegible]

- เครื่องตรวจวัดสารอินทรีย์ระเหยง่าย(VOCs) GC955
- เครื่องตรวจวัดสารอินทรีย์ระเหยง่าย(VOCs) GC955
- เครื่อง Dilution Calibrator (Sabio 4010)
- เครื่อง Hydrocarbon Scrubber(HTO)
- เครื่อง Zero Air Generator

<p>ผู้วิจัย: 310078020</p>	<p>แผนการตรวจเช็ค ช่องป่วง และปื้นแพ้สารก่อ วัสดุอินทรีย์ระเหยง่าย (VOCs) จัดตั้งจากวิทยาลัยอาชีวศึกษาภาคกลาง</p>	
<p>วันที่ส่งข้อมูล: 31 มีนาคม 2566</p>	<p>วันที่ส่งข้อมูล: 31 มีนาคม 2566</p>	<p>วันที่ส่งข้อมูล: 31 มีนาคม 2566</p>

Note : M = Maintenance H = Check C = Singlepoint Calibrate MF = Mass Flow Calibration

บริษัท ไออาร์พีซี จำกัด (มหาชน)

ลำดับที่	ชื่อเครื่องมือ	ยี่ห้อ	รุ่น	หมายเลขเครื่อง	รูปเครื่องมือ	หมายเหตุ
1	เครื่องตรวจวัดสารอินทรีย์ระเหยง่าย GC1	Synspec	GC955	2707		
2	เครื่องตรวจวัดสารอินทรีย์ระเหยง่าย GC2	Synspec	GC955	2708		
3	เครื่องควบคุมการปรับเทียบด้วยก๊าซมาตรฐาน	Sabio	4010	08800513		
4	Heated CO Scubber	ECOTECH	HTO1000	SA		
5	เครื่องมือถอดอากาศบริสุทธิ์	ECOTECH	8310LC	13-0555		
6	อุปกรณ์แปลงสัญญาณ	ADAM	-	-		
6	ก๊าซ H2	BIG	-	-		
6	ก๊าซ N2	BIG	-	-		



เครื่องวิเคราะห์และบันทึกข้อมูล(Data Logger)  
OPIS



บริษัท ไออาร์พีซี จำกัด (มหาชน)

ลำดับที่	ชื่อเครื่องมือ	ยี่ห้อ	รุ่น	หมายเลขเครื่อง	รูปเครื่องมือ	หมายเหตุ
1	เครื่องตรวจวัดก๊าซ	OPSS	AR500S	-		
2	Auto Alignment	OPSS	LO150-R	-		
3	เครื่องบันทึกข้อมูล	OPSS	WT256ST	-		
4	UV Filter Control Box	OPSS	-	-		
5	อุปกรณ์แปลงสัญญาณ	-	WU020	-		
6	อุปกรณ์แปลงสัญญาณอุณหภูมิกัมมา	MetOne	-	-		
7	เครื่องสำรองไฟฟ้า	-	-	-		
8	Recover RE150	OPSS	RE150-L-530	-		
9	Emitler	OPSS	EM150-L-586	-		

[illegible]



## สถานีตรวจวัดทิศทางและความเร็วลมระดับสูง WH40 (Ultra Sonic)



สำนักงานสิ่งแวดล้อมภาคที่ 1 เชียงใหม่		แผนกตรวจวัดสิ่งแวดล้อม และปรับปรุงสิ่งแวดล้อมระดับสูง WH40 (Ultra Sonic)		วันที่ตรวจ 31 มีนาคม 2566	
ผู้ปฏิบัติงาน 1 เมษายน 2565		ผู้ปฏิบัติงาน 31 มีนาคม 2566		รายละเอียดแผนการดำเนินการ	
เดือน	ปี	เดือน	ปี	วันที่	สถานะ
มกราคม	2565	มกราคม	2565	1	MH
กุมภาพันธ์	2565	กุมภาพันธ์	2565	2	MH
มีนาคม	2565	มีนาคม	2565	3	MH
เมษายน	2565	เมษายน	2565	4	MH
พฤษภาคม	2565	พฤษภาคม	2565	5	MH
มิถุนายน	2565	มิถุนายน	2565	6	MH
กรกฎาคม	2565	กรกฎาคม	2565	7	MH
สิงหาคม	2565	สิงหาคม	2565	8	MH
กันยายน	2565	กันยายน	2565	9	MH
ตุลาคม	2565	ตุลาคม	2565	10	MH
พฤศจิกายน	2565	พฤศจิกายน	2565	11	MH
ธันวาคม	2565	ธันวาคม	2565	12	MH
มกราคม	2566	มกราคม	2566	13	MH
กุมภาพันธ์	2566	กุมภาพันธ์	2566	14	MH
มีนาคม	2566	มีนาคม	2566	15	MH
เมษายน	2566	เมษายน	2566	16	MH
พฤษภาคม	2566	พฤษภาคม	2566	17	MH
มิถุนายน	2566	มิถุนายน	2566	18	MH
กรกฎาคม	2566	กรกฎาคม	2566	19	MH
สิงหาคม	2566	สิงหาคม	2566	20	MH
กันยายน	2566	กันยายน	2566	21	MH
ตุลาคม	2566	ตุลาคม	2566	22	MH
พฤศจิกายน	2566	พฤศจิกายน	2566	23	MH
ธันวาคม	2566	ธันวาคม	2566	24	MH
มกราคม	2567	มกราคม	2567	25	MH
กุมภาพันธ์	2567	กุมภาพันธ์	2567	26	MH
มีนาคม	2567	มีนาคม	2567	27	MH
เมษายน	2567	เมษายน	2567	28	MH
พฤษภาคม	2567	พฤษภาคม	2567	29	MH
มิถุนายน	2567	มิถุนายน	2567	30	MH
กรกฎาคม	2567	กรกฎาคม	2567	31	MH

Note : M = Maintenance H = Check C = เปลี่ยน

หมายเหตุ : แผนการปฏิบัติงานได้ดำเนินการตามแผน

บัญชีเครื่องมือและอุปกรณ์ประจำสถานีตรวจวัดทิศทางและความเร็วลมระดับสูง WH40 (Ultra Sonic)  
บริษัท ไออาร์พีซี จำกัด (มหาชน)

ลำดับที่	ชื่อเครื่องมือ	ยี่ห้อ	รุ่น	หมายเลขเครื่อง	รูปเครื่องมือ	หมายเหตุ
1	เครื่องวัดทิศทางลม และ ความเร็วลม	YOUNG	81000	-		
2	เครื่อง เก็บข้อมูล	Campbell	CR100KD	-		
3	เครื่องรับส่งข้อมูล	Rave XT	G2263-C	1231703297		
4	อุปกรณ์แปลงสัญญาณ	-	-	-		
5	ตู้ควบคุมไฟฟ้า	-	-	-		



จัดทำโดย

บริษัท สิทธิพรนอสโซซิเอตส์ จำกัด

SITHIPORN  
associates

IRPC

**GAS CHROMATOGRAPH TEST CERTIFICATION**

Certificate No. : SV0822/20530

Instrument Type : GC

Model :CP- 3800

Serial Number : 00734

Organization : S.P.S. Consulting Service Co., Ltd.

Address : 7 Phahonyothin Soi 24 Phahonyothin Rd. Ladyao Chatuchak Bangkok 10900

Date : 10/08/2022

**ELECTRONIC TEST**

CPU	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
LCD TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
VENT TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
KEY ECHO TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL
DESTRUCTION RAM TEST	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL

**RUN CHROMATOGRAM TEST**

DETECTOR : Pulsed Flame Photometric Detector ( PFPD Channel Rear )

INJECTOR : Capillary Injector Model 1079

**GC CONDITION:**

Column	80 °C hold 1 min., rate 20 °C/min. to 200 °C hold 1min.
Injector	220 °C
Detector	300 °C
Carrier flow	5 mL/min
H2 flow	13 mL/min
Air1 flow	20 mL/min
Air2 flow	10 mL/min

**Column:** Capillary Column CP sil 5 CB 0.25 ID x 15 M**Sample:** 1 µL Injection FPD Test Sample 0.002% Dodecanethiol, Methyl Parathion in Iso-octane**SENSITIVITY TEST:** Methyl Parathion (Area count) = 237,263 Counts





## Detector Sensitivity ( FID )

Detector Response	Result	Specification
Baseline Noise ( $\mu$ V)	2.94	$\leq 50$
Baseline Drift (%)	0.12	$\leq 1$
Sensitivity ( S/N for Methyl Parathion)	10,920	$\geq 1,024$

## Temperature Specification

Temperature	Set	Result	Specification
Column Oven ( $^{\circ}$ C)	80	80	$\pm 5$
Injector ( $^{\circ}$ C)	220	220	$\pm 5$
Detector ( $^{\circ}$ C)	300	300	$\pm 5$
Incubator ( $^{\circ}$ C)	60	N/A	$\pm 5$

## Relative Standard Deviation % ( % RSD)

Checkout Procedure	Result	Specification
Area Methyl Parathion ( %)	2.75	$\leq 5$
Retention Time Methyl Parathion ( %)	0.19	$\leq 0.5$

APPROVAL :

Signature: SuwarotEngineer : Suwarot TrikanutDate : 10/08/2022

Certificate No.: CP20220336EA

Operation No.: CP2022100024

## Certificate of Calibration

Equipment: Sound Level Meter

Manufacturer: RION

Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)

Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)

ID No.: -

Customer: IRPC Public Company Limited.

Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,  
Amphor Muang, Rayong 21000

Received Date: 25 October 2022

Calibrated Date: 2 - 7 November 2022

Issued Date: 16 November 2022

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: \_\_\_\_\_

( Mr. Sittichai Swaksuriyawong )  
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ( $k$ ) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.

Certificate No.: CP20220336EA

### Calibration Report

Equipment: Sound Level Meter  
Manufacturer: RION  
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)  
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)  
ID No.: -  
Ambient Temperature: ( 23 ± 2 ) °C  
Relative Humidity: ( 50 ± 15 ) %  
Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-  
IEC 61672-3:2013.

#### Condition of this result of calibration

1. Reference standards instrument :-

	Instrument	Model	Serial No.	Cert. No.	Due Date
1)	Standard microphone	4180	2661000	AA-1020-22	14 June 2023
2)	Arbitrary Function Generator	AFG2021	C010063	CK20220059EA	19 June 2023
3)	Programmable Attenuator	PA5	2913	EF-0014-22	3 April 2023
4)	6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5)	Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P220024 CD20220164EA	17 March 2023 24 July 2023
6)	Pressure humidity and Temperature Transmitter	PTU301	F0640003	CL1-P220029 CD20220165EA	31 March 2023 24 July 2023
7)	Performance Audio Analyzer	U8903B	MY56510003	CB20220063EA CK20220080EA	15 February 2023 8 September 2023

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

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
  - National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
  - National Institute of Metrology (Thailand)
  - Electrical and Electronics Institute; NSC Accredited Calibration No.0119

#### Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
94.1	94.1	0.0	±0.7

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 34536113.



Certificate No.: CP20220336EA

## Calibration Report

Function : 2. Self-generated Noise

### 2.1 Microphone Installed

Measured value (dB)
15.3

### 2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	9.9
C-weighting	15.4
Z-weighting	21.5

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
125	0.1	0.1	0.1	±1.0
1000	0.2	0.2	0.2	±0.7
8000	-0.6	-0.6	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
63	0.1	0.0	0.0	±1.0
125	0.0	-0.1	0.0	±1.0
250	0.0	-0.1	0.0	±1.0
500	0.0	-0.1	0.0	±1.0
1000	0.0	0.0	0.0	±0.7
2000	0.0	0.0	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.1	0.0	+1.5; -2.5
16000	-1.4	-1.4	0.0	+2.5; -16.0

Certificate No.: CP20220336EA

### Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

#### 5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

#### 5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

#### 7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	109.0	0.0	±0.8
114.0	114.0	0.0	±0.8
119.0	119.0	0.0	±0.8
124.0	124.0	0.0	±0.8
129.0	129.0	0.0	±0.8
130.0	130.0	0.0	±0.8
131.0	131.0	0.0	±0.8
132.0	132.0	0.0	±0.8
133.0	133.0	0.0	±0.8
134.0	134.0	0.0	±0.8
135.0	135.0	0.0	±0.8
136.0	136.0	0.0	±0.8
137.0	137.0	0.0	±0.8

Certificate No.: CP20220336EA

### Calibration Report

#### 7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
29.0	28.9	-0.1	±0.8

#### Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±0.5
	2	109.0	0.0	+1.0 ; -1.5
	0.25	99.9	-0.1	+1.0 ; -3.0
Slow	200	119.6	0.0	±0.5
	2	100.0	0.0	+1.0 ; -3.0
LAE	200	120.0	0.0	±0.5
	2	100.0	0.0	+1.0 ; -1.5
	0.25	91.0	0.0	+1.0 ; -3.0

#### Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.3	-0.1	±2.0
Positive half cycle	124.4	124.0	-0.4	±1.0
Negative half cycle	124.4	124.0	-0.4	±1.0



Certificate No.: CP20220336EA

### Calibration Report

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle		
139.4	139.4	0.0	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.1

### Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.  
2. Acceptance limits was IEC61672-3:2013 Class 1.  
3. The coverage factor  $k = 2.00$

- - End of Report - -

## ***GC Clarus 600/680 Preventive Maintenance (PM)***

<b>Company Name:</b>	<b>S.P.S. Consulting Service Co.,Ltd</b>		
<b>Address (Instrument Location):</b>	7 Soi Phaholyothin24 Phaholyothin Road, Jompol, Chatuchak, Bangkok, 10900.		
<b>Serial Number:</b>	680S14042502	<b>Service Tag:</b>	N68APSSFXMP
<b>Customer Name (if applicable):</b>	Ms.Sujinda	<b>PM number:</b>	1 of 2
<b>Service Engineer Name:</b>	Pramote Chaisorn	<b>Service Order Number:</b>	WO-01624977
<b>Date PM Performed: (DD-MMM-YYYY)</b>	04-Mar-2022	<b>Next PM Due Date: (DD-MMM-YYYY)</b>	04-Sep-2022

<b>Part Number</b>	<b>Release</b>	<b>Publication Date</b>	
TH09370070	C	August 2016	

### **Scope**

The purpose of this PM is to ensure the continued functionality of the Clarus 600 and Clarus 680 GC by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

### **General Instructions:**

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

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## Component List

Component / Specific Model	Serial #	Software Version	Configuration Notes
Clarus680	680S14042502	Totalchrom6.3.2	
Clarus SQ8T	648N4050804	Turbomass 6.4	
AtomX	US14113002	Tekma AtomX	

## Parts Lists

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
LF21-0503	Fluke179 multimeter	1	22460228	04-Nov-2022
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A				

## Procedure Checklist

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

### 1. General:

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

- ☒ Check incoming AC line voltage for proper levels and grounding.

L-N 220 Volt

L-G 220 Volt

N-G 0.35 Volt

*\*Neutral to ground not more than 0.5 volts peak to peak*

- ☒ Inspect all gas line filters and traps; Replace if necessary with customer supplied spares.

Carrier gas ☒ Helium ☐ Nitrogen ☐ Hydrogen

Moisture level ☒ Good ☐ Need to replace ☐ Other \_\_\_\_\_

Detector gas ☒ Air Zero ☒ Hydrogen ☐ Nitrogen ☐ Helium

Moisture level ☒ Good ☐ Need to replace ☐ Other \_\_\_\_\_

- ☒ Inspect the customer log book and make any appropriate PM entries.

- ☒ Leak check all fittings from the gas source to instrument.

Gas leakage ☒ Pass ☐ Fail Comment \_\_\_\_\_

- ☒ Perform general inspection of system for cleanliness.

- ☒ Inspect for functional and clean electronic cooling and oven vent fans

Electronic cooling fan ☒ Yes ☐ No

Oven cooling fan ☒ Yes ☐ No

### 2. Electronic :

- ☒ Check oven temperature. Calibrate if necessary.

Oven temperature set point 150 °C ☒ Pass ☐ Fail

- ☐ Check sub-ambient option. (If installed).

Oven temperature set point 5 °C ☐ Pass ☐ Fail

- ☒ Perform routine maintenance on detector/injector. Replace parts as necessary with customer supplied spares.

- ☒ Check flows, including split flows if applicable. Calibrate if necessary.
 

Carrier flow	Pass
Split flow	Pass
- ☒ Check detector gas flows and adjust if necessary.
 

Detector flow	Pass
---------------	------
- ☒ Autosampler installed ☒ Yes ☐ No
 

Check autosampler	sensor for wear and replace if necessary.
Vial sensor	Pass
Door sensor	Pass
Tower sensor	Pass
Plunger sensor	Pass
Elevator sensor	Pass
- ☒ Remove syringe, manually flush. Replace with customer supplied spare if necessary.
- ☒ Check firmware version. Upgrade to current levels if necessary.
 

Firmware version	<u>6.5</u>
------------------	------------
- ☒ Measure all accessible power supply voltages.
 

5 Volt	Pass
+15 Volt	Pass
-15 Volt	Pass
24 Volt	Pass
- ☒ Record all detector voltage signal.
 

Detector Channel A	<u>0.91</u> mV.
Detector Channel B	<u>NA</u> mV.

### 3. Diagnostics Tests:

- ☒ Run instrument diagnostics.
 

<input checked="" type="checkbox"/> BRAM	Pass
<input checked="" type="checkbox"/> EPROM	Pass
- ☒ Run Autosampler diagnostics.
 

<input checked="" type="checkbox"/> BRAM	Pass
<input checked="" type="checkbox"/> EPROM	Pass


### 4. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand
- ☒ Attach PM sticker.
- ☒ Update Logbook.

## Additional Comments

Additional Comments Regarding the PM

## Review

<i>The preventive maintenance checks and if applicable performance tests for Clarus600/680 GC have been completed.</i>	
<i>This Clarus600/680 GC</i>	<i>Pass</i>
<i>the preventive maintenance.</i>	
<b>Review of Preventive Maintenance:</b>	
Authorized PerkinElmer Representative: Pramote Chaisorn	 Date: 04-Mar-2022 (DD-MMM-YYYY)
Authorized Customer Representative:	Date: 04-Mar-2022 (DD-MMM-YYYY)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0455

MTC No. EEL. BP. 41/0465

## CALIBRATION CERTIFICATE

**Submitted by** : S.P.S. Consulting Service Co.,Ltd.  
**Address** : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.  
**Calibrated at** : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.  
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

### Instrument Calibrated :

**Description** : Sound Calibrator  
**Manufacturer** : ACO  
**Model** : 2127  
**Serial No.** : 130006

### Ambient Environment

**Temperature** :  $(23 \pm 3) ^\circ\text{C}$   
**Relative Humidity** :  $(50 \pm 15) \%$   
**Ambient Pressure** :  $(101.325 \pm 1.500) \text{ kPa}$

**Standards used** : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Keithley 2015-P S/N 4106495.
7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

**Calibration Procedure:** CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

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

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

**Date of Receipt** : 22 Apr. 2022

**Date of Calibration** : 28 Apr. 2022

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

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

FM.BL.MTC.002 Rev.4

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0455

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

Nominal Output of Unit Under Test = 94 dB re 20 $\mu$ Pa at 1000 Hz

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.93	-0.07	$\pm 0.10$	$\pm 0.40$ dB

2. Frequency

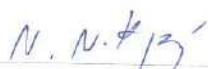
Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	999.9	-0.1	$\pm 1.5$	$\pm 1.0\%$


3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.44	$\pm 0.50$	$\pm 3.0\%$

- Note : 1. No adjustment.  
2. The calibrator pressure correction was not included.  
3. The microphone volume correction was not included.

Calibrated by :

  
(Mr. Nuttapong Niljrusvanit)

  
(Mr. Tawikiat Iamsamran)

Date of Calibration : 28 Apr. 2022

Date of Issue : 28 Apr. 2022

Approved by :

  
(Mr. Prawate Kluaypa)  
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Ref : 2011265042601787001

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End of Certificate

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

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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Noise R\_608/22

### Sound Level Meter Calibration Report

#### Acoustic Calibrator Data

Brand	CIRRUS	Number	AC-CR01/63
Model	CR515	Serial No.	92002
Calibration Range	94 dB, 1000 Hz	Last Calibration	19 March 2022
		Due Date	19 March 2023

#### Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
CR-B03	Cirrus	CR161B	G301155	20 November 2022	94.0	94.0
CR-B05	Cirrus	CR161B	G301134	20 November 2022	94.1	94.0
CR-B06	Cirrus	CR161B	G301151	20 November 2022	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.99 ± 0.10 dB	

Calibrated by :

Adul Dangklom  
(Mr. Adul Dangklom)

Approved by :

Peera Detudom  
(Mr. Peera Detudom)





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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Noise R\_608-1/22

### Sound Level Meter Calibration Report

#### Acoustic Calibrator Data

Brand	ACO	Number	AC 03/56
Model	2127	Serial No.	130006
Calibration Range	94 dB, 1000 Hz	Last Calibration	28 April 2022
		Due Date	28 April 2023

#### Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R52	ACO	6236	00192064	20 November 2022	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 ± 0.10 dB	

Calibrated by :

Adul Dangklom  
(Mr. Adul Dangklom)

Approved by :

(Signature)  
(Mr. Peera Detudom)



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด  
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Noise R\_358/22

## Sound Level Meter Calibration Report

### Acoustic Calibrator Data

Brand	ACO	Number	AC 03/56
Model	2127	Serial No.	130006
Calibration Range	94 dB, 1000 Hz	Last Calibration	28 April 2022
		Due Date	28 April 2023

### Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-R40	ACO	6236	00192052	03 July 2022	94.1	94.0
ACO-R41	ACO	6236	00192053	03 July 2022	94.1	94.0
ACO-R50	ACO	6236	00192062	03 July 2022	94.0	94.0
ACO-R51	ACO	6236	00192063	03 July 2022	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 $\pm$ 0.10 dB	

Calibrated by :

Phakhinai Khongkomnerd  
(Mr.Phakhinai Khongkomnerd )

Approved by :

Peera Detudom  
(Mr. Peera Detudom)