

ภาคผนวกที่ 4

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

ตรวจวัดคุณภาพสิ่งแวดล้อม



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

Console Calibration Report

Calibration Method

Critical Orifices

Calibration Data

Console Data		Calibration Data		
No.	Serial No.	Date	y	$\Delta H_{@}$ (mmH ₂ O)
B01	1563	01/09/2022	1.004	50.11
B02	8002514	02/09/2022	1.006	49.25
B03	1503016	05/09/2022	1.008	50.30
B04	00006659	05/09/2022	1.005	47.45
B05	00007428	01/09/2022	1.002	49.96
R01	1561	02/09/2022	1.003	49.86
R02	8002513	05/09/2022	1.006	50.09
R03	1570	05/09/2022	1.004	49.23
R04	8002519	01/09/2022	1.005	49.17
R05	1503015	01/09/2022	0.996	49.68

Remark : Accept Value of y (test) is $0.97 < y < 1.03$



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Pitot Tube Calibration Report

Calibration Method

Standard Pitot Tube

Calibration Data

Pitot Tube Data			Calibration Data		
No.	Type of Pitot	Coefficient of Standard Pitot	Date	Avg. of Cp (test)	
				Side A	Side B
B03	S	0.99	01/08/2022	0.84	0.83
B04	S	0.99	01/08/2022	0.85	0.84
B05	S	0.99	01/08/2022	0.84	0.84
B07	S	0.99	01/08/2022	0.83	0.84
B08	S	0.99	02/08/2022	0.85	0.84
B09	S	0.99	02/08/2022	0.84	0.84
B11	S	0.99	02/08/2022	0.84	0.83
B16	S	0.99	02/08/2022	0.85	0.84
B18	S	0.99	02/08/2022	0.84	0.83
B19	S	0.99	02/08/2022	0.84	0.84
B21	S	0.99	02/08/2022	0.84	0.85
B24	S	0.99	03/08/2022	0.84	0.84
B27	S	0.99	03/08/2022	0.84	0.85
B30	S	0.99	03/08/2022	0.84	0.84
B31	S	0.99	03/08/2022	0.84	0.83
B33	S	0.99	01/08/2022	0.83	0.84
B35	S	0.99	01/08/2022	0.85	0.84



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Pitot Tube Calibration Report

Calibration Method

Standard Pitot Tube

Calibration Data					
Pitot Tube Data			Calibration Data		
No.	Type of Pitot	Coefficient of Standard Pitot	Date	Avg. of Cp (test)	
				Side A	Side B
B36	S	0.99	01/08/2022	0.83	0.84
B37	S	0.99	01/08/2022	0.84	0.84
B38	S	0.99	02/08/2022	0.85	0.84
B39	S	0.99	02/08/2022	0.85	0.84
B40	S	0.99	02/08/2022	0.84	0.84
B41	S	0.99	02/08/2022	0.84	0.84
B44	S	0.99	02/08/2022	0.83	0.84
B45	S	0.99	01/08/2022	0.84	0.85
B46	S	0.99	01/08/2022	0.84	0.84
B47	S	0.99	03/08/2022	0.84	0.84
B48	S	0.99	03/08/2022	0.83	0.84
B49	S	0.99	01/08/2022	0.84	0.84
B54	S	0.99	01/08/2022	0.84	0.83
B56	S	0.99	01/08/2022	0.84	0.84
B57	S	0.99	04/08/2022	0.83	0.84
B58	S	0.99	04/08/2022	0.84	0.83



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High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3611

Calibration Data

High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B01	B01	01/08/2022	$y = 1.310x - 7.517$	0.998
B02	B02	01/08/2022	$y = 1.098x + 2.659$	0.997
B03	B03	01/08/2022	$y = 1.089x + 0.857$	0.998
B04	B04	01/08/2022	$y = 1.206x - 3.858$	0.995
B05	B05	01/08/2022	$y = 1.285x - 7.595$	0.997
B06	B06	01/08/2022	$y = 1.287x - 6.981$	0.998
B07	B07	01/08/2022	$y = 1.197x - 4.681$	0.998
B08	B08	01/08/2022	$y = 1.224x - 5.592$	0.999
B09	B09	01/08/2022	$y = 1.275x - 6.394$	0.997
B10	B10	01/08/2022	$y = 1.121x + 1.091$	0.995
B11	B11	04/08/2022	$y = 1.165x - 2.766$	0.998
B12	B12	04/08/2022	$y = 1.230x - 4.896$	0.998
B13	B13	01/08/2022	$y = 1.249x - 6.430$	0.996
B14	B14	02/08/2022	$y = 1.232x - 4.320$	0.996
B15	B15	02/08/2022	$y = 1.134x - 0.926$	0.997
B16	B16	02/08/2022	$y = 1.261x - 6.890$	0.998
B17	B17	02/08/2022	$y = 1.175x - 2.039$	0.997
B18	B18	02/08/2022	$y = 1.290x - 7.805$	0.999
B19	B19	02/08/2022	$y = 1.375x - 11.753$	0.995
B20	B20	02/08/2022	$y = 1.262x - 7.100$	0.999
B21	B21	03/08/2022	$y = 1.142x - 1.809$	0.999
B22	B22	02/08/2022	$y = 1.289x - 8.540$	0.997
B23	B23	02/08/2022	$y = 1.216x - 4.912$	0.999
B24	B24	01/08/2022	$y = 1.147x - 1.299$	1.000
B25	B25	02/08/2022	$y = 1.025x + 3.341$	0.997
B26	B26	02/08/2022	$y = 1.184x - 3.486$	0.995
B27	B27	03/08/2022	$y = 1.237x - 6.825$	0.996
B28	B28	02/08/2022	$y = 1.284x - 7.704$	0.998
B29	B29	02/08/2022	$y = 1.305x - 8.854$	0.996
B30	B30	03/08/2022	$y = 1.227x - 5.387$	0.996
B31	B31	03/08/2022	$y = 1.215x - 4.628$	0.995
B32	B32	03/08/2022	$y = 1.313x - 8.558$	0.995
B33	B33	03/08/2022	$y = 1.330x - 7.545$	1.000
B34	B34	03/08/2022	$y = 1.287x - 8.617$	0.999



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High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard

Model : TE 5025A

S/N : 3611

Calibration Data

High Volume Air Sampler Data		Calibration Data		
Recorder No.	Blower No.	Date	Actual Flowrate (ft ³ /min)	R ²
B35	B35	03/08/2022	y = 1.324x-9.985	0.995
B36	B36	02/08/2022	y = 1.199x-5.068	0.998
B37	B37	01/08/2022	y = 1.263x-6.105	0.995
B38	B38	01/08/2022	y = 1.200x-4.049	0.998
B39	B39	01/08/2022	y = 1.323x-9.022	0.998
B40	B40	01/08/2022	y = 1.223x-4.993	0.997
B41	B41	01/08/2022	y = 1.236x-5.071	0.998
B42	B42	01/08/2022	y = 1.230x-4.886	0.998
B43	B43	02/08/2022	y = 1.189x-3.190	0.998
B44	B44	02/08/2022	y = 1.336x-10.058	0.996
R01	R01	02/08/2022	y = 1.271x-7.214	0.999
R02	R02	02/08/2022	y = 1.254x-7.346	1.000
R03	R03	02/08/2022	y = 1.258x-7.858	0.998
R04	R04	02/08/2022	y = 1.175x-2.851	0.998
R05	R05	02/08/2022	y = 1.240x-7.136	0.999
R06	R06	01/08/2022	y = 1.389x-11.486	0.998
R07	R07	01/08/2022	y = 1.060x+2.168	0.998
R08	R08	01/08/2022	y = 1.206x-5.068	0.997
R09	R09	01/08/2022	y = 1.275x-7.830	0.998
R10	R10	02/08/2022	y = 1.260x-6.945	0.998
R11	R11	02/08/2022	y = 1.116x-1.299	0.999
R12	R12	02/08/2022	y = 1.294x-8.990	0.996
R13	R13	02/08/2022	y = 1.133x-0.833	0.999
R14	R14	03/08/2022	y = 1.157x-2.099	0.999
R15	R15	03/08/2022	y = 1.178x-3.248	0.999
R16	R16	03/08/2022	y = 1.203x-5.180	0.999
R17	R17	03/08/2022	y = 1.267x-6.960	0.999
R18	R18	04/08/2022	y = 1.281x-7.586	0.995
R19	R19	04/08/2022	y = 1.223x-4.898	0.995
R20	R20	04/08/2022	y = 1.350x-11.132	0.998

Certificate of Calibration

Certificate No. : 64-220066-1

Page : 1 of 2

Submitted by : S. P. S Consulting Service Co.,Ltd.

7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900

Equipment : Vacuum Gauge

Manufacturer : HI-LIGHT **Model :** N/A

ID No. : 1/60

Range : 0 in Hg to -30 in Hg **Resolution :** 1 in Hg

Environment : Ambient Temperature : $(20 \pm 2) ^\circ \text{C}$

Relative Humidity : $(50 \pm 10) \%$

Date of Received : 02 July 2021

Date of Calibration : 05 July 2021

Date of Issue : 05 July 2021

Calibrated by : Satja Sangkhum

Calibration Method : In-house method CAL-M2201 based on BS EN 837-1:2016 with Pressure Calibrator

Reference Standard Instruments : This certification is traceable to the International System of Units

Pressure Calibrator & Pressure Sensors Modules

ID No.	Cert. No.	Due Date	Traceability
220007	MP-0036-20	11 Mar 2022	National Institute of Metrology (Thailand), (NIMT)
220001	MP-0036-20	11 Mar 2022	National Institute of Metrology (Thailand), (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 64-220066-1

Page : 2 of 2

Result of Calibration : Without Adjustment

Function : Vacuum measurement

Condition of calibration :

- 1 Scale and conversion factor is 1 kPa = 0.295 in Hg
- 2 Angle of mounting from horizontal at 90 °
- 3 UUC reading after lightly tapped
- 4 Reference plane of UUC at center of Gauge
- 5 UUC calibrated by using clean air as pressure media
6. UUC Condition As-Received : Good

Standard Reading (in Hg)	UUC Reading (in Hg)	Correction (in Hg)
0.00	0	0.0
-4.69	-5	0.3
-9.57	-10	0.4
-14.67	-15	0.3
-19.71	-20	0.3
-29.93	-30	0.1
-29.92	-30	0.1
-19.69	-20	0.3
-14.69	-15	0.3
-9.58	-10	0.4
-4.69	-5	0.3
0.00	0	0.0

Remark

UUC : Unit Under Calibration

The uncertainty is combined hysteresis

The uncertainty of measurement was with in ± 0.39 in Hg

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

This reported uncertainty of measurment was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

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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 ²
B01	SKC	224-PCXR4	262101	04/07/2022	1,000	1,500	2,000	994	1,497	1,998	1.002x - 4.028	1.000
B02	SKC	224-PCXR4	626166	01/07/2022	1,000	1,500	2,000	1,002	1,505	2,001	1.009x - 20.106	0.999
B03	SKC	224-PCXR4	612968	04/07/2022	1,000	1,500	2,000	996	1,494	2,001	1.006x - 12.907	1.000
B04	SKC	224-PCXR4	602804	04/07/2022	1,000	1,500	2,000	1,000	1,502	1,996	1.001x - 2.688	1.000
B05	SKC	224-PCXR4	612693	04/07/2022	1,000	1,500	2,000	1,003	1,499	2,003	1.012x - 22.383	0.999
B06	SKC	224-PCXR4	262188	04/07/2022	1,000	1,500	2,000	996	1,508	2,009	1.020x - 35.110	0.999
B07	SKC	224-PCXR4	626262	01/07/2022	1,000	1,500	2,000	998	1,492	1,995	0.992x + 6.884	1.000
B08	SKC	224-PCXR4	626100	01/07/2022	1,000	1,500	2,000	1,003	1,499	2,003	1.012x - 23.269	0.999
B09	SKC	224-PCXR4	626479	01/07/2022	1,000	1,500	2,000	997	1,490	1,994	0.993x + 3.909	1.000
B10	SKC	224-PCXR4	091950	01/07/2022	1,000	1,500	2,000	993	1,503	2,001	1.017x - 33.950	0.999
B11	SKC	224-PCXR8	564315	04/07/2022	1,000	1,500	2,000	995	1,490	1,999	1.004x - 10.290	1.000
B12	SKC	224-PCXR4	034656	04/07/2022	1,000	1,500	2,000	1,003	1,503	2,003	1.010x - 19.404	0.999
B13	SKC	224-PCXR4	602073	04/07/2022	1,000	1,500	2,000	995	1,500	1,999	1.001x - 3.554	1.000
B14	SKC	224-PCXR4	626313	04/07/2022	1,000	1,500	2,000	999	1,491	1,988	0.992x + 7.243	1.000
B15	SKC	224-PCXR4	626474	04/07/2022	1,000	1,500	2,000	1,003	1,502	2,005	1.013x - 23.723	0.999
B16	SKC	224-PCXR4	626477	01/07/2022	1,000	1,500	2,000	994	1,504	2,001	1.015x - 31.425	0.999
B17	SKC	224-PCXR4	626860	04/07/2022	1,000	1,500	2,000	997	1,495	1,991	0.997x - 0.558	1.000
B18	SKC	224-PCXR4	691484	01/07/2022	1,000	1,500	2,000	1,003	1,500	2,001	1.009x - 18.825	0.999
B19	SKC	224-PCXR4	691599	01/07/2022	1,000	1,500	2,000	995	1,503	1,999	1.005x - 7.985	1.000
B20	SKC	224-PCXR4	691587	01/07/2022	1,000	1,500	2,000	993	1,504	1,999	1.014x - 30.719	0.999
B21	SKC	224-PCXR4	691531	04/07/2022	1,000	1,500	2,000	993	1,499	1,994	1.001x - 7.187	1.000
B22	SKC	224-PCXR4	691654	01/07/2022	1,000	1,500	2,000	1,004	1,501	2,003	1.011x - 19.990	0.999
B23	SKC	224-PCXR4	798393	04/07/2022	1,000	1,500	2,000	993	1,505	2,002	1.017x - 34.763	0.999
B24	SKC	224-PCXR4	626363	01/07/2022	1,000	1,500	2,000	1,000	1,502	2,000	1.011x - 22.826	0.999
B25	SKC	224-PCXR4	798489	04/07/2022	1,000	1,500	2,000	1,001	1,512	2,001	0.998x + 4.850	1.000
B26	SKC	224-PCXR4	798479	05/07/2022	1,000	1,500	2,000	999	1,499	1,993	0.996x + 2.692	1.000
B27	SKC	224-PCXR4	691673	05/07/2022	1,000	1,500	2,000	993	1,503	2,002	1.017x - 32.988	0.999
B28	SKC	224-PCXR4	691570	05/07/2022	1,000	1,500	2,000	1,001	1,500	2,002	1.012x - 23.632	0.999
B29	SKC	224-PCXR4	626472	05/07/2022	1,000	1,500	2,000	999	1,494	1,998	1.002x - 6.856	1.000
B30	SKC	224-PCXR4	691489	05/07/2022	1,000	1,500	2,000	1,004	1,500	2,004	1.013x - 22.910	0.999
B31	SKC	224-PCXR4	691509	04/07/2022	1,000	1,500	2,000	993	1,495	1,998	1.004x - 9.879	1.000
B32	SKC	224-PCXR4	091567	05/07/2022	1,000	1,500	2,000	992	1,504	2,001	1.016x - 32.243	0.999
B33	SKC	224-PCXR4	091756	05/07/2022	1,000	1,500	2,000	994	1,496	1,991	0.996x + 0.634	1.000
B34	SKC	224-PCXR4	612962	05/07/2022	1,000	1,500	2,000	1,002	1,501	2,002	1.011x - 21.693	0.999
B35	SKC	224-PCXR4	602682	04/07/2022	1,000	1,500	2,000	993	1,498	1,996	1.001x - 7.411	1.000
B36	SKC	224-PCXR4	626164	04/07/2022	1,000	1,500	2,000	999	1,495	1,999	1.000x - 4.946	1.000
B37	SKC	224-PCXR4	626256	01/07/2022	1,000	1,500	2,000	994	1,506	2,000	1.014x - 28.892	0.999
B38	SKC	224-PCXR4	626167	04/07/2022	1,000	1,500	2,000	997	1,497	1,996	1.002x - 5.504	1.000
B39	SKC	224-PCXR4	034637	04/07/2022	1,000	1,500	2,000	1,003	1,500	2,002	1.011x - 22.048	0.999
B40	SKC	224-PCXR4	798349	05/07/2022	1,000	1,500	2,000	995	1,505	2,002	1.017x - 34.763	0.999



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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	R²
B41	SKC	224-PCXR4	612669	06/07/2022	1,000	1,500	2,000	998	1,496	1,990	0.994x + 3.749	1.000
B42	SKC	224-PCXR4	626041	06/07/2022	1,000	1,500	2,000	1,003	1,498	1,995	0.990x + 12.946	1.000
B43	SKC	224-PCXR4	034636	06/07/2022	1,000	1,500	2,000	999	1,501	1,992	0.991x + 10.805	1.000
B44	SKC	224-PCXR8	529341	06/07/2022	1,000	1,500	2,000	1,002	1,501	2,003	1.012x - 21.857	0.999
B45	SKC	224-PCXR8	529594	04/07/2022	1,000	1,500	2,000	997	1,498	1,989	0.994x + 4.563	1.000
B46	SKC	224-PCXR8	566743	01/07/2022	1,000	1,500	2,000	994	1,504	2,002	1.016x - 33.363	0.999
B47	SKC	224-PCXR8	566747	04/07/2022	1,000	1,500	2,000	1,002	1,500	2,004	1.013x - 25.000	0.999
B48	SKC	224-PCXR8	566753	04/07/2022	1,000	1,500	2,000	999	1,494	1,998	0.999x - 2.194	1.000
B49	SKC	224-PCXR8	566780	04/07/2022	1,000	1,500	2,000	1,003	1,502	2,003	1.012x - 22.626	0.999
B50	SKC	224-PCXR8	500400	04/07/2022	1,000	1,500	2,000	1,002	1,495	2,002	1.001x - 3.458	1.000
B51	SKC	224-PCXR8	500363	04/07/2022	1,000	1,500	2,000	995	1,504	2,000	1.012x - 26.388	0.999
B52	SKC	224-PCXR8	093186	04/07/2022	1,000	1,500	2,000	995	1,497	1,994	0.997x - 1.360	1.000
B53	SKC	224-PCXR8	707670	04/07/2022	1,000	1,500	2,000	1,002	1,499	2,002	1.010x - 20.947	0.999
B54	SKC	224-PCXR3	509821	01/07/2022	1,000	1,500	2,000	993	1,501	2,001	1.016x - 33.878	0.999
B55	SKC	224-PCXR3	510710	01/07/2022	1,000	1,500	2,000	1,000	1,494	1,993	0.993x + 5.432	1.000
B56	SKC	224-PCXR3	511450	01/07/2022	1,000	1,500	2,000	1,002	1,500	2,001	1.011x - 20.804	0.999
B57	SKC	224-PCXR3	510798	01/07/2022	1,000	1,500	2,000	997	1,493	1,998	1.001x - 3.199	1.000
B58	SKC	224-PCXR3	509852	05/07/2022	1,000	1,500	2,000	1,001	1,498	1,999	1.007x - 19.033	0.999
B59	SKC	224-PCXR3	509862	05/07/2022	1,000	1,500	2,000	996	1,503	1,994	0.997x + 3.115	1.000
B60	SKC	224-PCXR3	512655	04/07/2022	1,000	1,500	2,000	1,002	1,500	2,003	1.012x - 23.691	0.999
B61	SKC	224-PCXR3	503915	04/07/2022	1,000	1,500	2,000	994	1,489	1,998	1.004x - 11.866	1.000
B62	SKC	224-PCXR3	505975	04/07/2022	1,000	1,500	2,000	999	1,494	1,996	0.997x - 0.104	1.000
B63	SKC	224-PCXR3	511432	01/07/2022	1,000	1,500	2,000	991	1,501	1,999	1.017x - 35.541	0.999
B64	SKC	224-PCXR3	508302	01/07/2022	1,000	1,500	2,000	997	1,493	1,989	0.982x + 5.947	1.000
B65	SKC	224-PCXR3	508310	04/07/2022	1,000	1,500	2,000	1,002	1,500	2,003	1.012x - 22.949	0.999
B66	SKC	224-PCXR3	509861	05/07/2022	1,000	1,500	2,000	1,002	1,491	1,991	0.988x + 13.425	1.000
B67	SKC	224-PCXR3	506295	01/07/2022	1,000	1,500	2,000	993	1,507	2,004	1.017x - 32.945	0.999
B68	SKC	224-PCXR3	505872	01/07/2022	1,000	1,500	2,000	1,002	1,491	1,997	0.994x + 5.755	1.000
B69	SKC	224-PCXR3	508375	01/07/2022	1,000	1,500	2,000	1,001	1,500	2,000	1.010x - 21.569	0.999
B70	SKC	224-PCXR3	510623	04/07/2022	1,000	1,500	2,000	992	1,503	1,997	1.002x - 6.533	1.000
B71	SKC	224-PCXR3	508367	05/07/2022	1,000	1,500	2,000	990	1,506	2,002	1.018x - 37.184	0.999
B72	SKC	224-PCXR3	505977	05/07/2022	1,000	1,500	2,000	1,001	1,498	1,993	0.993x + 5.652	1.000
B73	SKC	224-PCXR3	512606	04/07/2022	1,000	1,500	2,000	1,001	1,501	2,005	1.013x - 24.278	0.999
B74	SKC	224-PCXR3	505993	01/07/2022	1,000	1,500	2,000	996	1,495	1,994	1.000x - 4.682	1.000
B75	SKC	224-PCXR3	509820	01/07/2022	1,000	1,500	2,000	996	1,499	1,990	0.994x + 3.625	1.000
B76	SKC	224-PCXR3	509811	04/07/2022	1,000	1,500	2,000	993	1,498	1,998	1.007x - 14.602	1.000
B77	SKC	224-PCXR3	508301	04/07/2022	1,000	1,500	2,000	1,000	1,501	2,004	1.014x - 26.842	0.999
B78	SKC	224-PCXR3	510877	04/07/2022	1,000	1,500	2,000	996	1,503	1,998	1.012x - 27.121	0.999
B79	SKC	224-PCXR3	510920	04/07/2022	1,000	1,500	2,000	994	1,493	1,994	0.999x - 3.506	1.000



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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	R²
B80	SKC	224-PCXR3	504569	01/07/2022	1,000	1,500	2,000	1,003	1,499	2,001	1.011x - 21.873	0.999
B81	SKC	224-PCXR3	503480	01/07/2022	1,000	1,500	2,000	996	1,499	2,000	1.013x - 28.489	0.999
B82	SKC	224-PCXR3	505673	04/07/2022	1,000	1,500	2,000	993	1,499	1,996	1.001x - 6.102	1.000
B83	SKC	224-PCXR3	510785	05/07/2022	1,000	1,500	2,000	1,000	1,499	2,002	1.012x - 24.266	0.999
B84	SKC	224-PCXR3	508333	04/07/2022	1,000	1,500	2,000	997	1,495	1,991	0.996x + 1.460	1.000
B85	SKC	224-PCXR3	505757	01/07/2022	1,000	1,500	2,000	993	1,502	1,998	1.013x - 29.678	0.999
B86	SKC	224-PCXR3	512625	01/07/2022	1,000	1,500	2,000	1,003	1,502	2,004	1.012x - 22.383	0.999
B87	SKC	224-PCXR3	504324	06/07/2022	1,000	1,500	2,000	998	1,496	2,000	1.001x - 2.385	1.000
B88	SKC	224-PCXR3	508307	06/07/2022	1,000	1,500	2,000	997	1,498	1,994	0.997x + 1.093	1.000
B89	SKC	224-PCXR3	509860	06/07/2022	1,000	1,500	2,000	1,000	1,500	2,003	1.014x - 25.845	0.999
B90	SKC	224-PCXR3	508366	06/07/2022	1,000	1,500	2,000	992	1,502	2,000	1.015x - 32.055	0.999
B91	SKC	224-PCXR3	510919	04/07/2022	1,000	1,500	2,000	1,000	1,498	1,996	0.999x - 0.694	1.000
B92	SKC	224-PCXR3	510987	04/07/2022	1,000	1,500	2,000	1,002	1,501	2,004	1.013x - 23.312	0.999
B93	SKC	224-PCXR3	509845	05/07/2022	1,000	1,500	2,000	1,000	1,496	1,998	1.000x - 2.501	1.000
B94	SKC	224-PCXR8	A127871	05/07/2022	1,000	1,500	2,000	1,000	1,500	2,002	1.014x - 25.765	0.999
B95	SKC	224-PCXR8	A127921	05/07/2022	1,000	1,500	2,000	992	1,502	2,001	1.016x - 33.052	0.999
B96	SKC	224-PCXR8	A127942	05/07/2022	1,000	1,500	2,000	996	1,498	1,996	1.002x - 5.799	1.000
B97	SKC	224-PCXR8	A127955	05/07/2022	1,000	1,500	2,000	1,003	1,501	2,003	1.012x - 21.717	0.999
B98	SKC	224-PCXR8	A127956	05/07/2022	1,000	1,500	2,000	1,000	1,498	1,998	0.999x - 1.863	0.999



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 \pm 3 °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	R²
R01	SKC	224-PCXR4	602467	01/07/2022	1,000	1,500	2,000	993	1,508	2,004	1.020x - 38.744	0.998
R02	SKC	224-PCXR4	626450	01/07/2022	1,000	2,000	3,000	998	1,499	1,990	0.989x + 12.348	1.000
R03	SKC	224-PCXR4	691592	04/07/2022	1,000	1,500	2,000	1,003	1,500	2,004	1.012x - 22.080	0.999
R04	SKC	224-PCXR4	691672	01/07/2022	1,000	1,500	2,000	996	1,493	1,993	0.997x - 1.763	1.000
R05	SKC	224-PCXR4	798470	04/07/2022	1,000	1,500	2,000	994	1,506	1,999	1.013x - 30.077	0.999
R06	SKC	224-PCXR4	798456	04/07/2022	1,000	1,500	2,000	994	1,498	1,994	1.002x - 7.319	1.000
R07	SKC	224-PCXR4	798480	04/07/2022	1,000	1,500	2,000	994	1,490	2,000	1.008x - 17.031	1.000
R08	SKC	224-PCXR4	883215	05/07/2022	1,000	1,500	2,000	1,001	1,502	2,005	1.015x - 26.148	0.999
R09	SKC	224-PCXR4	034650	01/07/2022	1,000	1,500	2,000	991	1,504	2,002	1.018x - 36.777	0.999
R10	SKC	224-PCXR4	091765	04/07/2022	1,000	1,500	2,000	996	1,512	1,994	1.000x + 0.100	1.000
R11	SKC	224-PCXR4	091763	01/07/2022	1,000	1,500	2,000	1,000	1,499	2,002	1.013x - 25.598	0.999
R12	SKC	224-PCXR4	091568	04/07/2022	1,000	1,500	2,000	997	1,501	1,999	1.001x - 4.866	1.000
R13	SKC	224-PCXR4	091638	04/07/2022	1,000	1,500	2,000	1,002	1,498	1,993	0.991x + 10.115	1.000
R14	SKC	224-PCXR4	091784	04/07/2022	1,000	1,500	2,000	994	1,502	1,999	1.013x - 29.654	0.999
R15	SKC	224-PCXR8	529457	01/07/2022	1,000	1,500	2,000	1,001	1,500	2,004	1.013x - 25.263	0.999
R16	SKC	224-PCXR8	529643	01/07/2022	1,000	1,500	2,000	998	1,497	1,994	0.997x - 0.379	1.000
R17	SKC	224-PCXR8	529645	01/07/2022	1,000	1,500	2,000	994	1,509	2,000	1.014x - 30.173	0.999
R18	SKC	224-PCXR8	566756	04/07/2022	1,000	1,500	2,000	991	1,496	1,998	1.001x - 6.880	1.000
R19	SKC	224-PCXR8	566802	01/07/2022	1,000	1,500	2,000	1,003	1,499	2,000	1.010x - 19.831	0.999
R20	SKC	224-PCXR8	529089	01/07/2022	1,000	1,500	2,000	990	1,500	2,003	1.020x - 40.235	0.999
R21	SKC	224-PCXR8	665728	04/07/2022	1,000	1,500	2,000	998	1,493	1,999	1.001x - 5.604	1.000
R22	SKC	224-PCXR8	707444	04/07/2022	1,000	1,500	2,000	1,002	1,500	2,001	1.011x - 21.494	0.999
R23	SKC	224-PCXR8	761067	04/07/2022	1,000	1,500	2,000	998	1,494	1,992	0.994x + 2.896	1.000
R24	SKC	224-PCXR8	707893	01/07/2022	1,000	1,500	2,000	996	1,505	2,000	1.013x - 27.843	0.999
R25	SKC	224-PCXR8	761052	04/07/2022	1,000	1,500	2,000	998	1,500	1,993	0.993x + 6.633	1.000
R26	SKC	224-PCXR8	707956	04/07/2022	1,000	1,500	2,000	1,002	1,500	2,004	1.013x - 24.298	0.999
R27	SKC	224-PCXR8	707398	01/07/2022	1,000	1,500	2,000	996	1,503	2,001	1.013x - 28.844	0.999
R28	SKC	224-PCXR8	707481	04/07/2022	1,000	1,500	2,000	1,004	1,500	2,003	1.010x - 19.727	0.999
R29	SKC	224-PCXR8	707402	01/07/2022	1,000	1,500	2,000	1,005	1,491	1,991	0.988x + 13.928	1.000
R30	SKC	224-PCXR8	093811	01/07/2022	1,000	1,500	2,000	998	1,495	1,994	0.998x - 1.149	1.000
R31	SKC	224-PCXR8	093183	01/07/2022	1,000	1,500	2,000	1,001	1,501	2,001	1.012x - 23.161	0.999
R32	SKC	224-PCXR8	671950	04/07/2022	1,000	1,500	2,000	1,000	1,498	1,994	0.993x + 7.961	1.000
R33	SKC	224-PCXR4	626254	04/07/2022	1,000	1,500	2,000	992	1,502	1,999	1.017x - 34.540	0.999
R34	SKC	224-PCXR4	626131	04/07/2022	1,000	1,500	2,000	1,002	1,498	2,004	1.013x - 25.091	0.999
R35	SKC	224-PCXR8	707460	04/07/2022	1,000	1,500	2,000	998	1,498	1,995	0.994x + 5.472	1.000
R36	SKC	224-PCXR8	707446	01/07/2022	1,000	1,500	2,000	1,003	1,500	2,001	1.009x - 19.272	0.999
R37	SKC	224-PCXR8	707432	01/07/2022	1,000	1,500	2,000	999	1,499	1,998	0.998x + 0.243	1.000
R38	SKC	224-PCXR8	707349	01/07/2022	1,000	1,500	2,000	996	1,500	2,002	1.015x - 32.039	0.999



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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 ²
R40	SKC	224-PCXR4	612753	04/07/2022	1,000	1,500	2,000	1,002	1,501	2,003	1.012x - 22.926	0.999
R41	SKC	224-PCXR4	626140	04/07/2022	1,000	1,500	2,000	991	1,509	2,002	1.018x - 34.715	0.999
R42	SKC	224-PCXR4	626463	01/07/2022	1,000	1,500	2,000	995	1,493	2,000	1.004x - 7.949	1.000
R43	SKC	224-PCXR4	626129	04/07/2022	1,000	1,500	2,000	1,002	1,501	2,003	1.012x - 22.176	0.999
R44	SKC	224-PCXR4	602753	04/07/2022	1,000	1,500	2,000	1,002	1,495	1,993	0.996x + 1.332	1.000
R45	SKC	224-PCXR4	626137	04/07/2022	1,000	1,500	2,000	992	1,505	2,002	1.019x - 37.527	0.999



CERTIFICATE No : 22M2569

REFERENCE No : 64386-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : SARTORIUS

MODEL : BSA224S-CW

SERIAL No : 36591843

ID No : BA 09/61

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : TETNITHI W.

CALIBRATION DATE : 11-Mar-22

APPROVED BY : PONGSAK J.

ISSUED DATE : 17-Mar-22

RECEIVED DATE : 11-Mar-22



CERTIFICATE No : 22M2569

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : BSA224S-CW
MANUFACTURER : SARTORIUS S/N : 36591843
ID No : BA 09/61 RECEIVED DATE : 11-Mar-22
AIR PRESSURE : 1008mbar \pm 1mbar CALIBRATION DATE : 11-Mar-22
AMBIENT TEMPERATURE : 22° C \pm 1° C RELATIVE HUMIDITY : 51 %RH \pm 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS ADJUSTED USING WEIGHT OF QUALITY CALIBRATION TO ADJUST. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

<u>INSTRUMENT</u>	<u>MODEL</u>	<u>SERIAL No</u>	<u>CERTIFICATE No</u>	<u>DUE DATE</u>
1) STANDARD WEIGHT SET	E2	QK-I-151	C02210415	09-Feb-23

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

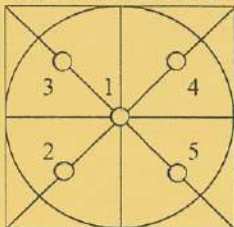
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000048 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.00	0.0000	0.0000	0.000078
0.10	0.1000	0.0000	0.000078
0.20	0.2000	0.0000	0.000078
0.50	0.5000	0.0000	0.000079
1.00	1.0000	0.0000	0.000079
2.00	2.0000	0.0000	0.000080
5.00	5.0000	0.0000	0.000081
10.00	10.0000	0.0000	0.000084
20.00	20.0000	0.0000	0.000089
50.00	50.0000	0.0000	0.00011
100.00	100.0000	0.0000	0.00019
200.00	199.9999	0.0001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	99.9999
2	99.9999
3	100.0000
4	99.9999
5	99.9998
OFF-CENTER LOADING	0.0001

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT PRODUCTION AREA

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

รายงานฉบับที่ 3

รายงานผลการตรวจสอบ ซ่อมบำรุงและปรับแต่งเครื่องมือและอุปกรณ์ใน
สถานีตรวจวัดคุณภาพอากาศ (Station) และหน่วยตรวจวัดคุณภาพ
อากาศแบบเคลื่อนที่ (Mobile & Micro) ทั้ง 9 หน่วย

“ในระหว่างวันที่ 1 กรกฎาคม 2565 ถึงวันที่ 31 ตุลาคม 2565”



“ใบสั่งซื้อ/ส่งจ้างเลขที่ 3100170564”



บริษัท ไออาร์พีซี จำกัด (มหาชน)



บริษัท เพทโร-อินสตรูเมนต์ จำกัด



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

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 August 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 หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

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

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 _x 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 ₂ ,HC,CO)	-	1800/36 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x 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 _x 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 _x BKG. ppb	8.7	8.7	ppb	0 to 60
NO COEF.	1.084	1.088	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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	(-3 °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 :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ 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 ₂ BKG. ppb	13.7	13.7	ppb	0 to 60
SO ₂ 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 :

PETRO-INSTRUMENTS CORP.,LTD.

O₃ 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 ₃ BKG. ppb	-0.5	-0.5	ppb	0 to 60
O ₃ 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 ₃				
Cell-A	24.9	24.3	ppb	Record only
Cell-B	11.6	13.1	ppb	Record only
O ₃	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 :

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 :

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	1.748	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 :

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 ³	0 to 1000 ug/m ³
b. Mass	16	3	ug/m ³	0 – 5,000 ug/m ³
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 :

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 ₂)	44.73	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84	ppm	Model :	146C
Methane (CH ₄)	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 _x (ppb)	0.00	1.70	1.70	400	401.0	0.25	Valid
SO ₂ (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 ₃ (ppb)	0.00	0.00	0.00	400	394.0	-1.50	Valid
CH ₄ (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 _x (ppb)	0.00	1.50	1.50	400	404.0	1.00	Valid
SO ₂ (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 ₃ (ppb)	0.00	1.00	1.00	400	399.0	-0.25	Valid
CH ₄ (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 :

PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Pluakgate IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas H2



Gas STD



PETRO-INSTRUMENTS CORP.,LTD.

อุปกรณ์ทำความสะอาด



Log Sheet



ถังดับเพลิง



EXP :xx-xx-xxxx

Replace Silica gel

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 August 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 หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

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

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 _x 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 ₂ ,HC,CO)	-	1800/36 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x 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 _x 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 _x BKG. ppb	8.7	8.7	ppb	0 to 60
NO COEF.	1.088	1.088	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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	(-3 °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 :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ 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 ₂ BKG. ppb	13.7	13.9	ppb	0 to 60
SO ₂ 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 :

PETRO-INSTRUMENTS CORP.,LTD.

O₃ 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 ₃ BKG. ppb	-0.5	-0.5	ppb	0 to 60
O ₃ 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 ₃				
Cell-A	0.8	24.3	ppb	Record only
Cell-B	2.0	13.1	ppb	Record only
O ₃	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 :

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 :

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 ³	0 to 1000 ug/m ³
b. Mass	91	93	ug/m ³	0 – 5,000 ug/m ³
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 :

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 ₂)	44.73	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84	ppm	Model :	146C
Methane (CH ₄)	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 _x (ppb)	0.00	1.90	1.90	400	398.0	-0.50	Valid
SO ₂ (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
O3 (ppb)	0.00	1.00	1.00	400	391.0	-2.25	Valid
CH4 (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 _x (ppb)	0.00	1.60	1.60	400	403.0	0.75	Valid
SO ₂ (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 ₃ (ppb)	0.00	1.00	1.00	400	398.0	-0.50	Valid
CH ₄ (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 Pluakgate IRPC



Inside Station



Lamp Sampling Box



Replace Filter



PETRO-INSTRUMENTS CORP.,LTD.

Gas H2



Gas STD



อุปกรณ์ทำความสะอาด



Log Sheet



ถังดับเพลิง



EXP :xx-xx-xxxx

Replace Silica gel

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. :	wirasak.k@irpc.co.th
Working Date :	06 September 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.
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:

- ตรวจเช็คถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

Serviced Date 06 September 2022

Approved Date : 06 September 2022

7/409 SolVibhavadi-Rangsit 36, Vibhavadi-Rangsit Rd., Chatuchak, Bangkok 10900, Thailand
 TEL: (662) 939 5711 (12 Lines), 513 2333 (12 Lines), 513 9575-9 FAX: (662) 513 3730, 939 4207-8
 Website <http://www.pico.co.th> E-mail-address: gshe@pico.co.th

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 _x 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 ₂ ,HC,CO)	-	1800/36 psi	

Note :

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

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x 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 _x 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 _x BKG. ppb	8.8	8.8	ppb	0 to 60
NO COEF.	1.088	1.092	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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 :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ 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 ₂ BKG. ppb	13.9	13.9	ppb	0 to 60
SO ₂ 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 :

PETRO-INSTRUMENTS CORP.,LTD.

O₃ 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 ₃ BKG. ppb	-0.5	-0.5	ppb	0 to 60
O ₃ 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 ₃				
Cell-A	16.4	10.2	ppb	Record only
Cell-B	9.4	-2.6	ppb	Record only
O ₃	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 :

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 :

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	2.053	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				
CH4 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				
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	37.4	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 :

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 ³	0 to 1000 ug/m ³
b. Mass	4	22	ug/m ³	0 – 5,000 ug/m ³
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 :

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 ₂)	44.73	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84	ppm	Model :	146C
Methane (CH ₄)	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 _x (ppb)	0.00	1.60	1.60	400	402.0	0.50	Valid
SO ₂ (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 ₃ (ppb)	0.00	0.00	0.00	400	390.0	-2.50	Valid
CH ₄ (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 _x (ppb)	0.00	1.60	1.60	400	403.0	0.75	Valid
SO ₂ (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 ₃ (ppb)	0.00	1.00	1.00	400	400.0	0.00	Valid
CH ₄ (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 :

PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Pluakgate IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas H2



Gas STD



PETRO-INSTRUMENTS CORP.,LTD.

<p>อุปกรณ์ทำความสะอาด</p> 	<p>Log Sheet</p> 
<p>ถังดับเพลิง</p>  <p>EXP :xx-xx-xxxx</p>	<p>Replace Silica gel</p>
<p>Replace fan of O3</p> 	

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. :	wirasak.k@irpc.co.th
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:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่

- End -

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 _x 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 ₂ ,HC,CO)	-	1800/36 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x 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 _x 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 _x BKG. ppb	8.8	8.8	ppb	0 to 60
NO COEF.	1.092	1.092	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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 :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ 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 ₂ BKG. ppb	13.9	14.1	ppb	0 to 60
SO ₂ 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 :

PETRO-INSTRUMENTS CORP.,LTD.

O₃ 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 ₃ BKG. ppb	-0.5	-0.5	ppb	0 to 60
O ₃ 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 ₃				
Cell-A	20.4	6.3	ppb	Record only
Cell-B	8.2	8.7	ppb	Record only
O ₃	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

Note :

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 :

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 :

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 ³	0 to 1000 ug/m ³
b. Mass	35	47	ug/m ³	0 – 5,000 ug/m ³
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 :

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 ₂)	44.73	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.84	ppm	Model :	146C
Methane (CH ₄)	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 _x (ppb)	0.00	1.60	1.60	400	401.0	0.25	Valid
SO ₂ (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
O3 (ppb)	0.00	1.00	1.00	400	399.0	-0.25	Valid
CH4 (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 _x (ppb)	0.00	1.50	1.50	400	404.0	1.00	Valid
SO ₂ (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
O3 (ppb)	0.00	1.00	1.00	400	401.0	0.25	Valid
CH4 (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 Pluakgate IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas H2



Gas STD



อุปกรณ์ทำความสะอาด



Log Sheet



ถังดับเพลิง



EXP :xx-xx-xxxx

Replace Silica gel

Replace fan of O3





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

สถานีตรวจวัดฯบริเวณโรงเรียน เทคโนโลยี ไออาร์พีซี

ใบสั่งซื้อ/ส่งจ้างเลขที่ 3100170564
Job No : JID2200310



บริษัท เพโทร-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. :	wirasak.k@irpc.co.th
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 _x 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:

- ตรวจเช็คถังดับเพลิงในสถานีพบว่าหมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- TEOM ยกเครื่องกลับไปซ่อมที่ บริษัท PICO

-- End --

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 _x 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 ₂ ,SO ₂ ,HC,CO)	-	1900/30 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x 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 _x 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 _x BKG. Ppb	47.6	47.6	ppb	0 to 60
NO COEF.	1.150	1.150	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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/NOx	NO/NOx		NO/NOx, NO, NOx
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	(-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.

SO₂ 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 ₂ BKG. ppb	56.8	56.9	ppb	0 to 60
SO ₂ 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 :

PETRO-INSTRUMENTS CORP.,LTD.

CO₂ 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 ₂ BKG. ppm			ppm	0 to 60
CO ₂ 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 :

ปิดเครื่องไว้อยู่ในระหว่างนำ part มาเปลี่ยน

PETRO-INSTRUMENTS CORP.,LTD.

O₃ 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 ₃ BKG. ppb	-0.9	-0.9	ppb	0 to 60
O ₃ 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 ₃				
Cell-A	2.5	-67.2	ppb	Record only
Cell-B	58.0	97.2	ppb	Record only
O ₃	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 :

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	0.375	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 :

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	1.820	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 :

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 ยกกลับไปซ่อมที่ บริษัท pico

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 :

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 ₂)	45.03	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.74	ppm	Model :	146i
Methane (CH ₄)	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 _x (ppb)	0.0			400.0			
SO ₂ (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 _x (ppb)	0.0	1.40	1.40	400.0	404.0	1.00	Valid
SO ₂ (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. เนื่องจากมีลมรั่วที่ Zero Air (รอกการแก้ไข)

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Techno IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas STD



Gas H2



AOMs Log Sheet



Replace Silica gel



ถังดับเพลิง



EXP :xx-xx-xxxx

อุปกรณ์ทำความสะอาด

Clean sampling set

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. :	wirasak.k@irpc.co.th
Working Date :	22 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 _x 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 ยกเครื่องกลับไปซ่อมที่ บริษัท PICO

-- End --

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 _x 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 ₂ ,HC,CO)	-	1900/30 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x 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 _x 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 _x BKG. Ppb	47.6	47.6	ppb	0 to 60
NO COEF.	1.150	1.150	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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	(-3) °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 :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ 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 ₂ BKG. ppb	56.7	56.7	ppb	0 to 60
SO ₂ 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	737.3	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 :

PETRO-INSTRUMENTS CORP.,LTD.

CO₂ 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 ₂ BKG. ppm			ppm	0 to 60
CO ₂ 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 : ปิดเครื่องไว้ก่อนในระหว่างนำ part มาเปลี่ยน

PETRO-INSTRUMENTS CORP.,LTD.

O₃ 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 ₃ BKG. ppb	-0.9	-0.9	ppb	0 to 60
O ₃ 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 ₃				
Cell-A	105.7	-87.4	ppb	Record only
Cell-B	-85.3	103.2	ppb	Record only
O ₃	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 :

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 :

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 :

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 ยกกลับไปซ่อมที่ บริษัท pico

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 :

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 ₂)	45.03	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.74	ppm	Model :	146i
Methane (CH ₄)	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 _x (ppb)	0.0			400.0			
SO ₂ (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 _x (ppb)	0.0	1.00	1.00	400.0	402.0	0.50	Valid
SO ₂ (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. เนื่องจากมีลมรั่วที่ Zero Air (รอกการแก้ไข)

PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Techno IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas STD



Gas H2



PETRO-INSTRUMENTS CORP.,LTD.

AQMs Log Sheet



Replace Silica gel



ถังดับเพลิง



EXP :xx-xx-xxxx

อุปกรณ์ทำความสะอาด

Clean sampling set



บริษัท เพทโร-อินสตรูเมนต์ จำกัด

PETRO-INSTRUMENTS CORP., LTD.

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

TEL: (662) 939 5711 (12 Lines), 513 2333 (12 Lines), 513 9575-9 FAX: (662) 513 3730, 939 4208

http : // www.pico.co.th E-mail-address : gshe@pico.co.th

SERVICE REPORT

Job No./เลขที่ของงาน :	JID2100310	Customer name/ ชื่อลูกค้า :	IRPC
Equipment /อุปกรณ์ :	Zero Air Supply	Station name/ชื่อสถานี :	Technology Station
Manufacturer/ผู้ผลิต :	Thermo	Location/ตั้งอยู่ที่ :	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@irpc.co.th
Working Hour/ชั่วโมงทำงาน :	6 Hr.	Mileage/ระยะทาง :	1600 km.

SCOPE OF WORK

(ขอบเขตของงาน)

☒ Urgent ☐ Service ☐ Other

FUNCTION CHECK&

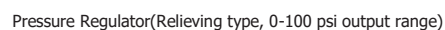
CORRECT ACTION

(ตรวจสอบการทำงานและการแก้ไข)

1. ทาการตรวจเช็ค Zero Air Supply Thermo Model 1160 พบว่า เกิดการ leak บริเวณ Pressure Regulator ตรวจเช็คพบว่า Pressure Regulator เสีย



ตรวจเช็คพบว่ามี การ leak บริเวณ Pressure Regulator



= 1 ea.

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

Service Report

Working Scope:

Service Station

Physical Checking:

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

Correction working:

Calibrate single-point of all analyzers.	Replace silica gel for dryer NO _x 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:

- ตรวจเช็คถึงดับเพลิงในสถานีพบว่า หมตอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- TEOM ยกเครื่องกลับไปซ่อมที่ บริษัท PICO

-- End --

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 _x 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 ₂ ,SO ₂ ,HC,CO)	-	1900/30 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x 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 _x 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 _x BKG. Ppb	47.6	47.6	ppb	0 to 60
NO COEF.	1.150	1.150	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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	(-)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 :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ 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 ₂ BKG. ppb	56.7	56.7	ppb	0 to 60
SO ₂ 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 :

PETRO-INSTRUMENTS CORP.,LTD.

CO₂ 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 ₂ BKG. ppm			ppm	0 to 60
CO ₂ 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 :

ปิดเครื่องไว้อยู่ในระหว่างนำ part มาเปลี่ยน

PETRO-INSTRUMENTS CORP.,LTD.

O₃ 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 ₃ BKG. ppb	-0.9	-0.9	ppb	0 to 60
O ₃ 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 ₃				
Cell-A	9.9	3.6	ppb	Record only
Cell-B	14.0	9.3	ppb	Record only
O ₃	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 :

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 :

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 :

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 ยกกลับไปซ่อมที่ บริษัท pico

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 :

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 ₂)	45.03	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.74	ppm	Model :	146i
Methane (CH ₄)	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 _x (ppb)	0.0			400.0			
SO ₂ (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 _x (ppb)	0.0		0.00	400.0			Valid
SO ₂ (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. เนื่องจากมีลมรั่วที่ Zero Air (รอกการแก้ไข)

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Techno IRPC



Inside Station



Lamp Sampling Box



Replace Filter



Gas STD



Gas H2



AOMs Log Sheet



Replace Silica gel



ถังดับเพลิง



EXP :xx-xx-xxxx

อุปกรณ์ทำความสะอาด

Clean sampling set

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. :	wirasak.k@irpc.co.th
Working Date :	17 September 2022	Working Hour :	6 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจเช็ค Data logger พบว่าทำงานได้ปกติ
- ตรวจเช็ค Diagnostic of all analyzers อยู่ในเกณฑ์ปกติ, เครื่อง VOC น้ำกลั่นมาแก้ไขเนื่องจากใช้ N2 มากผิดปกติ
- ตรวจเช็ค Reading of all analyzers และ Met sensor พบว่า WD, WS, TEMP, RH Sensor เสีย
- 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 _x 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 ยกเครื่องกลับไปซ่อมที่ บริษัท PICO

-- End --

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 _x 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 ₂ ,HC,CO)	-	1900/30 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x 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 _x 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 _x BKG. Ppb	47.6	47.6	ppb	0 to 60
NO COEF.	1.150	1.150	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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 :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ 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 ₂ BKG. ppb	56.7	56.8	ppb	0 to 60
SO ₂ 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 :

PETRO-INSTRUMENTS CORP.,LTD.

CO₂ 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 ₂ BKG. ppm			ppm	0 to 60
CO ₂ 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 : ปิดเครื่องไว้ก่อนในระหว่างนำ part มาเปลี่ยน

PETRO-INSTRUMENTS CORP.,LTD.

O₃ 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 ₃ BKG. ppb	-0.9	-0.9	ppb	0 to 60
O ₃ 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 ₃				
Cell-A	279.0	64.5	ppb	Record only
Cell-B	-248.0	-32.4	ppb	Record only
O ₃	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 :

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 :

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 :

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 ยกกลับไปซ่อมที่ บริษัท pico

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 :

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 ₂)	45.03	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	44.74	ppm	Model :	146i
Methane (CH ₄)	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 _x (ppb)	0.0			400.0			
SO ₂ (ppb)	0.0			400.0			
CO(ppm)	0.0			40.1			
O ₃ (ppb)	0.0			400.0			
CH ₄ (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 _x (ppb)	0.0		0.00	400.0			Valid
SO ₂ (ppb)	0.0		0.00	400.0			Valid
CO(ppm)	0.0		0.00	40.1			Valid
O ₃ (ppb)	0.0		0.00	400.0			Valid
CH ₄ (ppm)	0.0		0.00	4.50			Valid
THC(ppm)	0.0		0.00	4.50			Valid

Remark : ไม่ทำ Auto cal. เนื่องจากมีลมรั่วที่ Zero Air (รอกการแก้ไข)

PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Techno IRPC



Inside Station



Lamp Sampling Box



Replace Filter






Gas STD



Gas H2



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

SERVICE REPORT

Job No./ เลขที่ของงาน :	JID2100311	Customer name/ ชื่อลูกค้า :	IRPC
Equipment / อุปกรณ์ :	AQMs station	Station name/ ชื่อสถานี :	Techno
Manufacturer/ ผู้ผลิต :	-	Location/ ตั้งอยู่ที่ :	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.

SCOPE OF WORK

(ขอบเขตของงาน)

☐ Service ☒ Urgent: CM Konnong station ☐ Other

FUNCTION CHECK& CORRECT ACTION

(ตรวจสอบการทำงานและการแก้ไข)

- Data Logger ทำงานปกติ
- Zero Air Regulator เสีย
- Calibrator ทำงานปกติ
- SO2 Analyzer ทำงานปกติ
- NOx Analyzer Alarm Cooler Temperature
- Power Supply 12 VDC สำหรับชุด MET เสีย
- WD Sensor เสีย
- WS Sensor เสีย
- TEMP Sensor เสีย
- RH Sensor เสีย
- BP Sensor ทำงานปกติ
- ทำการเปลี่ยนอะไหล่ดังนี้
 - 1. Regulator for Zero (Part PICO) = 1 ea.
 - 2. Cooler for Nox Analyzer (Part IRPC) = 1 ea.
 - 3. Supply for MET (Part IRPC) = 1 ea.



บริษัท เพทโทร-อินสตรูเมนต์ จำกัด

PETRO-INSTRUMENTS CORP., LTD.

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

TEL: (662) 939 5711 (12 Lines), 513 2333 (12 Lines), 513 9575-9 FAX: (662) 513 3730, 939 4208

http : // www.pico.co.th E-mail-address : gshe@pico.co.th

PART REPLACEMENT
(รายการเปลี่ยนอะไหล่)

รายการเปลี่ยนอะไหล่

- | | | |
|--|-------------|---------|
| 1. Regulator for Zero (Part PICO) | P/N - | = 1 ea. |
| 2. Cooler for Nox Analyzer (Part IRPC) | P/N 9995 | = 1 ea. |
| 3. Supply for MET (Part IRPC) | P/N S-35-12 | = 1 ea. |

RECOMMENDATION
(คำแนะนำ)



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http : // www.pico.co.th E-mail-address : gshe@pico.co.th

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



บริษัท เพทโร-อินสตรูเมนต์ จำกัด

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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/ ตั้งอยู่ที่ :	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.

SCOPE OF WORK (ขอบเขตของงาน)	<input type="checkbox"/> Service <input checked="" type="checkbox"/> Urgent: CM Konnong station <input type="checkbox"/> Other
FUNCTION CHECK & CORRECT ACTION (ตรวจสอบการทำงานและการแก้ไข)	<p>วันที่ 6 ตุลาคม 2565 นำเครื่อง VOC กลับมาแก้ไข VOC ใช้ N2 มากผิดปกติ 150-200 PSI ต่อวัน</p> <ul style="list-style-type: none">- จากการตรวจเช็คพบ Pneumatic Actuator 6 port ชำรุด  <ul style="list-style-type: none">- เปลี่ยน Pneumatic Actuator 6 port ใหม่ 1 ชุด  <ul style="list-style-type: none">- ติดตั้งเครื่องตรวจวัดวันที่ 12 ตุลาคม 2565
PART REPLACEMENT (รายการเปลี่ยนอะไหล่)	รายการเปลี่ยนอะไหล่ Pneumatic Actuator 6 port (Part PICO) P/N CS/PN/00005-0002 = 1 ea.
RECOMMENDATION (คำแนะนำ)	

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



รายงานฉบับที่ 3 : รายงานผลการดูแล ตรวจสอบ บำรุงรักษาและปรับแต่งเครื่องมือและอุปกรณ์ในสถานีตรวจวัดคุณภาพอากาศ และหน่วยตรวจวัดคุณภาพอากาศแบบเคลื่อนที่ฯ ทั้ง 9 หน่วย
ครั้งที่ 2 : ตั้งแต่วันที่ 1 กรกฎาคม 2565 ถึงวันที่ 31 ตุลาคม 2565

สถานีตรวจวัดฯ บริเวณ
อบต.บ้านแลง

ใบส่งชื่อ/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 :	Ban Lang Station	E-mail address/Fax. :	wirasak.k@irpc.co.th
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 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 _x Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacement:

- Sample filter 47 mm. 5 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

Addition Recommended:

- ตรวจเช็คถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- Zero air นำมาจาก Micro#1 มาติดตั้งใช้งานชั่วคราว

— End —

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

PETRO-INSTRUMENTS CORP.,LTD.

General Checking

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

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Mobile 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 _x analyzer	OK	OK	
11	UPS 6 KVA	Bypass	Not use	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	1100/40 psi	
16	Standard gas#1 (NO,SO ₂ ,HC,CO)	-	1850/24 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x analyzer.	Model :	42i
Serial Number :	CM9540006	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	13.5	5.8	ppb	
NO _x reading	24.6	12.6	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	30.2	26.9	ppb	0 to 60
NO _x BKG. ppb	30.1	26.8	ppb	0 to 60
NO COEF.	1.294	1.294	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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				
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	15.3	15.3	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	-1041.2	-1041.2	Vdc	-400 to -1200 Vdc
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	15.0	15.0	Vdc	15.0 ± 1 Vdc
P15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	42.4	40.5	°C	15 °C to 45 °C
Chamber	46.7	46.8	°C	45 °C ± 2 °C
Cooler	-2.0	-3.0	°C	(-3) °C ± 2 °C
Converter	321.8	322.9	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	262.6	261.7	mmHg	250 ± 100 mmHg
Flow	0.611	0.614	L/min	0.5 to 1.00 L/min

Note :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ Analyzer

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	CM09540005	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.5	2.2	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
SO ₂ BKG. ppb	25.9	26.6	ppb	0 to 60
SO ₂ COEF	0.949	0.949	-	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	45	45	%	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	-718.2	-718.2		
Flash Supply	886	885		
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	14.7	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	34.8	31.9	°C	15 °C to 45 °C
Chamber	44.9	45.1	°C	45 °C ± 2 °C
Pressure	733.6	733.9	mmHg	750 ± 100 mmHg
Flow	0.542	0.542	L/min	0.5 to 1.00 L/min
Lamp intensity	92	92	%	40 - 100 %

Note :

PETRO-INSTRUMENTS CORP.,LTD.

CO Analyzer

Equipment :	Carbon Monoxide Analyzer.	Model :	48i-BNZAB
Serial Number :	CM09540032	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.491	0.816	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	10.851	10.867	ppm	0 to 60
CO COEF	1.285	1.285	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	On/Off	On
Pressure Compensation	On	On	On/Off	On
Baud Rate	9600	9600	bps	1200 to 115000
Instrument ID	48	48	-	0 to 99
Screen Contrast	45	45	%	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 +/- 1.0 Vdc
5.0 supply	4.9	4.9	Vdc	5.0 +/- 1.0 Vdc
15.0 supply	15.1	15.1	Vdc	15 +/- 2.0 Vdc
24.0 supply	23.8	23.8	Vdc	24.0 +/- 2.0 Vdc
-3.3 supply	-3.2	-3.2	Vdc	-3.3 +/- 1.0 Vdc
Interface board voltages:				
3.3 supply	3.3	3.3	Vdc	3.3 +/- 1.0 Vdc
5.0 supply	5.0	5.0	Vdc	5.0 +/- 1.0 Vdc
15.0 supply	15.0	15.0	Vdc	15 +/- 2.0 Vdc
24.0 supply	23.6	23.6	Vdc	24.0 +/- 2.0 Vdc
-15.0 supply	-15.0	-15.0	Vdc	-15.0 +/- 2.0 Vdc
18.0 IR supply	18.2	18.2	Vdc	18.0 +/- 2.0 Vdc
18.0 MOT supply	20.5	19.7	Vdc	18.0 +/- 2.0(Swing)
Temperatures				
Internal	34.9	32.3	°C	15°C to 45°C
Chamber	48.4	48.2	°C	50°C +/- 2°C
Pressure	748.6	748.3	mmHg	760 +/- 100 mmHg
Flow	0.917	0.918	L/min	1.00 +/- 0.3 L/min
S/R Ratio	1.1424800	1.1424100	-	1.14 - 1.18 @ ZERO
AGC intensity	198212	198392	Hz	150,000 - 300,000 Hz
Motor speed	100.01	100.01	%	80-100 %

Note :

PETRO-INSTRUMENTS CORP.,LTD.

O₃ Analyzer

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09540031	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	6.3	12.4	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O ₃ BKG. ppb	-1.5	-1.3	ppb	0 to 60
O ₃ COEF	0.932	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	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	15.1	15.1	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 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.2	-15.2	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.6	9.6	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	37.5	36.0	°C	5 - 50 °C
Bench Lamp Temp	54.1	54.1	°C	50 - 60 °C
Pressure	750.3	751.5	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.683	0.684	L/min	0.6 ± 0.2 L/min
Cell-B	0.699	0.701	L/min	0.6 ± 0.2 L/min
CELL A/B O ₃				
Cell-A	8.4	7.4	ppb	Record only
Cell-B	-8.3	15.8	ppb	Record only
O ₃	6.6	13.5	ppb	Record only
Lamp Intensity				
Cell A	86516	87284	Hz	45,000 - 150,000 HZ
Cell B	42708	43095	Hz	45,000 - 150,000 HZ

Note :

PETRO-INSTRUMENTS CORP.,LTD.

THC Analyzer

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	2ERTBRJ	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	2.076	2.074	ppm	0-25 ppm
NMHC reading	0.091	0.073	ppm	0-25 ppm
THC reading	2.167	2.147	ppm	0-25 ppm
Analyzer reading				
CH4 reading	2.076	2.074	ppm	0-25 ppm
NMHC reading	0.091	0.073	ppm	0-25 ppm
THC reading	2.167	2.147	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-50	-50	-	-3500 to 3500
Span calibration coefficient	1.1000	1.1000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-30	-30	-	-3500 to 3500
Span calibration coefficient	1.2000	1.2000	-	0.50000 to 2.00000
Analog Input				
Detector temp	38.0	35.5	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	78.2	78.2	kPa	80 kPa ± 4 kPa
Ambient	99.0	99.0	kPa	Current Atmospheric pressure
Purifier temp	414.3	412.3	°C	390-430 °C
Purifier pressure	18.2	18.8	kPa	8 kPa -25 kPa
NMC cutter temp	241.8	241.7	°C	230-260 °C
DC.24V	23.9	23.9	V.	24V ± 0.5 V
DC.5V	5.0	5.0	V.	5V ± 0.5 V

Note :

PETRO-INSTRUMENTS CORP.,LTD.

Continuous Ambient Particulate Monitor (PM-10)

Equipment :	PM10 (C14 Beta)	Model :	FH 62C14
Serial Number :	E-2276	Manufacturer :	Thermo Environment Instrument

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	40	18	µg/m ³	0 to 1000 µg/m ³
b. Mass	77	117	µg	1,500 µg (max. 3000 µg)
2) Operating Data				
a. Ambient conditions				
• Temperature:	31	31		-20°C....+50°C
• Air pressure:	1009	1009		750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	µg	
b. Air flow rate	<950	<950	L/Hr	
c. Cycle	720	720	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	50	50	°C	
b. Air flow rate	1000	1000	L/Hr	
5) Maintenance				
a. High Voltage	1300	1300	V	
b. Ref. threshold S2	195	195	mV	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION

All analyzer.

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

Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO ₂)	44.96	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	45.10	ppm	Model :	146i
Methane (CH ₄)	499.3	ppm	Serial number :	CM09350122
Carbon Monoxide (CO)	4527	ppm		
Cylinder NO. :	CC112632			
Expiration Date :	13 Aug 2023			

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	2.0	2.0	400	397	-0.8	valid
NO _x (ppb)	0.0	2.0	2.0	400	399	-0.3	valid
SO ₂ (ppb)	0.0	0.0	0.0	403	397	-1.5	valid
CO (ppm)	0.0	0.2	0.2	40.1	39.5	-1.5	valid
O ₃ (ppb)	1.0	1.0	1.0	400	399	-0.3	valid
CH ₄ (ppm)	0.0			4.00			
THC (ppm)	0.0			4.00			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	2.0	2.0	400	403	0.8	valid
NO _x (ppb)	0.0	2.0	2.0	400	405	1.3	valid
SO ₂ (ppb)	0.0	1.0	1.0	403	402	-0.2	valid
CO (ppm)	0.0	0.1	0.1	40.1	39.9	-0.5	valid
O ₃ (ppb)	1.0	1.0	1.0	400	403	0.8	valid
CH ₄ (ppm)	0.0	0.01	0.010	4.00	4.00	0.0	valid
THC (ppm)	0.0	0.01	0.010	4.00	4.00	0.0	valid

Remark : Percent Error per point must be less than $\pm 5\%$

PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Banlang



Inside Station



Lamp Sampling Box



Replace Filter



Gas STD



Gas H2



PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Log Sheet



Replace Silica gel



ถังดับเพลิง



EXP :xx-xx-xxxx

อุปกรณ์ทำความสะอาด

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 Lang Station	E-mail address/Fax. :	wirasak.k@irpc.co.th
Working Date :	17 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 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 _x Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.
Clean sampling set.	

Part Replacement:

- Sample filter 47 mm. 5 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- Zero air นำมาจาก Micro#1 มาติดตั้งใช้งานชั่วคราว

PETRO-INSTRUMENTS CORP.,LTD.

General Checking

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

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Mobile 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 _x analyzer	OK	OK	
11	UPS 6 KVA	Bypass	Not use	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	900/40 psi	
16	Standard gas#1 (NO,SO ₂ ,HC,CO)	-	1850/24 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x analyzer.	Model :	42i
Serial Number :	CM9540006	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	4.0	1.4	ppb	
NO _x reading	6.7	4.6	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	26.9	24.4	ppb	0 to 60
NO _x BKG. ppb	26.8	26.7	ppb	0 to 60
NO COEF.	1.424	1.442	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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				
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	15.3	15.3	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	-1041.2	-1041.2	Vdc	-400 to -1200 Vdc
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	15.0	15.0	Vdc	15.0 ± 1 Vdc
P15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	42.1	40.0	°C	15 °C to 45 °C
Chamber	46.8	46.7	°C	45°C ± 2 °C
Cooler	-1.9	-3.0	°C	(-)3 °C ± 2 °C
Converter	322.4	323.7	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	262.6	261.4	mmHg	250 ± 100 mmHg
Flow	0.611	0.612	L/min	0.5 to 1.00 L/min

Note :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ Analyzer

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	CM09540005	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.6	1.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
SO ₂ BKG. ppb	26.5	26.4	ppb	0 to 60
SO ₂ COEF	0.949	0.947	-	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	45	45	%	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	-718.2	-718.2		
Flash Supply	886	885		
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	14.7	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	34.1	32.9	°C	15°C to 45°C
Chamber	45.2	45.1	°C	45°C ± 2°C
Pressure	733.3	733.3	mmHg	750 ± 100 mmHg
Flow	0.541	0.542	L/min	0.5 to 1.00 L/min
Lamp intensity	92	92	%	40 – 100 %

Note :

PETRO-INSTRUMENTS CORP.,LTD.

CO Analyzer

Equipment :	Carbon Monoxide Analyzer.	Model :	48i-BNZAB
Serial Number :	CM09540032	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.655	0.430	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	10.872	10.911	ppm	0 to 60
CO COEF	1.285	1.287	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	On/Off	On
Pressure Compensation	On	On	On/Off	On
Baud Rate	9600	9600	bps	1200 to 115000
Instrument ID	48	48	-	0 to 99
Screen Contrast	45	45	%	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 +/- 1.0 Vdc
5.0 supply	4.9	4.9	Vdc	5.0 +/- 1.0 Vdc
15.0 supply	15.1	15.1	Vdc	15 +/- 2.0 Vdc
24.0 supply	23.8	23.8	Vdc	24.0 +/- 2.0 Vdc
-3.3 supply	-3.2	-3.2	Vdc	-3.3 +/- 1.0 Vdc
Interface board voltages:				
3.3 supply	3.3	3.3	Vdc	3.3 +/- 1.0 Vdc
5.0 supply	5.0	5.0	Vdc	5.0 +/- 1.0 Vdc
15.0 supply	15.0	15.0	Vdc	15 +/- 2.0 Vdc
24.0 supply	23.6	23.6	Vdc	24.0 +/- 2.0 Vdc
-15.0 supply	-15.0	-15.0	Vdc	-15.0 +/- 2.0 Vdc
18.0 IR supply	18.2	18.2	Vdc	18.0 +/- 2.0 Vdc
18.0 MOT supply	16.9	17.8	Vdc	18.0 +/- 2.0(Swing)
Temperatures				
Internal	34.1	33.2	°C	15°C to 45°C
Chamber	48.0	48.0	°C	50°C +/- 2°C
Pressure	748.3	748.6	mmHg	760 +/- 100 mmHg
Flow	0.884	0.909	L/min	1.00 +/- 0. 3 L/min
S/R Ratio	1.1429700	1.1420700	-	1.14 – 1.18 @ ZERO
AGC intensity	198443	198477	Hz	150,000 – 300,000 Hz
Motor speed	100.02	100.03	%	80-100 %

Note :

PETRO-INSTRUMENTS CORP.,LTD.

O₃ Analyzer

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09540031	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	13.1	11.4	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O ₃ BKG. ppb	-1.3	-1.3	ppb	0 to 60
O ₃ COEF	0.932	0.935	-	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	15.1	15.1	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 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.2	-15.2	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.6	9.6	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	37.3	36.4	°C	5 - 50 °C
Bench Lamp Temp	54.2	54.2	°C	50 - 60 °C
Pressure	750.6	750.3	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.679	0.682	L/min	0.6 ± 0.2 L/min
Cell-B	0.696	0.702	L/min	0.6 ± 0.2 L/min
CELL A/B O ₃				
Cell-A	17.2	16.7	ppb	Record only
Cell-B	8.3	4.1	ppb	Record only
O ₃	13.0	10.4	ppb	Record only
Lamp Intensity				
Cell A	86542	86957	Hz	45,000 - 150,000 HZ
Cell B	45472	45924	Hz	45,000 - 150,000 HZ

Note :

PETRO-INSTRUMENTS CORP.,LTD.

THC Analyzer

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	2ERTBRJ	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH ₄ reading	2.148	2.216	ppm	0-25 ppm
NMHC reading	0.128	0.995	ppm	0-25 ppm
THC reading	2.276	3.211	ppm	0-25 ppm
Analyzer reading				
CH ₄ reading	2.148	2.216	ppm	0-25 ppm
NMHC reading	0.128	0.995	ppm	0-25 ppm
THC reading	2.276	3.211	ppm	0-25 ppm
Calibration Factors				
CH ₄				
Zero calibration coefficient	-50	-50	-	-3500 to 3500
Span calibration coefficient	1.1000	1.1000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-30	-30	-	-3500 to 3500
Span calibration coefficient	1.2000	1.2000	-	0.50000 to 2.00000
Analog Input				
Detector temp	37.3	36.4	°C	Ambient Temp +(5 - 15 °C)
Detector pressure	78.0	78.1	kPa	80 kPa ± 4 kPa
Ambient	98.9	98.9	kPa	Current Atmospheric pressure
Purifier temp	414.4	412.4	°C	390-430 °C
Purifier pressure	18.8	18.7	kPa	8 kPa -25 kPa
NMC cutter temp	242.0	243.0	°C	230-260 °C
DC.24V	23.9	23.9	V.	24V ± 0.5 V
DC.5V	5.0	5.0	V.	5V ± 0.5 V

Note :

PETRO-INSTRUMENTS CORP.,LTD.

Continuous Ambient Particulate Monitor (PM-10)

Equipment :	PM10 (C14 Beta)	Model :	FH 62C14
Serial Number :	E-2276	Manufacturer :	Thermo Environment Instrument

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	18	0	µg/m ³	0 to 1000 µg/m ³
b. Mass	16	27	µg	1,500 µg (max. 3000 µg)
2) Operating Data				
a. Ambient conditions				
• Temperature:	31	31		-20°C....+50°C
• Air pressure:	1006	1006		750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	µg	
b. Air flow rate	<950	<950	L/Hr	
c. Cycle	720	720	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	50	50	°C	
b. Air flow rate	1000	1000	L/Hr	
5) Maintenance				
a. High Voltage	1300	1300	V	
b. Ref. threshold S2	195	195	mV	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION

All analyzer.

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

Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO ₂)	44.96	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	45.10	ppm	Model :	146i
Methane (CH ₄)	499.3	ppm	Serial number :	CM09350122
Carbon Monoxide (CO)	4527	ppm		
Cylinder NO. :	CC112632			
Expiration Date :	13 Aug 2023			

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	2.0	2.0	400	399	-0.3	valid
NO _x (ppb)	0.0	2.0	2.0	400	401	0.3	valid
SO ₂ (ppb)	0.0	2.0	2.0	403	396	-1.7	valid
CO (ppm)	0.0	0.3	0.3	40.1	40.0	-0.2	valid
O ₃ (ppb)	1.0	1.0	1.0	400	396	-1.0	valid
CH ₄ (ppm)	0.0			4.00			
THC (ppm)	0.0			4.00			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	1.0	1.0	400	401	0.3	valid
NO _x (ppb)	0.0	2.0	2.0	400	403	0.8	valid
SO ₂ (ppb)	0.0	1.0	1.0	403	400	-0.7	valid
CO (ppm)	0.0	0.2	0.2	40.1	40.2	0.2	valid
O ₃ (ppb)	1.0	1.0	1.0	400	402	0.5	valid
CH ₄ (ppm)	0.0	0.01	0.010	4.00	3.99	-0.2	valid
THC (ppm)	0.0	0.01	0.010	4.00	4.00	0.0	valid

Remark : Percent Error per point must be less than ± 5 %

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Banlang



Inside Station



Lamp Sampling Box



Replace Filter



Gas STD



Gas H2



ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Log Sheet



Replace Silica gel



ถังดับเพลิง



อุปกรณ์ทำความสะอาด

EXP :xx-xx-xxxx

Clean sampling set



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 Lang Station	E-mail address/Fax. :	wirasak.k@irpc.co.th
Working Date :	02 September 2022	Working Hour :	6 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจสอบ Data logger พบว่าทำงานได้ปกติ
- ตรวจสอบ Diagnostic of all analyzers พบว่า NOx cooler เสื่อมสภาพ alarm high และ PMT เริ่มเสื่อมสภาพ, CO preamp เสื่อมสภาพ zero swing, O3 detector B เสื่อม intensity ต่ำ
- ตรวจสอบ Reading of all analyzers และ Met sensor พบว่า BP และ RAIN ชำรุด (Off scan)
- ตรวจสอบ ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจสอบ Dilutor และ Zero Air พบว่า Pump zero air ไม่มี auto drain, regenerative dryer ชำรุด, regulator ปรับ pressure ได้ประมาณ 17 PSI
- ตรวจสอบ เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ(จอ display เพี้ยนบางช่วงเวลา, มอเตอร์สำหรับเปิดปิด chamber เสื่อมสภาพ)
- 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 _x Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.
Clean sampling set.	

Part Replacement:

- Sample filter 47 mm. 5 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

Addition Recommended:

- ตรวจสอบถังดับเพลิงในสถานีพบว่า หมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- Zero air นำมาจาก Micro#1 มาติดตั้งใช้งานชั่วคราว
-

— End —

Serviced by :	ชินรส มุขโรจน์	Serviced Date :	02 September 2022
Approved by:		Approved Date :	02 September 2022

7/409 Soi Vibhavadi-Rangsit 36, Vibhavadi-Rangsit Rd., Chatuchak, Bangkok 10900, Thailand
TEL: (662) 939 5711 (12 Lines), 513 2333 (12 Lines), 513 9575-9 FAX: (662) 513 3730, 939 4207-8
Website <http://www.pico.co.th> E-mail-address: gshe@pico.co.th

PETRO-INSTRUMENTS CORP.,LTD.

General Checking

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

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Mobile 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 _x analyzer	OK	OK	
11	UPS 6 KVA	Bypass	Not use	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	800/40 psi	
16	Standard gas#1 (NO,SO ₂ ,HC,CO)	-	1850/24 psi	

Note :

7/409 Soi Vibhavadi-Rangsit 36, Vibhavadi-Rangsit Rd., Chatuchak, Bangkok 10900, Thailand
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Website <http://www.pico.co.th> E-mail-address: gshe@pico.co.th

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x analyzer.	Model :	42i
Serial Number :	CM9540006	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	4.3	1.1	ppb	
NO _x reading	10.0	7.7	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	25.7	26.9	ppb	0 to 60
NO _x BKG. ppb	26.9	26.2	ppb	0 to 60
NO COEF.	1.442	1.442	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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				
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	15.3	15.3	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	-1041.9	-1041.9	Vdc	-400 to -1200 Vdc
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	15.0	15.0	Vdc	15.0 ± 1 Vdc
P15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	40.3	40.0	°C	15 °C to 45 °C
Chamber	49.7	49.8	°C	45 °C ± 2 °C
Cooler	-2.9	-3.0	°C	(-3) °C ± 2 °C
Converter	322.6	323.2	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	259.9	259.9	mmHg	250 ± 100 mmHg
Flow	0.603	0.605	L/min	0.5 to 1.00 L/min

Note :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ Analyzer

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	CM09540005	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	1.8	3.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
SO ₂ BKG. ppb	26.4	26.4	ppb	0 to 60
SO ₂ COEF	0.947	0.957	-	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	45	45	%	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	-718.2	-718.2		
Flash Supply	887	888		
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	14.7	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	33.2	32.9	°C	15 °C to 45 °C
Chamber	45.1	45.0	°C	45 °C ± 2 °C
Pressure	732.1	731.4	mmHg	750 ± 100 mmHg
Flow	0.439	0.439	L/min	0.5 to 1.00 L/min
Lamp intensity	92	92	%	40 - 100 %

Note :

PETRO-INSTRUMENTS CORP.,LTD.

CO Analyzer

Equipment :	Carbon Monoxide Analyzer.	Model :	48i-BNZAB
Serial Number :	CM09540032	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.619	0.763	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	10.926	11.073	ppm	0 to 60
CO COEF	1.287	1.291	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	On/Off	On
Pressure Compensation	On	On	On/Off	On
Baud Rate	9600	9600	bps	1200 to 115000
Instrument ID	48	48	-	0 to 99
Screen Contrast	45	45	%	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 +/- 1.0 Vdc
5.0 supply	4.9	4.9	Vdc	5.0 +/- 1.0 Vdc
15.0 supply	15.1	15.1	Vdc	15 +/- 2.0 Vdc
24.0 supply	23.8	23.8	Vdc	24.0 +/- 2.0 Vdc
-3.3 supply	-3.2	-3.2	Vdc	-3.3 +/- 1.0 Vdc
Interface board voltages:				
3.3 supply	3.3	3.3	Vdc	3.3 +/- 1.0 Vdc
5.0 supply	5.0	5.0	Vdc	5.0 +/- 1.0 Vdc
15.0 supply	15.0	15.0	Vdc	15 +/- 2.0 Vdc
24.0 supply	23.6	23.6	Vdc	24.0 +/- 2.0 Vdc
-15.0 supply	-15.0	-15.0	Vdc	-15.0 +/- 2.0 Vdc
18.0 IR supply	18.2	18.2	Vdc	18.0 +/- 2.0 Vdc
18.0 MOT supply	22.7	19.7	Vdc	18.0 +/- 2.0(Swing)
Temperatures				
Internal	33.3	32.9	°C	15°C to 45°C
Chamber	48.5	48.1	°C	50°C +/- 2°C
Pressure	746.8	746.2	mmHg	760 +/- 100 mmHg
Flow	0.933	0.894	L/min	1.00 +/- 0.3 L/min
S/R Ratio	1.1429400	1.1427400	-	1.14 - 1.18 @ ZERO
AGC intensity	198647	198472	Hz	150,000 - 300,000 Hz
Motor speed	100.03	100.02	%	80-100 %

Note :

PETRO-INSTRUMENTS CORP.,LTD.

O₃ Analyzer

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09540031	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	17.0	22.3	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O ₃ BKG. ppb	-1.3	-1.3	ppb	0 to 60
O ₃ COEF	0.935	0.935	-	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	15.1	15.1	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 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.2	-15.2	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.6	9.6	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	36.7	36.3	°C	5 - 50 °C
Bench Lamp Temp	54.1	54.1	°C	50 - 60 °C
Pressure	748.8	748.5	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.682	0.679	L/min	0.6 ± 0.2 L/min
Cell-B	0.699	0.696	L/min	0.6 ± 0.2 L/min
CELL A/B O ₃				
Cell-A	15.8	22.3	ppb	Record only
Cell-B	24.0	27.5	ppb	Record only
O ₃	18.2	24.9	ppb	Record only
Lamp Intensity				
Cell A	86568	86644	Hz	45,000 - 150,000 HZ
Cell B	42345	42386	Hz	45,000 - 150,000 HZ

Note :

PETRO-INSTRUMENTS CORP.,LTD.

THC Analyzer

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	2ERTBRJ	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH4 reading	2.192	2.256	ppm	0-25 ppm
NMHC reading	0.189	0.102	ppm	0-25 ppm
THC reading	2.381	2.358	ppm	0-25 ppm
Analyzer reading				
CH4 reading	2.192	2.256	ppm	0-25 ppm
NMHC reading	0.189	0.102	ppm	0-25 ppm
THC reading	2.381	2.358	ppm	0-25 ppm
Calibration Factors				
CH4				
Zero calibration coefficient	-50	-50	-	-3500 to 3500
Span calibration coefficient	1.1000	1.1000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-30	-30	-	-3500 to 3500
Span calibration coefficient	1.2000	1.2000	-	0.50000 to 2.00000
Analog Input				
Detector temp	36.6	36.2	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	77.8	77.7	kPa	80 kPa ± 4 kPa
Ambient	98.8	98.6	kPa	Current Atmospheric pressure
Purifier temp	413.3	413.3	°C	390-430 °C
Purifier pressure	18.6	18.8	kPa	8 kPa -25 kPa
NMC cutter temp	241.7	242.2	°C	230-260 °C
DC.24V	23.9	23.9	V.	24V ± 0.5 V
DC.5V	5.0	5.0	V.	5V ± 0.5 V

Note :

PETRO-INSTRUMENTS CORP.,LTD.

Continuous Ambient Particulate Monitor (PM-10)

Equipment :	PM10 (C14 Beta)	Model :	FH 62C14
Serial Number :	E-2276	Manufacturer :	Thermo Environment Instrument

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	16	11	µg/m ³	0 to 1000 µg/m ³
b. Mass	159	142	µg	1,500 µg (max. 3000 µg)
2) Operating Data				
a. Ambient conditions				
• Temperature:	33	33		-20°C....+50°C
• Air pressure:	1006	1006		750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	µg	
b. Air flow rate	<950	<950	L/Hr	
c. Cycle	720	720	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	50	50	°C	
b. Air flow rate	1000	1000	L/Hr	
5) Maintenance				
a. High Voltage	1300	1300	V	
b. Ref. threshold S2	195	195	mV	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION

All analyzer.

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

Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO ₂)	44.96	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	45.10	ppm	Model :	146i
Methane (CH ₄)	499.3	ppm	Serial number :	CM09350122
Carbon Monoxide (CO)	4527	ppm		
Cylinder NO. :	CC112632			
Expiration Date :	13 Aug 2023			

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	2.0	2.0	400	399	-0.3	valid
NO _x (ppb)	0.0	2.0	2.0	400	401	0.3	valid
SO ₂ (ppb)	0.0	2.0	2.0	403	392	-2.7	valid
CO (ppm)	0.0	0.3	0.3	40.1	40.1	0.0	valid
O ₃ (ppb)	1.0	1.0	1.0	400	400	0.0	valid
CH ₄ (ppm)	0.0			4.00			
THC (ppm)	0.0			4.00			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	1.0	1.0	400	398	-0.5	valid
NO _x (ppb)	0.0	2.0	2.0	400	400	0.0	valid
SO ₂ (ppb)	0.0	1.0	1.0	403	402	-0.2	valid
CO (ppm)	0.0	0.2	0.2	40.1	40.1	0.0	valid
O ₃ (ppb)	1.0	1.0	1.0	400	401	0.3	valid
CH ₄ (ppm)	0.0	0.01	0.010	4.00	4.00	0.0	valid
THC (ppm)	0.0	0.01	0.010	4.00	4.00	0.0	valid

Remark : Percent Error per point must be less than $\pm 5\%$

PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Banlang



Inside Station



Lamp Sampling Box



Replace Filter



Gas STD



Gas H2



PETRO-INSTRUMENTS CORP.,LTD.

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Log Sheet



Replace Silica gel



ถังดับเพลิง



EXP :xx-xx-xxxx

อุปกรณ์ทำความสะอาด

Clean sampling set

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 Lang Station	E-mail address/Fax. :	wirasak.k@irpc.co.th
Working Date :	19 September 2022	Working Hour :	6 Hours

Service Report

Working Scope:

Service Station

Physical Checking:

- ตรวจเช็ค Data logger พบว่าทำงานได้ปกติ
- ตรวจเช็ค Diagnostic of all analyzers พบว่า NOX cooler เสื่อมสภาพ alarm high และ PMT เริ่มเสื่อมสภาพ, CO preamp เสื่อมสภาพ zero swing, O3 detector B เสื่อม intensity ต่ำ
- ตรวจเช็ค Reading of all analyzers และ Met sensor พบว่า BP และ RAIN ขำรุด (Off scan)
- ตรวจเช็ค ผล Calibration พบว่าอยู่ในเกณฑ์ปกติ
- ตรวจเช็ค Dilutor และ Zero Air พบว่า Pump zero air ไม่มี auto drain, regenerative dryer ขำรุด, regulator ปรับ pressure ได้ประมาณ 17 PSI
- ตรวจเช็ค เครื่องวัดฝุ่น PM-10 พบว่าทำงานได้ปกติ(จอ display เพี้ยนบางช่วงเวลา, มอเตอร์สำหรับเปิดปิด chamber เสื่อมสภาพ)
- 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 _x Analyzer.
Replace sample filter 47 mm.	Drain water for pump of Zero Air.

Part Replacement:

- Sample filter 47 mm. 5 ea. (Part Support by IRPC)
- Silica gel. P/N: 6998 1/2 Bottle. (Part Support by IRPC)

Addition Recommended:

- ตรวจเช็คถังดับเพลิงในสถานีพบว่าหมดอายุการใช้งานแล้ว แนะนำเปลี่ยนใหม่
- Zero air นำมาจาก Micro#1 มาติดตั้งใช้งานชั่วคราว

PETRO-INSTRUMENTS CORP.,LTD.

General Checking

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

Item	Description	Set-Point Value	Status & Value	Remark
	<u>On Mobile</u>			
1	Air conditioner operation	OK	OK	
2	Mobile 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 _x analyzer	OK	OK	
11	UPS 6 KVA	Bypass	Not use	
12	Data logger	OK	OK	
13	Ventilation fan	OK	OK	
14	Power cable	OK	OK	
15	Hydrogen Gas	>500 psi	600/40 psi	
16	Standard gas#1 (NO,SO ₂ ,HC,CO)	-	1800/24 psi	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

NO-NO₂-NO_x Analyzer

Equipment :	NO-NO ₂ -NO _x analyzer.	Model :	42i
Serial Number :	CM9540006	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading				
NO reading	4.6	5.3	ppb	
NO _x reading	11.1	11.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
NO BKG. ppb	26.6	26.6	ppb	0 to 60
NO _x BKG. ppb	26.0	25.9	ppb	0 to 60
NO COEF.	1.442	1.442	-	1.0 ± 0.3
NO _x COEF.	1.000	1.000	-	1.0 ± 0.3
NO ₂ 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 _x	NO/NO _x		NO/NO _x , NO, NO _x
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				
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	15.3	15.3	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	-1041.9	-1041.9	Vdc	-400 to -1200 Vdc
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	15.0	15.0	Vdc	15.0 ± 1 Vdc
P15.0 Supply	15.1	15.1	Vdc	15.0 ± 1 Vdc
24.0 Supply	23.9	23.9	Vdc	24.0 ± 1 Vdc
-15.0 Supply	-15.0	-15.0	Vdc	-15.0 ± 1 Vdc
Temperatures				
Internal	41.0	40.3	°C	15 °C to 45 °C
Chamber	49.7	49.8	°C	45°C ± 2 °C
Cooler	-2.7	-3.0	°C	(-)3 °C ± 2 °C
Converter	321.3	324.2	°C	325 °C ± 5 °C
Converter Set	325.0	325.0	°C	325 °C
Pressure	263.2	262.3	mmHg	250 ± 100 mmHg
Flow	0.604	0.602	L/min	0.5 to 1.00 L/min

Note :

PETRO-INSTRUMENTS CORP.,LTD.

SO₂ Analyzer

Equipment :	Sulfur Dioxide analyzer.	Model :	43i
Serial Number :	CM09540005	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	1.7	1.9	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
SO ₂ BKG. ppb	26.2	25.8	ppb	0 to 60
SO ₂ COEF	0.957	0.943	-	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	45	45	%	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	-718.2	-718.2		
Flash Supply	888	888		
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	14.7	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	33.8	°C	15°C to 45°C
Chamber	44.9	44.9	°C	45°C ± 2°C
Pressure	735.1	735.1	mmHg	750 ± 100 mmHg
Flow	0.441	0.441	L/min	0.5 to 1.00 L/min
Lamp intensity	92	92	%	40 – 100 %

Note :

PETRO-INSTRUMENTS CORP.,LTD.

CO Analyzer

Equipment :	Carbon Monoxide Analyzer.	Model :	48i-BNZAB
Serial Number :	CM09540032	Manufacturer :	Thermo Electron

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Sample reading	0.113	0.599	ppm	
Range	50.0	50.0	ppm	0 to 100 ppm
Averaging Time	10	10	Sec	10 to 300 Sec
Calibration Factors				
CO BKG. ppm	11.034	10.578	ppm	0 to 60
CO COEF	1.291	1.284	-	1.0 ± 0.3
Instrument Controls				
Temp Compensation	On	On	On/Off	On
Pressure Compensation	On	On	On/Off	On
Baud Rate	9600	9600	bps	1200 to 115000
Instrument ID	48	48	-	0 to 99
Screen Contrast	45	45	%	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 +/- 1.0 Vdc
5.0 supply	4.9	4.9	Vdc	5.0 +/- 1.0 Vdc
15.0 supply	15.1	15.1	Vdc	15 +/- 2.0 Vdc
24.0 supply	23.8	23.8	Vdc	24.0 +/- 2.0 Vdc
-3.3 supply	-3.2	-3.2	Vdc	-3.3 +/- 1.0 Vdc
Interface board voltages:				
3.3 supply	3.3	3.3	Vdc	3.3 +/- 1.0 Vdc
5.0 supply	5.0	5.0	Vdc	5.0 +/- 1.0 Vdc
15.0 supply	15.0	15.0	Vdc	15 +/- 2.0 Vdc
24.0 supply	23.6	23.6	Vdc	24.0 +/- 2.0 Vdc
-15.0 supply	-15.0	-15.0	Vdc	-15.0 +/- 2.0 Vdc
18.0 IR supply	18.2	18.2	Vdc	18.0 +/- 2.0 Vdc
18.0 MOT supply	18.7	19.2	Vdc	18.0 +/- 2.0(Swing)
Temperatures				
Internal	35.2	34.0	°C	15°C to 45°C
Chamber	48.5	47.9	°C	50°C +/- 2°C
Pressure	750.1	750.7	mmHg	760 +/- 100 mmHg
Flow	0.879	0.884	L/min	1.00 +/- 0. 3 L/min
S/R Ratio	1.1426000	1.1423000	-	1.14 – 1.18 @ ZERO
AGC intensity	198239	198602	Hz	150,000 – 300,000 Hz
Motor speed	100.01	100.02	%	80-100 %

Note :

PETRO-INSTRUMENTS CORP.,LTD.

O₃ Analyzer

Equipment :	Ozone Analyzer.	Model :	49i
Serial Number :	CM09540031	Manufacturer :	Thermo Electron

Diagnostic Test Value				
Parameter	Observed Value		Unit	Nominal Range
	Before	After		
Sample reading	18.8	21.1	ppb	
Range	500	500	ppb	50 to 1000 ppb
Averaging Time	30	30	Sec	10 to 300 Sec
Calibration Factors				
O ₃ BKG. ppb	-1.3	-1.3	ppb	0 to 60
O ₃ COEF	0.935	0.928	-	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	15.1	15.1	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 ± 0.5 Vdc
5.0 Supply	5.0	5.0	Vdc	5.0 ± 0.5 Vdc
15.0 Supply	15.1	15.1	Vdc	15.0 ± 0.5 Vdc
-15.0 Supply	-15.2	-15.2	Vdc	-15.0 ± 0.5 Vdc
24.0 Supply	23.7	23.7	Vdc	24.0 ± 2 Vdc
Photo Lamp	9.6	9.6	Vdc	≈ 9.6 Vdc
Temperatures				
Bench Temp	37.3	36.4	°C	5 - 50 °C
Bench Lamp Temp	54.2	54.2	°C	50 - 60 °C
Pressure	752.1	752.1	mmHg	760 ± 100 mmHg
Flow				
Cell-A	0.681	0.674	L/min	0.6 ± 0.2 L/min
Cell-B	0.697	0.694	L/min	0.6 ± 0.2 L/min
CELL A/B O ₃				
Cell-A	10.8	12.4	ppb	Record only
Cell-B	7.7	-14.1	ppb	Record only
O ₃	6.6	10.5	ppb	Record only
Lamp Intensity				
Cell A	86036	86441	Hz	45,000 – 150,000 HZ
Cell B	41882	42115	Hz	45,000 - 150,000 HZ

Note :

PETRO-INSTRUMENTS CORP.,LTD.

THC Analyzer

Equipment :	Total hydrocarbon analyzer.	Model :	APHA-370
Serial Number :	2ERTBRJ	Manufacturer :	Horiba

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
Data logger reading				
CH ₄ reading	2.501	2.328	ppm	0-25 ppm
NMHC reading	0.287	0.114	ppm	0-25 ppm
THC reading	2.788	2.442	ppm	0-25 ppm
Analyzer reading				
CH ₄ reading	2.501	2.328	ppm	0-25 ppm
NMHC reading	0.287	0.114	ppm	0-25 ppm
THC reading	2.788	2.442	ppm	0-25 ppm
Calibration Factors				
CH ₄				
Zero calibration coefficient	-50	-50	-	-3500 to 3500
Span calibration coefficient	1.1000	1.1000	-	0.50000 to 2.00000
THC				
Zero calibration coefficient	-30	-30	-	-3500 to 3500
Span calibration coefficient	1.2000	1.2000	-	0.50000 to 2.00000
Analog Input				
Detector temp	38.1	37.3	°C	Ambient Temp +(5 – 15 °C)
Detector pressure	77.8	78.0	kPa	80 kPa ± 4 kPa
Ambient	99.2	99.2	kPa	Current Atmospheric pressure
Purifier temp	414.6	412.8	°C	390-430 °C
Purifier pressure	18.2	18.7	kPa	8 kPa -25 kPa
NMC cutter temp	241.4	242.0	°C	230-260 °C
DC.24V	23.9	23.9	V.	24V ± 0.5 V
DC.5V	5.0	5.0	V.	5V ± 0.5 V

Note :

PETRO-INSTRUMENTS CORP.,LTD.

Continuous Ambient Particulate Monitor (PM-10)

Equipment :	PM10 (C14 Beta)	Model :	FH 62C14
Serial Number :	E-2276	Manufacturer :	Thermo Environment Instrument

Diagnostic test value				
Parameter	Observed value		Unit	Nominal range
	Before	After		
1) Sample reading				
a. PM-10 Concentration	15	43	µg/m ³	0 to 1000 µg/m ³
b. Mass	80	110	µg	1,500 µg (max. 3000 µg)
2) Operating Data				
a. Ambient conditions				
• Temperature:	29	31		-20°C....+50°C
• Air pressure:	1011	1011		750...1050 kPa
3) Filter Change parameters				
a. Mass	>1500	>1500	µg	
b. Air flow rate	<950	<950	L/Hr	
c. Cycle	720	720	min	
d. Hour	24	24	Hr.	
4) Normal Value for Heater and Air flow rate				
a. Heating temperature	50	50	°C	
b. Air flow rate	1000	1000	L/Hr	
5) Maintenance				
a. High Voltage	1300	1300	V	
b. Ref. threshold S2	195	195	mV	

Note :

PETRO-INSTRUMENTS CORP.,LTD.

SINGLE-POINT GAS CALIBRATION

All analyzer.

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

Standard gas concentration			Dilutor detail	
Sulfur Dioxide (SO ₂)	44.96	ppm	Manufacturer :	Thermo
Nitric Oxide (NO)	45.10	ppm	Model :	146i
Methane (CH ₄)	499.3	ppm	Serial number :	CM09350122
Carbon Monoxide (CO)	4527	ppm		
Cylinder NO. :	CC112632			
Expiration Date :	13 Aug 2023			

BEFORE CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	2.0	2.0	400	399	-0.3	valid
NO _x (ppb)	0.0	2.0	2.0	400	401	0.3	valid
SO ₂ (ppb)	0.0	1.0	1.0	403	395	-2.0	valid
CO (ppm)	0.0	0.0	0.0	40.1	38.9	-3.0	valid
O ₃ (ppb)	1.0	1.0	1.0	400	402	0.5	valid
CH ₄ (ppm)	0.0			4.00			
THC (ppm)	0.0			4.00			

AFTER CALIBRATION RESULT

PARAMETER	ZERO			SPAN			JUDGEMENT
	IDEAL	ACTUAL	ERROR	IDEAL	ACTUAL	%ERROR	
NO (ppb)	0.0	2.0	2.0	400	399	-0.3	valid
NO _x (ppb)	0.0	2.0	2.0	400	401	0.3	valid
SO ₂ (ppb)	0.0	1.0	1.0	403	408	1.2	valid
CO (ppm)	0.0	0.1	0.1	40.1	40.2	0.2	valid
O ₃ (ppb)	1.0	0.0	0.0	400	401	0.3	valid
CH ₄ (ppm)	0.0	0.01	0.010	4.00	4.00	0.0	valid
THC (ppm)	0.0	0.01	0.010	4.00	4.00	0.0	valid

Remark : Percent Error per point must be less than ± 5 %

ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Stations Banlang



Inside Station



Lamp Sampling Box



Replace Filter



Gas STD



Gas H2



ภาพถ่ายการเข้าปฏิบัติงานตามแผนการบำรุงรักษา

Log Sheet



Replace Silica gel



ถังดับเพลิง



อุปกรณ์ทำความสะอาด

EXP :xx-xx-xxxx

Clean sampling set

Lambda UV Preventive Maintenance (PM)

Company Name:	S.P.S. CONSULTING SERVICE CO., LTD.		
Address:	7 Phaholyothin 24 Chompol Chatujak Bangkok		
User Name:	เบญจวรรณ	WO Number:	WO-01808592
Telephone Number:	086-141-2523	PM Number:	1 of 6
Customer Support Engineer:	Kerkkiat Kerdasil	Certificate Number:	UV5077-2022
Date PM Performed: (DD-MMM-YYYY)	22-Jul-2022	Next PM Due Date: (DD-MMM-YYYY)	22-Jan-2023

Scope

The purpose of this PM is to ensure the continued functionality of the PerkinElmer Lambda UV/Vis Spectrophotometer 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 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
LAMBDA25	501S14123010	6.2.0.0741	STD	1.27
NA	NA	NA	NA	NA

Standard Lists

Part Number (If applicable)	Description	Quantity	Batch/Lot/SN#	Expiration Date (MM-YY)
B250 0999	Stray Light Standard			
	NaI	1	1943	Mar/23
	NaNO2	1	2963	
	KCl	1	31030	
	H2O	1	71497	
B050-7805	Secondary Standard for calibration of wavelength and photometric accuracy or use NBS/NIST 930 standards			
	Gray Glass G1	1	2926	Mar/23
	Gray Glass G2	1	3501	
	Gray Glass G3	1	2552	
	Holmium Oxide	1	1085	
	NA	NA	NA	
	NA	NA	NA	

Additional Parts Required for PM					
Part Number (if applicable)	Description	Quantity	Serial #		Remark
NA	NA	NA	NA		NA
NA	NA	NA	NA		NA
NA	NA	NA	NA		NA
Additional Reagents and Standards Required for PM					
Part Number (if applicable)	Description	Quantity	Batch/Lot #		Expiration Date (MM/YY)
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA

Procedure Checklist

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

1. General:

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

2. Optical checks:

- ☒ Lamp Alignment/Energy
- ☒ Sample Compartment Windows/Monochromator
- ☒ Mirror and Grating Alignment
- ☒ Cell Holder Alignment

3. Mechanical:

- ☒ Physical inspection – Please write any comments in the additional comments section.
- ☒ Grating Drive Mechanism.
- ☒ Lamp Change Mechanism.
- ☒ Slit Drive Manual Servo.

4. Performance Test:

- ☒ D2 Wavelength accuracy

	Actual Value	Specification
Accuracy at 656.1 nm	656.12	± 0.1

- ☒ Holmium Oxide wavelength accuracy. (Specification ± 0.5 nm.)

Filter ID #		1085	
Test	Calibration Value	Actual Value	Deviation
279.3 nm	279.3	279.34	0.04
360.8 nm	360.8	360.9	0.10
459.9 nm	459.9	459.99	0.09
536.4 nm	536.2	536.35	0.15

- ☒ Stay Light.

Test	Filter ID #	Result	Specification
NaI @ 220 nm	1943	0.0193	< 0.02 %T
NaNO ₂ @ 340 nm	2963	0.0180	< 0.02 %T
NaNO ₂ @ 370 nm	2963	0.0172	< 0.02 %T
KCl @ 200 nm	31030	2.5258	≥ 2 A

- ☒ Baseline Flatness.

Corrected Baseline	Specification
0.000251	± 0.001 A

- ☒ Noise Test @ 500 nm.

Actual Value	Specification
0.000015	± 0.00008 A

☒ Photometric Accuracy. (Specification ± 0.006 A.)

Filter 1 ID #		2926	
Test	Calibrated Value	Actual Value	Deviation
440 nm	0.3487	0.3497	0.0010
546.1 nm	0.3038	0.3055	0.0017
635 nm	0.3215	0.3241	0.0026
Filter 2 ID #		3501	
Test	Calibrated Value	Actual Value	Deviation
440 nm	1.0009	1.0040	0.0031
546.1 nm	0.9795	0.9818	0.0023
635 nm	1.0302	1.0333	0.0031
Filter 3 ID #		2552	
Test	Calibrated Value	Actual Value	Deviation
440 nm	0.4940	0.4953	0.0013
546.1 nm	0.4583	0.4593	0.0010
635 nm	0.5058	0.5076	0.0018

5. Accessory (where applicable):

- ☐ Integrating Sphere
- ☐ Reflecting Attachment
- ☐ Cell Changer
- ☐ Sipper
- ☐ Auto Sampler

6. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand
- ☒ Attach PM sticker.

Additional Comments

Additional Comments Regarding the PM

Review

<p><i>The preventive maintenance checks and if applicable performance tests for Lambda UV have been completed.</i></p>	
<p>This Lambda UV Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.</p>	
<p align="center">Review of Preventive Maintenance:</p>	
<p>Authorized PerkinElmer Representative:</p> <p align="center"><i>Kerkkiat</i></p>	<p>Date:</p> <p align="center">22/Jul/2022 (DD-MMM-YYYY)</p>
<p>Authorized Customer Representative:</p>	<p>Date:</p> <p align="center">22/Jul/2022 (DD-MMM-YYYY)</p>



MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

Customer : <u>S.P.S.Consulting Service Co.,Ltd</u>	Date Tested: <u>January 11, 2023</u>	
	Recommendation Recertification	
Address : <u>7 Soi Phaholyothin 24</u>	Period <u>6</u> Months	
<u>Paholyothin Road</u>	Recertification Due: <u>July 11, 2023</u>	
<u>Jompol Chatuchak, Bangkok 1090</u>	Date Last Certified: <u>July 11, 2022</u>	
User Name: <u>K.Phenpha Vipasthawatt</u>	Visit Number: <u>2 of 2</u>	
Phone: <u>083-9269252</u>	PerkinElmer Phone: <u>02-719-6420 ext 206</u>	
Fax: <u>02-513-4221</u>	PerkinElmer Fax: <u>02-318-5597</u>	

CONFIGURATION TESTED		ACCESSORIES/COMPONENT NOT INCLUDED
MODEL	SERIAL NUMBER	
<u>OPTIMA 5300DV</u>	<u>077C7042401</u>	
TESTED EQUIPMENT	CALIBRATION NUMBER	EXPIRATION
<u>IPV Methods</u>		
TEST STANDARD USED	PART NUMBER	EXPIRATION DATE
<u>Multielement Standard</u>	<u>N069-1579</u>	<u>May 30, 2023</u>
<u>Wavecal Solution</u>	<u>N058-2152</u>	<u>February 28, 2023</u>
<u>VIS Wavecal solution</u>	<u>N930-2946</u>	<u>August 30, 2023</u>
<u>Instrument Cal. STD4</u>	<u>N930-0221</u>	<u>November 30, 2023</u>
CUSTOMER SUPPLIED	COMMENTS	CUSTOMER INITIALS
<u>2 % HNO3</u>		
<u>10 % HNO3</u>		



MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER 077C7042401**DATE TESTED** January 11, 2023**1. MECHANICAL CHECKS**

- | | |
|--|-----------------------------|
| A. Inspect and clean all fans and filters. | <input type="checkbox"/> OK |
| B. Inspect and replace as necessary, all torch components including the RF coil. | <input type="checkbox"/> OK |
| C. Inspect all tubing for sign of clacking or leaking. | <input type="checkbox"/> OK |
| D. Adjust water and gas pressure regulator settings. | <input type="checkbox"/> OK |
| E. Inspect and leak check pneumatics drawers. | <input type="checkbox"/> OK |
| F. Clean the exterior of the instrument. | <input type="checkbox"/> OK |

2. OPTICAL CHECKS

- | | |
|---|-----------------------------|
| A. Inspect and clean all optical components. | <input type="checkbox"/> OK |
| B. As required, check and replace all purgefilters. | <input type="checkbox"/> OK |
| C. Recheck optical alignment. | <input type="checkbox"/> OK |

3. COOLING SYSTEM CHECKS

- | | |
|---|------------------------------|
| A. Perform preventive maintenance on chiller. | <input type="checkbox"/> OK |
| B. Flush out the chiller every year. | <input type="checkbox"/> N/A |

4. PERFORMANCE CHECKS

- | | |
|----------------------------|-----------------------------|
| A. Torch View Alignment. | <input type="checkbox"/> OK |
| B. Wavelength Calibration. | <input type="checkbox"/> OK |



MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER : 077C7042401
DATE TESTED : January 11, 2023

PARAMETER		SPECIFICATION		FINAL VALUE	
Spectral Resolution : UV	As 193.696 nm	≤ 0.007		<u>0.00504</u>	
	Ni 231.604 nm	≤ 0.008		<u>0.00646</u>	
	Ni 341.476 nm	≤ 0.012		<u>0.00768</u>	
Spectral Resolution : VIS	La 408.672 nm	≤ 0.020		<u>0.01597</u>	
	Ba 455.403 nm	≤ 0.025		<u>0.02185</u>	
Precision					
	As 193.656 nm	% RSD	< 1.0	<u>0.89</u>	%
	Zn 213.856 nm	% RSD	< 1.0	<u>0.77</u>	%
	Mn 257.610 nm	% RSD	< 1.0	<u>0.51</u>	%
	La 379.478 nm	% RSD	< 1.0	<u>0.44</u>	%
	Ba 455.403 nm	% RSD	< 1.0	<u>0.44</u>	%
	Ba 493.408 nm	% RSD	< 1.0	<u>0.46</u>	%
Detection Limits : Axial	Tl 190.080 nm	3(sd)		<u>4.04</u>	ppb
	As 193.696 nm	3(sd)		<u>3.58</u>	ppb
	Pb 220.353 nm	3(sd)		<u>1.90</u>	ppb
Detection Limits : Radial	As 193.696 nm	3(sd)		<u>47.72</u>	ppb
	Zn 213.856 nm	3(sd)		<u>1.02</u>	ppb
	Mn 257.610 nm	3(sd)		<u>0.68</u>	ppb
	La 379.478 nm	3(sd)		<u>1.43</u>	ppb
	Ba 455.403 nm	3(sd)		<u>0.10</u>	ppb
	Ba 493.408 nm	3(sd)		<u>0.36</u>	ppb
BEC : Axial (IB X 500)/(IS-IB)	Cd 226.502 nm	≤ 150 ppb		<u>58.36</u>	
BEC : Radial (IB X 1000)/(IS-IB)	Mn 257.610 nm	≤ 45 ppb		<u>104142.80</u>	



MAINTENANCE AND TEST CERTIFICATE MODEL

OPTIMA 5300DV

SERIAL NUMBER 077C7042401DATE TESTED January 11, 2023**Remarks :**

Commissioning follow as commissioning performance sheets.

This is to certify that the above tests have been performed and the configuration tested



meets



does not meet

the PerkinElmer Specifications listed on this certificate.

This certificate does not modify PerkinElmer's standard terms and condition of sale,
including warranty terms.

Service Department PerkinElmer Ltd.

Authorized Representative:




(Mr. Wiphan Promlumda)

Service Engineer

PinAAcle 900Z Preventive Maintenance (PM)

Company Name:	S.P.S.CONSULTING SERVICE CO.,LTD		
Address (Instrument Location):	7 SOI ,PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.JOMPOL, CHATUCHAK, BAN		
Serial Number:	PZAS19090402	PM Number:	2/2
Customer Name (if applicable):	K.PHENPHA	Telephone Number:	083-926-9252
Customer Support Engineer Name:	K. DUANG	Service Order Number:	WO-01709985
Date PM Performed: (DD-MMM-YYYY)	01-Dec-2022	Next PM Due Date: (DD-MMM-YYYY)	01-Jun-2023
Standard Labor Hours to Complete PM :		5 hours	

Part Number	Release	Publication Date	
09370144 Rev.9	A	January 2018	

Scope

The purpose of this PM is to ensure the continued functionality of the PinAAcle 900Z by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM.

Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files.

The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer.

Update the PM sticker and instrument logbook as required.

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Component List

Component / Specific Model	Serial #	Configuration Notes

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
B0501696	Fan Filters	N/A
B3002013	THGA Contact Cylinders	N/A
B3141064	Glycerol for THGA Cooling	N/A

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quality	Batch/Lot #	Expired Date (MM/YY)
N9300244	GFAAS Mixed Standard	AR	56-021CRY1	30-Jun-2023

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

Additional Tools Required for PM			
Part Number (if applicable)	Description	Quantity	Serial #
B3100652 Or N9307029	Electronic Flow Meter	1	N/A
B0505495	Test Jig	1	N/A
03030997	System 2 EDL Driver	1	03030997
N3050605	As System 2 EDL	1	16148
N3050121	Cu Lumina HCL	1	092216-010130
N3050109	Ba Lumina HCL	1	102416-040160
N3050139	K Lumina HCL	1	110716-010060
N3050152	Ni Lumina HCL	1	100516-030190
N3050119	Cr Lumina HCL	1	091911-020150

Procedure Checklist

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

1. General:

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

2. PC Instrument Software:

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

3. Mechanical:

- ☒ Inspect and clean all fans and filters. Replace filters if necessary
- ☒ Inspect all gas and water lines for leaks and/or wear. Replace if needed. Thoroughly inspect all quick connects. Replace the Y connector, P/N 09921079, if needed.
- ☒ Clean exterior of the instrument.
- ☒ Check the drain system for signs of wear. Replace worn or damaged parts.
- ☒ Inspect the pole pieces and clean where the pole pieces contact the furnace. Replace the pole piece p-rings as needed, P/N's B0501018 & B0501250. Grease the O-rings as needed with Apiezon L grease, P/N 09905148
- ☒ Inspect the four insulation pads on the front contact housing of the THGA in furnace. If the pads are missing replace the THGA furnace or replace the insulator pads on the furnace.
- ☒ Inspect the graphite tube and clean the contact cylinders. Replace if necessary.
- ☒ Check internal and external gas flows with the Electronic Gas Flow Meter and the Gas Flow Test Probe as described in the Service Manual. Correct if necessary.
- ☒ Check furnace open/close function.
- ☒ Verify the operation of the GFTV Camera for proper operation and viewing alignment in the furnace camera Tube View window. Align if needed.
- ☒ Check the operation of the Halogen Light ASSY for the GFTV Camera. Replace if needed.
- ☒ Check the water level/quality in the recirculation (if applicable). Add distilled water if necessary.
- ☒ Check the cooling system fluid flow rate with the FCS In-Line Flow Meter for proper levels if needed. Refer to SDB# COSY008.STN
- ☒ Perform Cooling System maintenance if needed per SDB# COSY005.STN.
- ☒ Check auto sampler operation.
- ☒ Perform an auto sampler check valve test as described in the Service Manual.
- ☒ Lubricate the spindles of the auto sampler pumps and all moving parts of the tray mechanics as described in the Service Manual.
- ☒ Inspect the auto sampler sampling capillary as described in the Service Manual. Replace if necessary.
- ☒ Inspect the four insulation pads on the front contact housing of the THGA in furnace. If the pads are missing replace the THGA furnace or replace the insulator pads on the furnace.
- ☒ Inspect the graphite tube and clean the contact cylinders. Replace if necessary.
- ☒ Check internal and external gas flows with the Electronic Gas Flow Meter and the Gas Flow Test Probe as described in the Service Manual. Correct if necessary.
- ☒ Check furnace open/close function

4. Electrical:

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

5. Optics:

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

6. Gasses:

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

7. After PM Performance tests [THGA]:

7.1 Furnace Gas Flows

Description: Ensures the flow rates are within specification.

Parameter	Specification	Test Results	Pass/Fail
Internal Flow Rate	250 mL/min \pm 25 mL/min	250	Passed
External Flow Rate	100 mL/min \pm 10 mL/min	102	Passed

7.2 Chromium Baseline Noise

Description: Signal to noise check.

Parameter	Specification	Results	Pass/Fail
Baseline Noise	\leq 0.005 Abs.	0.0010	Passed
Standard Deviation	\leq 0.005	0.0005	Passed

7.3 Chromium Characteristic Mass and Precision

Description: Calculate the characteristic mass using the characteristic mass tool and precision from the integrated absorbance values.

Parameter	Specification	Results	Pass/Fail
Cr m ₀ Results	\leq 7.0 pg/0.0044 A-s	5.7	Passed
Precision	\leq 2.0 %	1.34	Passed

7.4 Copper Characteristic Mass and Zeeman Ratio

Description: Calculate the characteristic mass using the characteristic mass tool and check the Zeeman Ratio.

Parameter	Specification	Results	Pass/Fail
Cu m ₀ Result	≤ 16.5 pg/0.0044 A-s	15.6	Passed
Zeeman Ratio	0.52 ± 0.04	0.52	Passed

8. 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.

Additional Comments

Additional Comments Regarding the PM	
Zeeman Ratio	$= \frac{\text{Atomic Signal (Peak area)}}{\text{Atomic Signal (Peak area)} + \text{Background Signal (Peak area)}}$ $= \frac{0.1387}{0.1387+0.1253}$ $= 0.52$

Review

<i>The preventive maintenance checks and if applicable performance tests for PinAAcle 900Z have been completed.</i>	
<i>This PinAAcle 900Z Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.</i>	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative: <div style="text-align: center; margin-top: 20px;"> </div>	Date: 01-Dec-2022 <small>(DD-MMM-YYYY)</small>
Authorized Customer Representative: <div style="text-align: center; margin-top: 20px;"> </div>	Date: 01-Dec-2022 <small>(DD-MMM-YYYY)</small>

Certificate No.: CP20220335EA

Operation No.: CP2022100023

Certificate of Calibration

Equipment: Sound Level Meter

Manufacturer: RION

Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)

Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (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

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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.: CP20220335EA

Calibration Report

Equipment: Sound Level Meter
 Manufacturer: RION
 Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
 Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (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	±1.0

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

Certificate No.: CP20220335EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (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	±1.0

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

Certificate No.: CP20220335EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
15.4

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	11.3
C-weighting	17.1
Z-weighting	23.2

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	0.7	0.7	0.8	±1.5
1000	0.2	0.2	0.2	±1.0
8000	-2.4	-2.3	-2.4	±5.0

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	0.0	-0.1	0.0	±2.0
125	0.0	-0.1	0.0	±1.5
250	0.0	-0.1	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.1	0.1	0.0	±5.0

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

Certificate No.: CP20220335EA

Calibration Report

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	±0.3

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	±1.1
99.0	99.0	0.0	±1.1
104.0	104.0	0.0	±1.1
109.0	109.0	0.0	±1.1
114.0	114.0	0.0	±1.1
119.0	119.0	0.0	±1.1
124.0	124.0	0.0	±1.1
129.0	129.0	0.0	±1.1
130.0	130.0	0.0	±1.1
131.0	131.0	0.0	±1.1
132.0	132.0	0.0	±1.1
133.0	133.0	0.0	±1.1
134.0	134.0	0.0	±1.1
135.0	135.0	0.0	±1.1
136.0	136.0	0.0	±1.1
137.0	137.0	0.0	±1.1

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	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1

Certificate No.: CP20220335EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	33.8	-0.2	±1.1
29.0	28.9	-0.1	±1.1

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	±1.0
	2	109.0	0.0	+1.0 ; -2.5
	0.25	99.9	-0.1	+1.5 ; -5.0
Slow	200	119.6	0.0	±1.0
	2	100.0	0.0	+1.0 ; -5.0
LAE	200	120.0	0.0	±1.0
	2	100.0	0.0	+1.0 ; -2.5
	0.25	90.9	-0.1	+1.5 ; -5.0

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	125.2	-0.2	±3.0
Positive half cycle	124.4	124.1	-0.3	±2.0
Negative half cycle	124.4	124.1	-0.3	±2.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle		
139.5	139.6	0.1	±1.5

Certificate No.: CP20220335EA

Calibration Report

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	±0.3

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 2.
3. The coverage factor $k = 2.00$

-- End of Report --

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 - -

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

MTC No. EEL. BP. 41/0465

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 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ 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	± 0.10	± 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	± 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	± 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 :



Approved by :



Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 28 Apr. 2022

Date of Issue : 28 Apr. 2022

Ref : 2011265042601787001

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End of Certificate

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.BLMTC.002 Rev.4



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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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

Noise R_583/22

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	14 November 2022	94.0	94.0
ACO-R41	ACO	6236	00192053	14 November 2022	94.1	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.93 \pm 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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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Noise R_582/22

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-R50	ACO	6236	00192062	14 November 2022	94.0 94.0
ACO-R51	ACO	6236	00192063	14 November 2022	94.1 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 :

Peera Detudom
(Mr. Peera Detudom)



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
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Noise R_389/22

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

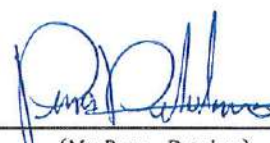
Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B29	ACO	6236	00182011	19 July 2022	94.1	94.0
ACO-B36	ACO	6236	00192027	19 July 2022	94.0	94.0
ACO-B41	ACO	6236	00192032	19 July 2022	94.1	94.0
ACO-B43	ACO	6236	00192034	19 July 2022	94.0	94.0
ACO-R18	ACO	6236	00172065	19 July 2022	94.0	94.0
ACO-R21	ACO	6236	00182004	19 July 2022	94.1	94.0
ACO-R22	ACO	6236	00182010	19 July 2022	94.0	94.0
ACO-R26	ACO	6236	00192038	19 July 2022	94.0	94.0
ACO-R31	ACO	6236	00192043	19 July 2022	94.1	94.0
ACO-R33	ACO	6236	00192045	19 July 2022	94.0	94.0
ACO-R34	ACO	6236	00192046	19 July 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 :


(Mr. Peera Detuklom)